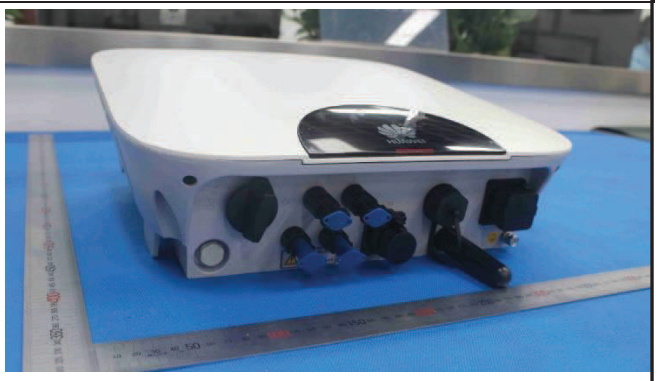
Prüfbericht-Nr.: *Test Report No.*:	**50093942 002**	**Auftrags-Nr.:** *Order No.*:	154331862	Seite 1 von 31 *Page 1 of 31*
Kunden-Referenz-Nr.: *Client Reference No.*:	474705	**Auftragsdatum:** *Order date*:	18.05.2018	
Auftraggeber: *Client*:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China			
Prüfgegenstand: *Test item*:	Hybrid Inverter			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	SUN2000L-5KTL, SUN2000L-4.6KTL, SUN2000L-4KTL, SUN2000L-3.68KTL, SUN2000L-3KTL, SUN2000L-2KTL, SUN2000L-5KTL-CN, SUN2000L-4KTL-CN, SUN2000L-3KTL-CN, **SUN2000-5KTL-L0, SUN2000-4KTL-L0, SUN2000-3KTL- L0, SUN2000-2KTL-L0**			
Auftrags-Inhalt: *Order content*:	TUV Bauart approval			
Prüfgrundlage: *Test specification*:	EN 62109-1: 2010 IEC 62109-1: 2010, EN 62109-2: 2011, IEC 62109-2: 2011			

Wareneingangsdatum: *Date of receipt*:	21.05.2018
Prüfmuster-Nr.: *Test sample No.*:	A000798123-001
Prüfzeitraum: *Testing period*:	21.05.2018 – 22.06.2018
Ort der Prüfung: *Place of testing*:	TÜV Rheinland (Shanghai) Co.,Ltd.
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland (Shanghai) Co.,Ltd.
Prüfergebnis*: *Test result**:	Pass



geprüft von / *tested by*:			**kontrolliert von** / *reviewed by*:		
23.08.2018	Thomas Qian / PE		23.08.2018	Tobias Yang / RE	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

Add the new models SUN2000-5KTL-L0, SUN2000-4KTL-L0, SUN2000-3KTL- L0, SUN2000-2KTL-L0 and see details at the report.

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Test Report issued under the responsibility of:

TÜVRheinland®

www.tuv.com

TEST REPORT
IEC 62109-1
Safety of power converters for use in photovoltaic power systems – Part1: General requirements

Report Reference No. .....:	50093942 002
Date of issue.....:	See cover page.
Total number of pages .....:	See cover page.
Testing Laboratory.....:	**TÜV Rheinland (Shanghai) Co., Ltd.**
Address .....:	B1-13F, No. 177, Lane 777, West Guangzhong Road, Zhabei District, Shanghai 200072, P. R. China
Testing location/ procedure .....:	CBTL ☐ TMP ☐ WMT ☐ SMT ☐ RMT ☐ CCATL ☒
Testing location/ address .....:	See cover page.
Applicant's name .....:	**Huawei Technologies Co., Ltd.**
Address .....:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China
Test specification:	
Standard .....:	IEC 62109-1: 2010, EN 62109-1: 2010
Test procedure .....:	TUV Bauart approval
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC 62109-1A
Test Report Form(s) Originator .....:	VDE Testing and Certification Institute
Master TRF.....:	Dated 2011-03

Test item description .....:	Hybrid Inverter
Trade Mark .....:	HUAWEI
Manufacturer .....:	Huawei Machine Co., Ltd.
Model/Type reference .....:	SUN2000L-5KTL, SUN2000L-4.6KTL, SUN2000L-4KTL, SUN2000L-3.68KTL, SUN2000L-3KTL, SUN2000L-2KTL, SUN2000L-5KTL-CN, SUN2000L-4KTL-CN, SUN2000L-3KTL-CN, SUN2000-5KTL-L0, SUN2000-4KTL-L0, SUN2000-3KTL- L0, SUN2000-2KTL-L0
Ratings .....:	See copy of marking plate.

Testing procedure and testing location:	
☐ **CB Testing Laboratory:**	
Testing location/ address.....:	
☐ **Associated CB Test Laboratory:**	
Testing location/ address.....:	
Tested by (name + signature) .....:	See cover page.
Approved by (+ signature).....:	See cover page.
☐ Testing procedure: TMP	
Tested by (name + signature) .....:	
Approved by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: WMT	
Tested by (name + signature) .....:	
Witnessed by (+ signature) .....:	
Approved by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: SMT	
Tested by (name + signature) .....:	
Approved by (+ signature).....:	
Supervised by (+ signature) .....:	
Testing location/ address.....:	
☐ Testing procedure: RMT	
Tested by (name + signature) .....:	
Approved by (+ signature).....:	
Supervised by (+ signature) .....:	
Testing location/ address.....:	

List of Attachments (including a total number of pages in each attachment):

- ATTACHMENT 1 – Test report of IEC 62109-2: 2011 and EN 62109-2: 2011 (6 pages)
- ATTACHMENT 2 – CDF (15 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
Clause 5 & 7.3.7.1	The laboratory is described on cover page.

Summary of compliance with National Differences:

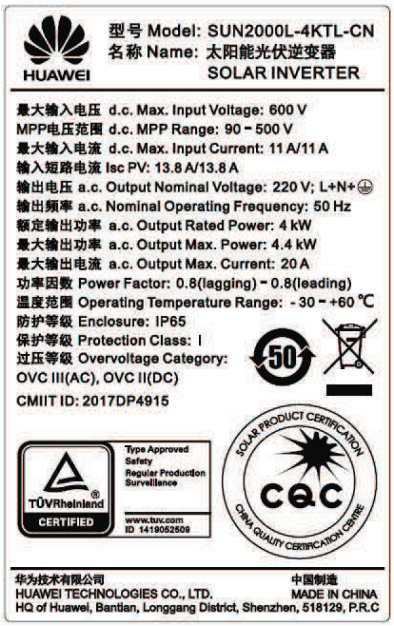
List of countries addressed: None.

☒ The product fulfils the requirements of
IEC/EN 62109-1: 2010 and IEC/EN 62109-2: 2011

Copy of marking plate:

"The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCB' s that own these marks"


HUAWEI
型号 Model: SUN2000L-5KTL-CN
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 600 V
MPP电压范围 d.c. MPP Range: 90 - 500 V
最大输入电流 d.c. Max. Input Current: 11 A/11 A
输入短路电流 Isc PV: 13.8 A/13.8 A
输出电压 a.c. Output Nominal Voltage: 220 V; L+N+⏚
输出频率 a.c. Nominal Operating Frequency: 50 Hz
额定输出功率 a.c. Output Rated Power: 5 kW
最大输出功率 a.c. Output Max. Power: 5.5 kW
最大输出电流 a.c. Output Max. Current: 25 A
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 30 - +60 ℃
防护等级 Enclosure: IP65
保护等级 Protection Class: I
过压等级 Overvoltage Category:
OVC III(AC), OVC II(DC)
CMIIT ID: 2017DP4916
50
Type Approved
Safety
Regular Production Surveillance
TÜVRheinland
CERTIFIED
www.tuv.com
ID 1419052509
SOLAR PRODUCT CERTIFICATION
CQC
CHINA QUALITY CERTIFICATION CENTRE
华为技术有限公司
HUAWEI TECHNOLOGIES CO., LTD.
HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
中国制造
MADE IN CHINA


HUAWEI
型号 Model: SUN2000L-4KTL-CN
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 600 V
MPP电压范围 d.c. MPP Range: 90 - 500 V
最大输入电流 d.c. Max. Input Current: 11 A/11 A
输入短路电流 Isc PV: 13.8 A/13.8 A
输出电压 a.c. Output Nominal Voltage: 220 V; L+N+⏚
输出频率 a.c. Nominal Operating Frequency: 50 Hz
额定输出功率 a.c. Output Rated Power: 4 kW
最大输出功率 a.c. Output Max. Power: 4.4 kW
最大输出电流 a.c. Output Max. Current: 20 A
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 30 - +60 ℃
防护等级 Enclosure: IP65
保护等级 Protection Class: I
过压等级 Overvoltage Category:
OVC III(AC), OVC II(DC)
CMIIT ID: 2017DP4915
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Type Approved
Safety
Regular Production Surveillance
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CERTIFIED
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HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
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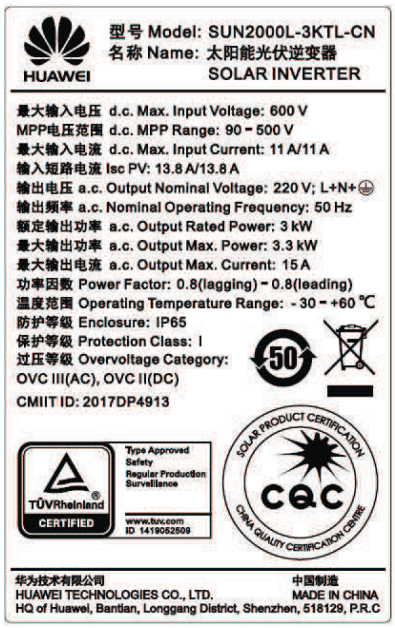
HUAWEI
型号 Model: SUN2000L-3KTL-CN
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 600 V
MPP电压范围 d.c. MPP Range: 90 - 500 V
最大输入电流 d.c. Max. Input Current: 11 A/11 A
输入短路电流 Isc PV: 13.8 A/13.8 A
输出电压 a.c. Output Nominal Voltage: 220 V; L+N+⏚
输出频率 a.c. Nominal Operating Frequency: 50 Hz
额定输出功率 a.c. Output Rated Power: 3 kW
最大输出功率 a.c. Output Max. Power: 3.3 kW
最大输出电流 a.c. Output Max. Current: 15 A
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 30 - +60 ℃
防护等级 Enclosure: IP65
保护等级 Protection Class: I
过压等级 Overvoltage Category:
OVC III(AC), OVC II(DC)
CMIIT ID: 2017DP4913
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Type Approved
Safety
Regular Production Surveillance
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HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
中国制造
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HUAWEI
型号 Model: SUN2000-5KTL-L0
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 600 V
MPP电压范围 d.c. MPP Range: 90 - 500 V
最大输入电流 d.c. Max. Input Current: 11 A/11 A
输入短路电流 Isc PV: 15 A/15 A
输出电压 a.c. Output Nominal Voltage:
220/230/240 V; L+N+⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 5 kVA
最大输出功率 a.c. Output Max. Power: 5.5 kVA
最大输出电流 a.c. Output Max. Current: 25 A
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 30 - +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP65
保护等级 Protection Class: I
过压等级 Overvoltage Category:
OVC III(AC), OVC II(DC)
50
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中国制造
MADE IN CHINA


HUAWEI
型号 Model: SUN2000-4KTL-L0
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 600 V
MPP电压范围 d.c. MPP Range: 90 - 500 V
最大输入电流 d.c. Max. Input Current: 11 A/11 A
输入短路电流 Isc PV: 15 A/15 A
输出电压 a.c. Output Nominal Voltage:
220/230/240 V; L+N+⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 4 kVA
最大输出功率 a.c. Output Max. Power: 4.4 kVA
最大输出电流 a.c. Output Max. Current: 20 A
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 30 - +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP65
保护等级 Protection Class: I
过压等级 Overvoltage Category:
OVC III(AC), OVC II(DC)
50
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HUAWEI TECHNOLOGIES CO., LTD.
HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
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HUAWEI
型号 Model: SUN2000-3KTL-L0
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 600 V
MPP电压范围 d.c. MPP Range: 90 - 500 V
最大输入电流 d.c. Max. Input Current: 11 A/11 A
输入短路电流 Isc PV: 15 A/15 A
输出电压 a.c. Output Nominal Voltage:
220/230/240 V; L+N+⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 3 kVA
最大输出功率 a.c. Output Max. Power: 3.3 kVA
最大输出电流 a.c. Output Max. Current: 15 A
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 30 - +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP65
保护等级 Protection Class: I
过压等级 Overvoltage Category:
OVC III(AC), OVC II(DC)
50
华为技术有限公司
HUAWEI TECHNOLOGIES CO., LTD.
HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
中国制造
MADE IN CHINA

Importer:
Huawei Technologies Hungary Ltd.
Add.: Hungary-Budapest-Kozraktaru. 30-32, Riverpark, 1st floor

Manufacturer:
Huawei Technologies Co., Ltd.
Add.: HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C

CE

Test item particulars:	
Equipment mobility ..... :	☐ movable ☐ hand-held ☐ transportable ☒ fixed ☐ stationary ☐ for building-in
Connection to the mains..... :	☐ pluggable equipment ☐ direct plug-in ☒ permanent connection ☐ for building-in
Enviromental category..... :	☒ outdoor ☒ indoor conditional ☒ indoor unconditional
Operating condition ..... :	☒ continuous ☐ short-time ☐ intermittent
Over voltage category mains..... :	☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV
Over voltage category PV ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%) ..... :	According to the specified supply range, see model list on the following pages for details.
Tested for IT power systems ..... :	☒ Yes ☐ No
IT testing, phase-phase voltage (V) ..... :	220/230/240 V
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg)..... :	10.6 (approx.)
Pollution degree ..... :	☐ PD 1 ☒ PD 2 (inside) ☒ PD 3 (outside)
IP protection class ..... :	IP65
Possible test case verdicts:	
- test case does not apply to the test object ..... :	N/A
- test object was not evaluated for the requirement .... :	N/E
- test object does meet the requirement ..... :	Pass (P)
- test object does not meet the requirement ..... :	Fail (F)
Testing:	
Date of receipt of test items..... :	See cover page
Date(s) of performance of tests..... :	See cover page

General remarks:

"(see Attachment #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

The tests results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

Throughout this report a ☐ comma / ☒ **point** is used as the decimal separator.

Determination of the test results includes consideration of measurement uncertainty from the test equipment and methods.

History of amendments and modifications:

Report No. 50093942 001, dated 29.09.2017 (Original report)

Report No. 50093942 002, dated 17.08.2018 (to issue the modification based on original report)

Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	

Name and address of factory (ies):

Huawei Machine Co., Ltd.

No. 2 City Avenue, Songshan Lake Sci. & Tech. Industry Park, Dongguan 523808, P.R. China

& Shenzhen Dongzhou New Energy Technologies Co., Ltd.

Shenzhen Pingshan Factory Zone A, Yingzhan Industrial Park Kengzi Street, Pingshan New District Shenzhen, 518125, P.R. China

General product information:

Description of changes:

For models: SUN2000L-5KTL-CN, SUN2000L-4KTL-CN, SUN2000L-3KTL-CN

1. Changes:
   - 1.1 Power board:
     - Add the ESS BUS Y capacitors, C2907, C2908;
     - Add the PV capacitors C3526, C3527, C3528; change from C3501,C3502,C3503 to C3523,C3524,C3525;
     - Add the AC supplyment source capacitors, C3522,C499;
     - Change the magnet ring as 17010230, 17010263 between DC switch and PCB;
     - Add L 10060081 at the BOOST;
     - Change the Fireware version from END1PWRA VER.A to END1PWRC VER.B.
   - 1.2 Monitoring board:
     - Change the indicator light from 16 LED to 0805.
     - Change the Fireware version from END1CTLA VER.A to END1CTLA VER.C.
   - 1.3 Driver board:
     - Change the Fireware version from END1DRVA VER.A to END1DRVA VER.B.
   - 1.4 DC PV plug:
     - Change the plug from HH4CFC5DM to HH4CFD4TMS and from HH4CMD5TM to HH4CMD4TMS;
   - 1.5 Safety mark:
     - Updated the safey mark.
   - 1.6 Three in One Label:
     - Distinguish the 4G model and WIFI model.
   - 1.7 Power Grid :
     - Add IT grid. It should ensure the same voltage level with inverter.
   - 1.8 Factory:
     - Add new factory: Shenzhen Dongzhou New Energy Technologies Co., Ltd.

For models: SUN2000L-5KTL, SUN2000L-4.6KTL, SUN2000L-4KTL, SUN2000L-3.68KTL, SUN2000L-3KTL, SUN2000L-2KTL

2. Changes:
   - 2.1 Power board:
     - Add the 10*200k R between N pole and the cover.
     - Change the magnet ring as 17010230, 17010263 between DC switch and PCB;
     - Change Y capacitors from C2907,C2908 to C3492,C3493;
     - Change the Fireware version from END1PWRC VER.B to END1PWRB VER.A.
   - 2.2 Monitoring board:
     - Change the indicator light from 16 LED to 0805.
     - Change the Fireware version from END1CTLA VER.A to END1CTLA VER.C.
   - 2.3 Driver board:
     - Change the Fireware version from END1DRVA VER.A to END1DRVA VER.B.
   - 2.4 DC PV plug and ESS DC plug:
     - Change the plug from HH4CFC5DM to HH4CFD4TMS and from HH4CMD5TM to HH4CMD4TMS; change from HH4CFC5DM, HH4CMD5TM to HH4CMD4TMS, HH4PFC5TMS.
   - 2.5 Safety mark:
     - Updated the safey mark.
   - 2.6 Power Grid :
     - Add IT grid. It should ensure the same voltage level with inverter.
   - 2.7 Factory:
     - Add new factory: Shenzhen Dongzhou New Energy Technologies Co., Ltd.

For added 4 models: SUN2000-5KTL-L0, SUN2000-4KTL-L0, SUN2000-3KTL- L0, SUN2000-2KTL-L0

3. Changes:
   3.1 Compare with SUN2000L-5KTL-CN, SUN2000L-4KTL-CN, SUN2000L-3KTL-CN models:
   - Add 4 models, just change the label;
   - Add the 2KW model, which is same with SUN2000L-2KTL;

   3.2 Compare with SUN2000L-5KTL, SUN2000L-4KTL, SUN2000L-3KTL, SUN2000L-2KTL models:
   - Delete the components about the ESS;
   - Change the supplyment source capacitors from the electrolytic capacitor to the hybrid capacitor;
   - Change the terminal from COM to USB-4G;
   - Updated the CDF and use the new CDF.

Remark:

The external circuit breakers or protective devices for PV array connection and Grid connection are required which statements are provided in user installation manual.

Model list:

MODELS LIST		SUN2000L-5KTL	SUN2000L-4.6KTL	SUN2000L-4KTL
PV INPUT	V_{MAX} PV [Vdc]	600		
	I_{SC} PV [A]	15		
	MPP Voltage Range V_{MPP} [Vdc]	90–500V		
	Max. Input Current I_{MAX} [A] for each channel	11		
	MPP Full Power Voltage Range [Vdc]	260-480	260-480	210-480
	Start PV Voltage[Vdc]	120		
	Stop PV Voltage[Vdc] (PCE Shutdown)	90		
	Backfeed Current [A]	0		
	Overvoltage Category(OVC)	OVC II		
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V / 230 V / 240 V		
	Rated Output Frequency F_{NETZ}[Hz]	50 / 60		
	Rated Output Power P_E[W]	5000	4600	4000
	Max. Output Power P_{Emax} [W]	5500	5000	4400
	Max. Apparent power S_{Emax} [VA]	5500	5000	4400
	Rated Output Current Ir[A]	23A@220V 22A@230V 21A@240V	21A@220V 20A@230V 19.2A@240V	18.2A@220V 17.4A@230V 16.7A@240V
	Max. Output Current Imax[A]	25	23	20
	Power Factor cosφ [λ]	[-0.8 , +0.8]		
	Standby Power Consumption [W]	≤10		
	Night Power Consumption [W]	≤ 1		
	THD [V /I] (100% full power)	<3%		
	Acoustic Noise [dB]	25dB (Typ)		
	Overvoltage Category(OVC)	III		
Battery INPUT	V_{MAX} BAT [Vdc]	600V	600V	600V
	Voltage Range	350~600Vdc	350~600Vdc	350~600Vdc
	Start Voltage[Vdc]	/	/	/
	Max. Discharge Current I_{MAX} [A]	10A	10A	10A
	Max. Charge Current [A]	10A	10A	10A
	Overvoltage Category(OVC)	OVC II		
System	Type of inverter	Transformerless		
	MPPT strings	2 strings		

	MPPT tracking	2 tracking group
	Protective Class	I
	Enclosure Protection (IP)	IP65
	Operating Temperature Range [ºC]	-30 to +60
	Pollution degree (PD)	PD 3
	Altitude [m]	4000
	Size [mm]	375 mm x 375 mm x 149.5 mm
	Weight [kg]	10.6 approx.
	Firmware version	SUN2000L V100R001

MODELS LIST		SUN2000L-3.68KTL	SUN2000L-3KTL	SUN2000L-2KTL
PV INPUT	V_{MAX} PV [Vdc]	600		
	I_{SC} PV [A]	15		
	MPP Voltage Range V_{MPP} [Vdc]	90–500V		
	Max. Input Current I_{MAX} [A] for each channel	11		
	MPP Full Power Voltage Range [Vdc]	190-480	160-480	120-480
	Start PV Voltage[Vdc]	120		
	Stop PV Voltage[Vdc] (PCE Shutdown)	90		
	Backfeed Current [A]	0		
	Overvoltage Category(OVC)	OVC II		
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V / 230 V / 240 V		
	Rated Output Frequency F_{NETZ}[Hz]	50 / 60		
	Rated Output Power P_E[W]	3680	3000	2000
	Max. Output Power P_{Emax} [W]	3680	3300	2200
	Max. Apparent power S_{Emax} [VA]	3680	3300	2200
	Rated Output Current Ir[A]	16A@220V 16A@230V 15.4A@240V	14A@220V 13.1A@230V 12.5A@240V	9.1A@220V 8.7A@230V 8.4A@240V
	Max. Output Current Imax[A]	16	15	10
	Power Factor cosφ [λ]	[-0.8 , +0.8]		
	Standby Power Consumption [W]	≤10		
	Night Power Consumption [W]	≤ 1		
	THD [V /I] (100% full power)	<3%		
	Acoustic Noise [dB]	25dB (Typ)		

	Overvoltage Category(OVC)	III		
Battery INPUT	V_{MAX} BAT [Vdc]	600V	600V	600V
	Voltage Range	350~600Vdc	350~600Vdc	350~600Vdc
	Start Voltage[Vdc]	/	/	/
	Max. Discharge Current I_{MAX} [A]	10A	10A	10A
	Max. Charge Current [A]	10A	10A	10A
	Overvoltage Category(OVC)	OVC II		
System	Type of inverter	Transformerless		
	MPPT strings	2 strings		
	MPPT tracking	2 tracking group		
	Protective Class	I		
	Enclosure Protection (IP)	IP65		
	Operating Temperature Range [ºC]	-30 to +60		
	Pollution degree (PD)	PD 3		
	Altitude [m]	4000		
	Size [mm]	375 mm x 375 mm x 149.5 mm		
	Weight [kg]	10.6 approx.		
	Firmware version	SUN2000L V100R001		

MODELS LIST		SUN2000L-5KTL-CN	SUN2000L-4KTL-CN	SUN2000L-3KTL-CN
PV INPUT	V_{MAX} PV [Vdc]	600		
	I_{SC} PV [A]	13.8		
	MPP Voltage Range V_{MPP} [Vdc]	90–500V		
	Max. Input Current I_{MAX} [A] for each channel	11		
	MPP Full Power Voltage Range [Vdc]	260-480	210-480	210-480
	Start PV Voltage[Vdc]	120		
	Stop PV Voltage[Vdc] (PCE Shutdown)	90		
	Backfeed Current [A]	0		
	Overvoltage Category(OVC)	OVC II		
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V		
	Rated Output Frequency F_{NETZ}[Hz]	50		
	Rated Output Power P_E[W]	5000	4000	3000
	Max. Output Power P_{Emax} [W]	5500	4400	3300
	Max. Apparent power S_{Emax} [VA]	5500	4400	3300

	Rated Output Current Ir[A]	23A@220V	18.2@220V	14A@220V
	Max. Output Current Imax[A]	25	20	15
	Power Factor cosφ [λ]	[-0.8 , +0.8]		
	Standby Power Consumption [W]	≤10		
	Night Power Consumption [W]	≤ 1		
	THD [Ѵ /I] (100% full power)	<3%		
	Acoustic Noise [dB]	25dB (Typ)		
	Overvoltage Category(OVC)	III		
System	Type of inverter	Transformerless		
	MPPT strings	2 strings		
	MPPT tracking	2 tracking group		
	Protective Class	I		
	Enclosure Protection (IP)	IP65		
	Operating Temperature Range [ºC]	-30 to +60		
	Pollution degree (PD)	PD 3		
	Altitude [m]	4000		
	Size [mm]	375 mm x 375 mm x 149.5 mm		
	Weight [kg]	10.6 approx.		
	Firmware version	SUN2000L V100R001		

MODELS LIST		SUN2000-5KTL-L0	SUN2000-4KTL-L0	SUN2000-3KTL-L0	SUN2000-2KTL-L0
PV INPUT	V_{MAX} PV [Vdc]	600			
	I_{SC} PV [A]	15			
	MPP Voltage Range V_{MPP} [Vdc]	90–500V			
	Max. Input Current I_{MAX} [A] for each channel	11			
	MPP Full Power Voltage Range [Vdc]	260-480	210-480	160-480	120-480
	Start PV Voltage[Vdc]	120			
	Stop PV Voltage[Vdc] (PCE Shutdown)	90			
	Backfeed Current [A]	0			
	Overvoltage Category(OVC)	OVC II			
AC	Rated Output Voltage Ur [Vac]	220 V / 230 V / 240 V			

	Rated Output Frequency F_{NETZ}[Hz]	50/60			
	Rated Output Power P_E[W]	5000	4000	3000	2000
	Max. Output Power P_{Emax} [W]	5500	4400	3300	2200
	Max. Apparent power S_{Emax} [VA]	5500	4400	3300	2200
	Rated Output Current Ir[A]	23A@220V 22A@230V 21A@240V	18.2A@220V 17.4A@230V 16.7A@240V	14.0A@220V 13.1A@230V 12.5A@240V	9.1A@220V 8.7A@230V 8.4A@240V
	Max. Output Current Imax[A]	25	20	15	10
	Power Factor cosφ [λ]	[-0.8 , +0.8]			
	Standby Power Consumption [W]	≤10			
	Night Power Consumption [W]	≤ 1			
	THD [V /I] (100% full power)	<3%			
	Acoustic Noise [dB]	25dB (Typ)			
	Overvoltage Category(OVC)	III			
System	Type of inverter	Transformerless			
	MPPT strings	2 strings			
	MPPT tracking	2 tracking group			
	Protective Class	I			
	Enclosure Protection (IP)	IP65			
	Operating Temperature Range [ºC]	-30 to +60			
	Pollution degree (PD)	PD 3			
	Altitude [m]	4000			
	Size [mm]	375 mm x 375 mm x 149.5 mm			
	Weight [kg]	10.6 approx.			
	Firmware version	SUN2000L V100R001			

Throughout the test report following abbreviations may be used:

- input	i/p	- normal conditions	NC
- output	o/p	- single fault conditions	SFC
- short-circuited	s-c	- Max. temperature measured	MT
- overloaded	o-l	- PCE disconnected from grid	DG
- open-circuited	o-c	- PCE shut down	SD
- functional insulation	FI	- fault indication	FID
- basic insulation	BI	- no indication of dielectric breakdown	NB
- supplementary insulation	SI	- no hazards	NH
- double insulation	DI	- pass the dielectric strength test.	PEST
- reinforced insulation	RI	- test repeated (3 times), similar result	TRSR
- overvoltage category	OVC	- tissue paper remained intact	TRI
- pollution degree	PD	- cheesecloth remained intact	CRI
- insulating material group	MG	- between parts of opposite polarity	BOP
- decision voltage classification	DVC	- internal protection operated	IPO
- (safety) extra-low voltage	(S)ELV	- (no) components damaged (list damaged components)	(N)CD
- protection by protective impedance	PPI	- PCE can (not) recover to operate automatically after removing the abnormal or single fault condition	(N)RO

Note(s): Indicate used abbreviations (if any)

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Clause	Requirement – Test	Result - Remark	Verdict

5	**MARKING AND DOCUMENTATION**		**P**
5.1	Marking		P
5.1.1	General		P
	Equipment shall bear markings as specified in 5.1 and 5.2	The marking label is on the outer surface of the enclosure.	P
	Graphic symbols may be used and shall be in accordance with Annex C or IEC 60417 as applicable.	All used graphic symbols are in accordance with Annex C.	P
	Graphic symbols shall be explained in the documentation provided with the PCE.	The explanations are provided in the user manual.	P
5.1.2	Durability of markings	The labels were subjected to the permanence of marking test. The labels were rubbed with the cloth soaked with petroleum spirit for 30 s.	P
	Markings required by this clause to be located on the PCE shall remain clear and legible under conditions of NORMAL USE and resist the effects of cleaning agents specified by the manufacturer	After this test there was no damage to the labels. The marking on the labels did not fade. There was no curling or lifting of the label's edges.	P
5.1.3	Identification		P
	The equipment shall, as a minimum, be permanently marked with:	See below.	
	a) the name or trade mark of the manufacturer or supplier	See copy of marking plate.	P
	b) a model number, name or other means to identify the equipment	See above.	P
	c) a serial number, code or other marking allowing identification of manufacturing location and the manufacturing batch or date within a three month time period.	See above.	P
5.1.4	Equipment ratings		P
	Unless otherwise specified in another part of IEC 62109, the following ratings, as applicable shall be marked on the equipment:	See below	P
	- input voltage, type of voltage (a.c. or d.c.), frequency, and max. continuous current for each input	See model list.	P
	- output voltage, type of voltage (a.c. or d.c.), frequency, max. continuous current, and for a.c. outputs, either the power or power factor	See above.	P
	- Protective class (I, II, or III)	See above.	P
	- Overvoltage Category	See above.	P

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Clause	Requirement – Test	Result - Remark	Verdict
	- the environmental information required in section 6	See model list and section 6.	P
5.1.5	Fuse identification		N/A
	Marking shall be located adjacent to each fuse or fuseholder, or on the fuseholder, or in another location provided that it is obvious to which fuse the marking applies, giving the fuse current rating and where fuses of different voltage rating value could be fitted, the fuse voltage rating.	Not used.	N/A
	Where fuses with special fusing characteristics such as time delay or breaking capacity are necessary, the type shall also be indicated	See above.	N/A
	For fuses not located in operator access areas and for soldered-in fuses located in operator access areas, it is permitted to provide an unambiguous cross-reference (for example, F1, F2, etc.) to the servicing instructions which shall contain the relevant information.	See above.	N/A
5.1.6	Terminals, connections and controls		P
	If necessary for safety, an indication shall be given of the purpose of Terminals, connectors, controls, and indicators, and their various positions, including any connections for coolant fluids such as water and drainage. The symbols in Annex C may be used, and where there is insufficient space, symbol 9 of Annex C may be used.	Relevant symbol, indicator or information are available.	P
	Push-buttons and actuators of emergency stop devices, and indicator lamps used only to indicate a warning of danger or the need for urgent action shall be coloured red.		P
	A multiple-voltage unit shall be marked to indicate the particular voltage for which it is set when shipped from the factory. The marking is allowed to be in the form of a paper tag or any other nonpermanent material.		N/A
	A unit with d.c. terminals shall be plainly marked indicating the polarity of the connections, with:		P
	the sign “+“ for positive and “-„ for negative; or	The “+” and “-“ marking provided adjacent to the PV input terminal.	P
	a pictorial representation illustrating the proper polarity where the correct polarity can be unambiguously determined from the representation	No pictorial representation illustration used.	N/A
5.1.6.1	Protective conductor terminals		P

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Clause	Requirement – Test	Result - Remark	Verdict
	The means of connection for the protective earthing conductor shall be marked with:		P
	- symbol 7 of Annex C; or	Symbol 7 of Table C.1  marked adjacent to the PE terminal.	P
	- the letters “PE“; or	See above.	N/A
	- the colour coding green-yellow.		P
5.1.7	Switches and circuit-breakers		P
	The on and off-positions of switches and circuits breakers shall be clearly marked. If a push-button switch is used as the power switch, symbols 10 and 16 of Annex C may be used to indicate the on-position, or symbols 11 and 17 to indicate the off-position, with the pair of symbols (10 and 16, or 11 and 17) close together.	The letter “ON” and “OFF” is clearly marked.	P
5.1.8	Class II Equipment	Class I Equipment.	N/A
	Equipment using Class II protective means throughout shall be marked with symbol 12 of Annex C. Equipment which is only partially protected by DOUBLE INSULATION or REINFORCED INSULATION shall not bear symbol 12 of Table Annex C.	See above.	N/A
	Where such equipment has provision for the connection of an earthing conductor for functional reasons (see 7.3.6.4) it shall be marked with symbol 6 of Annex C	See above.	N/A
5.1.9	Terminal boxes for External Connections	The temperature observed on the terminals were not exceed the limited values specified.	N/A
	Where required by note 1 of Table 2 as a result of high temperatures of terminals or parts in the wiring compartment, there shall be a marking, visible beside the terminal before connection, of either:		N/A
	a) the minimum temperature Rating and size of the cable to be connected to the TERMINALS; or		N/A
	b) a marking to warn the installer to consult the installation instruction. Symbol 9 of Table D-1 is an acceptable marking		N/A
5.2	Warning markings	See below.	P
5.2.1	Visibility and legibility requirements for warning markings	Warning markings are be visible and legible.	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Warning markings shall be legible, and shall have minimum dimensions as follows:		P
	- Printed symbols shall be at least 2,75 mm high		P
	- Printed text characters shall be at least 1,5 mm high and shall contrast in colour with the background		P
	- Symbols or text that are moulded, stamped or engraved in a material shall have a character height of at least 2,0 mm, and if not contrasting in colour from the background, shall have a depth or raised height of at least 0,5 mm	No such symbols.	N/A
5.2.2	Content for warning markings		P
5.2.2.1	Ungrounded heatsinks and similar parts		N/A
	An ungrounded heat sink or other part that may be mistaken for a grounded part and involves a risk of electric shock in accordance with 7.3 shall be marked with symbol 13 of Annex C, or equivalent. The marking may be on or adjacent to the heatsink and shall be clearly visible when the PCE is disassembled to the extent that a risk of contact with the heatsink exists.		N/A
5.2.2.2	Hot Surfaces		P
	A part of the PCE that exceeds the temperature limits specified in 4.3.2 shall be marked with symbol 14 of Annex C or equivalent.	Marked with symbol 14 of Table C.1. 	P
5.2.2.3	Coolant		N/A
	A unit containing coolant that exceeds 70 °C shall be legibly marked externally where readily visible after installation with symbol 15 of Annex C. The documentation shall provide a warning regarding the risk of burns from hot coolant, and either:	Not used.	N/A
	a) statement that coolant system servicing is to be done only by SERVICE PERSONNEL, or		N/A
	b) instructions for safe venting, draining, or otherwise working on the cooling system, if these operations can be performed without OPERATOR access to HAZARDS internal to the equipment		N/A
5.2.2.4	Stored energy		P
	Where required by 7.3.9.2 or 7.4.2 the PCE shall be marked with Symbol 21 of Annex C and the time to discharge capacitors to safe voltage and energy levels shall accompany the symbol.	Marked with Symbol 21 of Table C.1 and the time to discharge capacitors to safe voltage and energy levels accompany the symbol.	P
5.2.2.5	Motor guarding		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	Where required by 8.2 a marking shall be provided where it is visible to service personnel before removal of a guard, warning of the hazard and giving instructions for safe servicing (for example disconnection of the source before removing the guard).		N/A
5.2.3	Sonic hazard markings and instructions	No such hazard.	N/A
	If required by 10.2.1 a PCE shall:		N/A
	a) be marked to warn the operator of the sonic pressure hazard; or		N/A
	b) be provided with installation instructions that specify how the installer can enxure that the sound pressure level from equipment at its point of use after installation, will not reach a value, which could cause a hazard. These instructions shall include the measured sound pressure level, and shall identify readily available and practicable protective materials or measures which may be used.		N/A
5.2.4	Equipment with multiple sources of supply		P
	A PCE with connections for multiple energy sources shall be marked with symbol 13 of Annex C and the manual shall contain the information required in 5.3.4.	Marked with symbol 13 of Annex C and explained in user manual. 	P
	The symbol shall be located on the outside of the unit or shall be prominently visible behind any cover giving access to hazardous parts.	See above.	P
5.2.5	Excessive touch current		P
	Where required by 7.3.6.3.7 the PCE shall be marked with symbol 15 of Annex C. See also 5.3.2 for information to be provided in the installation manual.	Marked with symbol 15 of Table C.1 and relevant information is provided in user's manual. 	P
5.3	Documentation		P
5.3.1	General	See below.	P
	The documentation provided with the PCE shall provide the information needed for the safe opera-tion, installation, and (where applicable) mainte-nance of the equipment. The documentation shall include the items required in 5.3.2 through 5.3.4, and the following:	All related informations provided in the user's maunal.	P
	a) explanations of equipment makings, including symbols used		P
	b) location and function of terminals and controls		P

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Clause	Requirement – Test	Result - Remark	Verdict
	c) all ratings or specifications that are necessary to safely install and operate the PCE, including the following environmental ratings along with an explanation of their meaning and any resulting installation requirements:		P
	– ENVIRONMENTAL CATEGORY as per 6.1		P
	– WET LOCATIONS classification fort he intended external environment as per 6.1		P
	– POLLUTION DEGREE classification for the intended external environment as per 6.2		P
	– INGRESS PROTECTION rating as per 6.3		P
	– Ambient temperature and relative humidity ratings		P
	– MAXIMUM altitude rating		P
	– OVERVOLTAGE CATEGORY assigned to each input and output port as per 7.3.7.1.2, accompanied by guidance regarding how to ensure that the installation complies with the required overvoltage categories;		P
	d) a warning that when the photovoltaic array is exposed to light, it supplies a d.c. voltage to the PCE		P
5.3.1.1	Language		P
	Instructions related to safety shall be in a language that is acceptable in the country where the equip-ment is to be installed.	Instruction related to safety is in English.	P
5.3.1.2	Format		P
	In general, the documentation must be provided in printed form and is to be delivered with the equipment.	The printed form is available and is delivered with the PCE.	P
	For equipment which requires the use of a computer for both installation and operation, documentation may be provided in electronic format without accompanying printed format.	See above.	N/A
5.3.2	Information related to installation		P
	The documentation shall include installation and where applicable, specific commissioning instruc-tions and, if necessary for safety, warnings against hazards which could arise during installation or commissioning of the equipment. The information provided shall include:	All below related informations provided in the user's maunal.	P

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Clause	Requirement – Test	Result - Remark	Verdict
	a) assembly, location, and mounting requirements:		P
	b) ratings and means of connection to each source of supply and any requirements related to wiring and external controls, colour coding of leads, disconnection means, or overcurrent protection needed, including instructions that the installation position shall not prevent access to the disconnection means;		P
	c) ratings and means of connection of any outputs from the PCE, and any requirements related to wiring and externals controls, colour coding of leads, or overcurrent protection needed;		P
	d) explanation of the pin-out of connectors for external connections, unless the connector is used for a standard purpose (e.g. RS 232)		P
	e) ventilation requirements;		P
	f) requirements for special services, for example cooling liquid;	No cooling liquid used in the PCE.	N/A
	g) instructions and information relating to sound pressure level if required by 10.2.1;	No hazardous sound level.	N/A
	h) where required by 14.8.1.3, instructions for the adequate ventilation of the room or location in which PCE containing vented or valve-regulated batteries is located, to prevent the accumulation of hazardous gases;	No battery used in the PCE.	N/A
	i) tightening torque to be applied to wiring terminals;		P
	j) values of backfeed short-circuit currents available from the PCE on input and output conductors under fault conditions, if those currents exceeds the max. rated current of the circuit, as per 4.4.4.6;	No backfeed current available.	P
	k) for each input to the PCE, the max value of short-circuit current available from the source, for which the PCE is designed; and		P
	l) compatibility with RCD and RCM;	RCMU built in the PCE.	P
	m) instructions for protective earthing, including the information required by 7.3.6.3.7 if a second protective earthing conductor is to be installed:		P

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Clause	Requirement – Test	Result - Remark	Verdict
	n) where required by 7.3.8, the installation instructions shall include the following or equivalent wording: "This product can cause a d.c. current in the external protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in a case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product."		P
	o) for PCE intended to charge batteries, the battery nominal voltage rating, size and type		P
	p) PV array configuration information, such as ratings, whether the array is to be grounded or floating, any external protection devices needed, etc.		P
5.3.3	Information related to operation		P
	Instructions for use shall include any operating instructions necessary to ensure safe operation, including the following, as applicable:	All below related informations provided in the user's maunal.	P
	– Instructions for adjustment of controls including the effects of adjustment;		P
	– Instructions for interconnection to accessories and other equipment, including indication of suitable accessories, detachable parts and any special materials;		P
	– Warnings regarding the risk of burns from surfaces permitted to exceed the temperature limits of 4.3.2 and required operator actions to reduce the risk; and		P
	– Instructions, that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.		P
5.3.4	Information related to maintenance		P
	Maintenance instructions shall include the following:	All below related informations provided in the service maunal.	
	– Intervals and instructions for any preventive maintenance that is required to maintain safety (for example air filter replacement or periodic re-tightening of terminals);		P
	– Instructions for accessing operator access areas, if any are present, including a warning not to enter other areas of the equipment;		P

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Clause	Requirement – Test	Result - Remark	Verdict
	– Part numbers and instructions for obtaining any required operator replaceable parts;		N/A
	– Instructions for safe cleaning (if recommended)		P
	– Where there is more than one source of supply energizing the PCE, information shall be provided in the manual to indicate which disconnect device or devices are required to be operated in order to completely isolate the equipment.		P
5.3.4.1	Battery maintenance		N/A
	Where required by 14.8.5, the documentation shall include the applicable items from the following list of instructions regarding maintenance of batteries:	No battery used in the PCE.	N/A
	– Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions		N/A
	– When replacing batteries, replace with the same type and number of batteries or battery packs		N/A
	– General instructions regarding removal and installation of batteries		N/A
	– CAUTION: Do not dispose of batteries in a fire. The batteries may explode.		N/A
	– CAUTION: Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.		N/A
	– CAUTION: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:		N/A
	a) Remove watches, rings, or other metal objects.		N/A
	b) Use tools with insulated handles.		N/A
	c) Wear rubber gloves and boots.		N/A
	d) Do not lay tools or metal parts on top of batteries		N/A
	e) Disconnect charging source prior to connecting or disconnecting battery terminals		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).		N/A

7.3.7	Insulation Including Clearance and Creepage Distances	See below.	P
7.3.7.1	General		P
	This subclause gives minimum requirements for insulation, based on the principles of IEC 60664.		P
	Manufacturing tolerances shall be taken into account during measurement of creepage, clearance, and insulation distance in the PCE.		P
	Insulation shall be selected after consideration of the following influences:		P
	–pollution degree	See sub clause 7.3.7.1.1.	P
	–overvoltage category	See sub clause 7.3.7.1.2.	P
	–supply earthing system	See sub clause 7.3.7.1.3.	P
	–insulation voltage	See sub clause 7.3.7.1.4.	P
	–location of insulation		P
	–type of insulation		P
	Compliance of insulation, creepage distances, and clearance distances, shall be verified by measurement or visual inspection, and the tests of 7.5.		P
7.3.7.1.1	Pollution degree	PD 2 (inside), PD 3 (outside)	P
7.3.7.1.2	Overvoltage category and Impulse withstand voltage rating :		P
	- MAINS circuits	O.V.C III	P
	- PV circuits insulated	O.V.C II	P
	- PV circuits not insulated	No such circuits.	N/A
	- Other circuits	O.V.C II	P
7.3.7.1.3	Supply earthing systems	For TN, TT and IT system.	P

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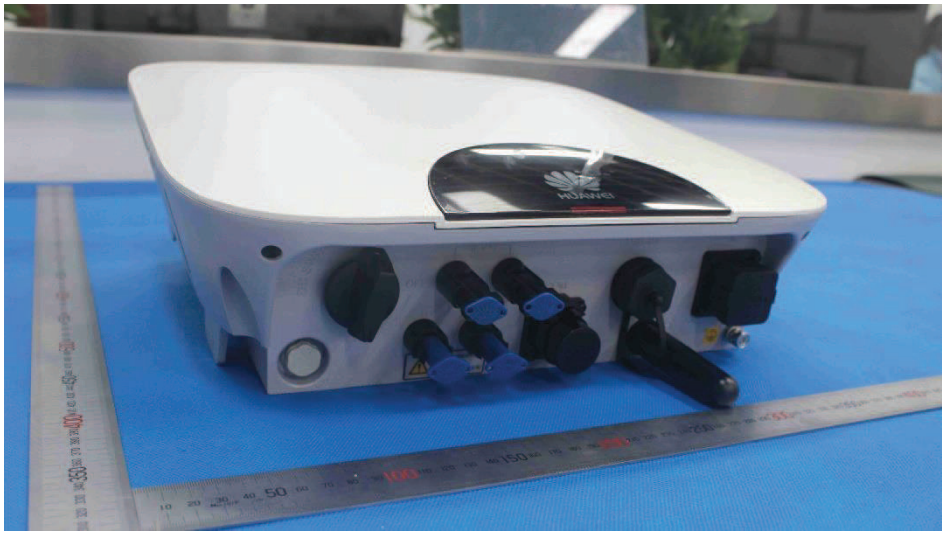
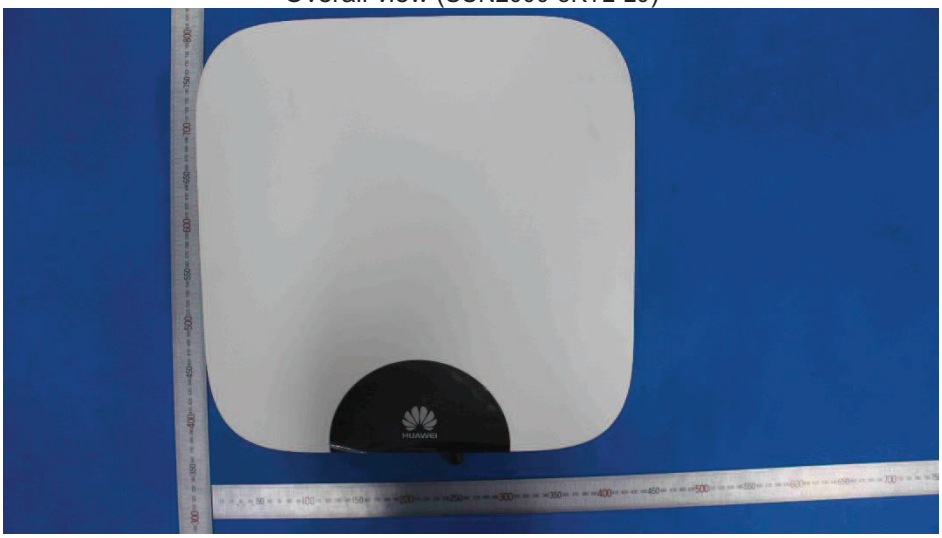
Clause	Requirement – Test	Result - Remark	Verdict
	Three basic types of earthing system are described in IEC 60364-1. They are:		P
	• TN system: has one point directly earthed, the accessible conductive parts of the installation being connected to that point by protective conductors. Three types of TN systems, TN-C, TN-S and TN-C-S, are defined according to the arrangement of the neutral and protective conductor.		P
	• TT system: has one point directly earthed, the accessible conductive parts of the installation being connected to earth electrodes electrically independent of the earth electrodes of the power system;		P
	• IT sytem: has all live parts isolated from earth or one point connected to earth through an impedance, the accessible conductive parts of the installation being earthed independently or collectively to the earthing system.		P
7.3.7.1.4	Insulation voltages	PV supply circuits: 4000V ($V_{MAX\ PV}$: 600Vd.c.) AC mains circuits: 4000V (Rated: 230Va.c.) Other circuits: 2500V (Rated: 230Va.c.)	P
	Table 12 makes use of the circuit system voltage and overvoltage category to define the impulse withstand voltage and the temporary overvoltage.		P

- End of test report

PHOTOS:



Overall view (SUN2000-5KTL-L0)

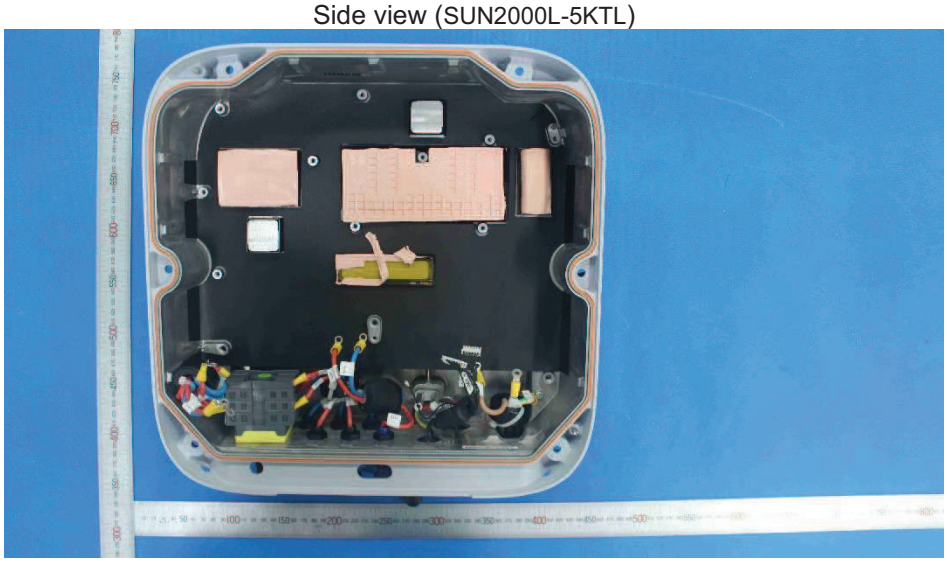


Overall view (SUN2000-5KTL-L0)

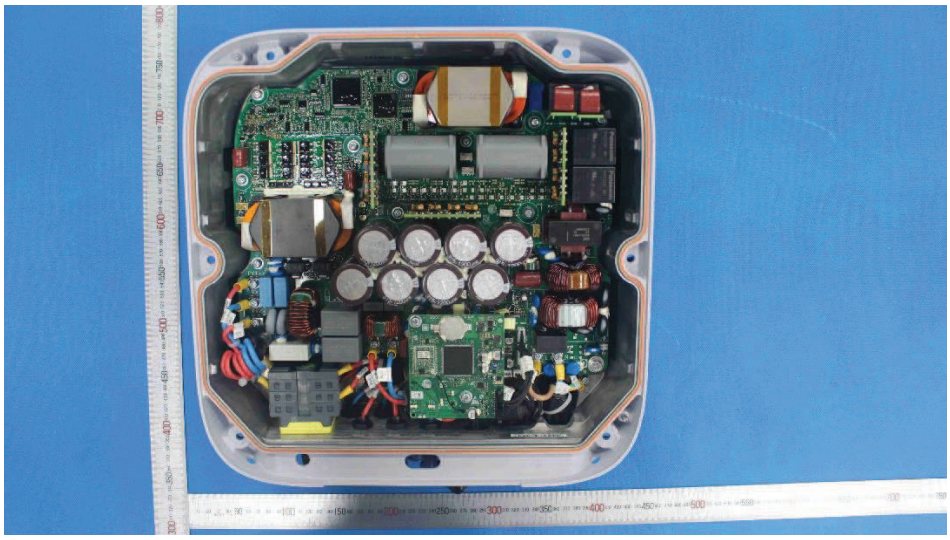
Side view (SUN2000-5KTL-L0)

Overall view (SUN2000L-5KTL)

Side view (SUN2000L-5KTL)



Internal view



Internal view

Test Report issued under the responsibility of:

TÜVRheinland®

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TEST REPORT
IEC 62109-2
Safety of power converters for use in photovoltaic power systems – Part2: Particular requirements for inverters

Report Reference No. .....:	50093942 002 attachment 1.
Tested by (name + signature) .....:	See cover page
Witnessed by (name + signature) ....:	N/A
Supervised by (name + signature) ...:	N/A
Approved by (name + signature).....:	See cover page
Date of issue.....:	See cover page
Testing Laboratory .....:	TÜV Rheinland (Shanghai) Co., Ltd.
Address .....:	No.177, Lane 777, West Guangzhong Road, Jing'an District, Shanghai 200072, P. R. China
Testing location/ procedure .....:	CBTL ☐ TMP ☐ WMT ☐ SMT ☐ RMT ☐ CCATL ☐
Testing location/ address .....:	See cover page
Applicant's name .....:	See cover page
Address .....:	See cover page
Test specification:	
Standard .....:	IEC 62109-2: 2011
Test procedure .....:	TÜV Rheinland Type approval.
Non-standard test method……..:	N/A
Test Report Form No.....:	IEC62109_2B
Test Report Form(s) Originator .....:	LCIE - Laboratoire Central des Industries Electriques
Master TRF.....:	Dated 2016-11

Test item description .....:	See report 50093942 002.
Trade Mark .....:	See report 50093942 002.
Manufacturer .....:	See report 50093942 002.
Model/Type reference .....:	See report 50093942 002.
Ratings .....:	See report 50093942 002.

Testing procedure and testing location:
☒ **Testing Laboratory:**
Testing location/ address..... : See cover page
☐ **Associated CB Test Laboratory:**
Testing location/ address..... :
Tested by (name + signature).... : See cover page
Approved by (+ signature) ..... : See cover page
☐ Testing procedure: TMP
Tested by (name + signature).... :
Approved by (+ signature) ..... :
Testing location/ address..... :
☐ Testing procedure: WMT
Tested by (name + signature).... :
Witnessed by (+ signature)..... :
Approved by (+ signature) ..... :
Testing location/ address..... :
☐ Testing procedure: SMT
Tested by (name + signature).... :
Approved by (+ signature) ..... :
Supervised by (+ signature)..... :
Testing location/ address..... :
☐ Testing procedure: RMT
Tested by (name + signature).... :
Approved by (+ signature) ..... :
Supervised by (+ signature)..... :
Testing location/ address..... :

List of Attachments (including a total number of pages in each attachment):
See report 50093942 002.

Summary of testing	
Tests performed (name of test and test clause): N/A	**Testing location:** The laboratory described on cover page.

Summary of compliance with National Differences
List of countries addressed: See report 50093942 002.

Copy of marking plate:

See report 50093942 002.

Test item particulars:				
Equipment mobility	☐ movable	☐ hand-held		
	☐ stationary	☒ fixed (Wall mounted)		
Connection to the mains	☐ pluggable equipment	☐ direct plug-in		
	☒ permanent connection	☐ for building-in		
Enviromental category	☒ outdoor	☐ indoor conditional	☐ indoor unconditional	
Operating condition	☒ continuous	☐ short-time	☐ intermittent	
Over voltage category mains	☐ OVC I	☐ OVC II	☒ OVC III	☐ OVC IV
Over voltage category PV	☐ OVC I	☒ OVC II	☐ OVC III	☐ OVC IV
Mains supply tolerance (%)	According to specified supply range			
Tested for IT power systems	☐ Yes	☒ No		
IT testing, phase-phase voltage (V)	N/A			
Class of equipment	☒ Class I	☐ Class II		
	☐ Class III	☐ Not classified		
Mass of equipment (kg)	See model list			
Pollution degree	☐ PD 1	☐ PD 2	☒ PD 3	
IP protection class	IP65			

Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	Pass (P)
- test object does not meet the requirement	Fail (F)
Testing:	
Date of receipt of test items	See report 50093942 002
Date(s) of performance of tests	See report 50093942 002

General remarks:

"(see Attachment #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

The tests results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Determination of the test results includes consideration of measurement uncertainty from the test equipment and methods.

Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided:

☐ Yes

☒ Not applicable

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies): See report 50093942 002

General product information:

See report 50093942 002.

Throughout the test report following abbreviations may be used:

•	cl	clearance	•	int	internal distance
•	dcr	creepage distance	•	o-c	open-circuit
•	dti	distance through insulation	•	o-l	overload
•	PCE	Power Conversion Equipment	•	s-c	short-circuit
•	BI	basic insulation	•	SI	supplementary insulation
•	DI	double insulation	•	RI	reinforced insulation

IEC 62109-2			
Clause	Requirement – Test	Result - Remark	Verdict
5	Marking and documentation *This clause of Part 1 is applicable with the following exceptions:*	See report 50093942 002.	P
5.1	Marking		P
5.1.4	Equipment ratings *Replacement:*		P
5.2	Warning markings		P
5.2.2	Content for warning markings		P
5.2.2.6	Inverters for closed electrical operating areas		P
5.3	Documentation		P
5.3.2	Information related to installation *Additional subclauses:*		P
5.3.2.1	Ratings		P
5.3.2.2	Grid-interactive inverter setpoints		P
5.3.2.3	Transformers and isolation		N/A
5.3.2.4	Transformers required but not provided		N/A
5.3.2.5	PV modules for non-isolated inverters		P
5.3.2.6	Non-sinusoidal output waveform information	Grid-connection inverter.	N/A
5.3.2.7	Systems located in closed electrical operating areas	Not specified to be located in closed electrical operating area.	N/A
5.3.2.8	Stand- alone inverter output circuit bonding	Grid-connection inverter.	N/A
5.3.2.9	Protection by application of RCD's	Integrated RCM provided in inverter.	N/A
5.3.2.10	Remote indication of faults		P
5.3.2.11	External array insulation resistance measurement and response		N/A
5.3.2.12	Array functional grounding information		N/A
5.3.2.13	Stand-alone inverters for dedicated loads	Grid-connection inverter.	N/A
5.3.2.14	Identification of firmware version(s)	See report 50093942 002.	P

- End of test report -

Constructional Data Form (CDF) for Electrical Appliances

License holder	:	Huawei Technologies Co., Ltd.
License holder Address	:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C.
Factory name and Address	:	**Huawei Machine Co., Ltd.** No. 2 City Avenue, Songshan Lake Sci. & Tech. Industry Park, 523808 Dongguan, People's Republic of China. **Shenzhen Dongzhou New Energy Technologies Co., Ltd.** Shenzhen Pingshan Factory Zone A, Yingzhan Industrial Park Kengzi Street, Pingshan New District Shenzhen, 518125, P.R. China.
Type of Appliance	:	Hybrid Inverter
Type Designation	:	SUN2000L-5KTL, SUN2000L-4.6KTL, SUN2000L-4KTL, SUN2000L-3.68KTL, SUN2000L-3KTL, SUN2000L-2KTL, SUN2000L-5KTL-CN, SUN2000L-4KTL-CN, SUN2000L-3KTL-CN, SUN2000-5KTL-L0, SUN2000-4KTL-L0, SUN2000-3KTL- L0, SUN2000-2KTL-L0
Rating	:	See model list in test report
Protection Class	:	Class I
Supply connection	:	☐ fixed power cord ☒ permanent connection ☐ appliance inlet ☐ direct plug in ☐Special Connector

Model list:

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Date	**Name**	**Signature**

MODELS LIST		SUN2000L-5KTL	SUN2000L-4.6KTL	SUN2000L-4KTL
PV INPUT	V_{MAX} PV [Vdc]	600		
	I_{SC} PV [A]	15		
	MPP Voltage Range V_{MPP} [Vdc]	90–500V		
	Max. Input Current I_{MAX} [A] for each channel	11		
	MPP Full Power Voltage Range [Vdc]	260-480	260-480	210-480
	Start PV Voltage[Vdc]	120		
	Stop PV Voltage[Vdc] (PCE Shutdown)	90		
	Backfeed Current [A]	0		
	Overvoltage Category(OVC)	OVC II		
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V / 230 V / 240 V		
	Rated Output Frequency F_{NETZ}[Hz]	50 / 60		
	Rated Output Power P_E[kW]	5000	4600	4000
	Max. Output Power P_{Emax} [kW]	5500	5000	4400
	Max. Apparent power S_{Emax} [VA]	5500	5000	4400
	Rated Output Current Ir[A]	23A@220V 22A@230V 21A@240V	21A@220V 20A@230V 19.2A@240V	18.2A@220V 17.4A@230V 16.7A@240V
	Max. Output Current Imax[A]	25	23	20
	Power Factor cosφ [λ]	[-0.8 , +0.8]		
	Standby Power Consumption [W]	≤10		
	Night Power Consumption [W]	≤ 1		
	THD [∀ /I] (100% full power)	<3%		
	Acoustic Noise [dB]	25dB (Typ)		
	Overvoltage Category(OVC)	III		
Battery INPUT	V_{MAX} BAT [Vdc]	600V	600V	600V
	Voltage Range	350~600Vdc	350~600Vdc	350~600Vdc
	Start Voltage[Vdc]	/	/	/
	Max. Discharge Current I_{MAX} [A]	10A	10A	10A
	Max. Charge Current [A]	10A	10A	10A
	Overvoltage Category(OVC)	OVC II		
S	Type of inverter	Transformerless		

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Date **Name** **Signature**

MPPT strings	2 strings
MPPT tracking	2 tracking group
Protective Class	I
Enclosure Protection (IP)	IP65
Operating Temperature Range [ºC]	-30 to +60
Pollution degree (PD)	PD 3
Altitude [m]	4000
Size [mm]	375 mm x 375 mm x 149.5 mm
Weight [kg]	10.6 approx.
Firmware version	SUN2000L V100R001

MODELS LIST		SUN2000L-3.68KTL	SUN2000L-3KTL	SUN2000L-2KTL
PV INPUT	V_{MAX} PV [Vdc]	600		
	I_{SC} PV [A]	15		
	MPP Voltage Range V_{MPP} [Vdc]	90–500V		
	Max. Input Current I_{MAX} [A] for each channel	11		
	MPP Full Power Voltage Range [Vdc]	190-480	160-480	120-480
	Start PV Voltage[Vdc]	120		
	Stop PV Voltage[Vdc] (PCE Shutdown)	90		
	Backfeed Current [A]	0		
	Overvoltage Category(OVC)	OVC II		
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V / 230 V / 240 V		
	Rated Output Frequency F_{NETZ}[Hz]	50 / 60		
	Rated Output Power P_E[kW]	3680	3000	2000
	Max. Output Power P_{Emax} [kW]	3680	3300	2200
	Max. Apparent power S_{Emax} [VA]	3680	3300	2200
	Rated Output Current Ir[A]	16A@220V 16A@230V 15.4A@240V	14A@220V 13.1A@230V 12.5A@240V	9.1A@220V 8.7A@230V 8.4A@240V
	Max. Output Current Imax[A]	16	15	10
	Power Factor cosφ [λ]	[-0.8 , +0.8]		
	Standby Power Consumption [W]	≤10		
	Night Power Consumption [W]	≤ 1		
	THD [V /I] (100% full power)	<3%		
	Acoustic Noise [dB]	25dB (Typ)		
	Overvoltage Category(OVC)	III		
Battery INPUT	V_{MAX} BAT [Vdc]	600V	600V	600V
	Voltage Range	350~600Vdc	350~600Vdc	350~600Vdc
	Start Voltage[Vdc]	/	/	/
	Max. Discharge Current I_{MAX} [A]	10A	10A	10A
	Max. Charge Current [A]	10A	10A	10A
	Overvoltage Category(OVC)	OVC II		

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Date	**Name**	**Signature**

System	Type of inverter	Transformerless
	MPPT strings	2 strings
	MPPT tracking	2 tracking group
	Protective Class	I
	Enclosure Protection (IP)	IP65
	Operating Temperature Range [ºC]	-30 to +60
	Pollution degree (PD)	PD 3
	Altitude [m]	4000
	Size [mm]	375 mm x 375 mm x 149.5 mm
	Weight [kg]	10.6 approx.
	Firmware version	SUN2000L V100R001

MODELS LIST		SUN2000L-5KTL-CN	SUN2000L-4KTL-CN	SUN2000L-3KTL-CN
PV INPUT	V_{MAX} PV [Vdc]	600		
	I_{SC} PV [A]	13.8		
	MPP Voltage Range V_{MPP} [Vdc]	90–500V		
	Max. Input Current I_{MAX} [A] for each channel	11		
	MPP Full Power Voltage Range [Vdc]	260-480	210-480	210-480
	Start PV Voltage[Vdc]	120		
	Stop PV Voltage[Vdc] (PCE Shutdown)	90		
	Backfeed Current [A]	0		
	Overvoltage Category(OVC)	OVC II		
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V		
	Rated Output Frequency F_{NETZ}[Hz]	50		
	Rated Output Power P_E[kW]	5000	4000	3000
	Max. Output Power P_{Emax} [kW]	5500	4400	3300
	Max. Apparent power S_{Emax} [VA]	5500	4400	3300
	Rated Output Current Ir[A]	23A@220V	18.2@220V	14A@220V
	Max. Output Current Imax[A]	25	20	15
	Power Factor cosφ [λ]	[-0.8 , +0.8]		
	Standby Power Consumption [W]	≤10		
	Night Power Consumption [W]	≤ 1		
	THD [V /I] (100% full power)	<3%		
	Acoustic Noise [dB]	25dB (Typ)		
	Overvoltage Category(OVC)	III		
System	Type of inverter	Transformerless		
	MPPT strings	2 strings		
	MPPT tracking	2 tracking group		
	Protective Class	I		
	Enclosure Protection (IP)	IP65		
	Operating Temperature Range [ºC]	-30 to +60		
	Pollution degree (PD)	PD 3		

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Date **Name** **Signature**

Altitude [m]	4000
Size [mm]	375 mm x 375 mm x 149.5 mm
Weight [kg]	10.6 approx.
Firmware version	SUN2000L V100R001

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Date **Name** **Signature**

MODELS LIST		SUN2000-5KTL-L0	SUN2000-4KTL-L0	SUN2000-3KTL-L0	SUN2000-2KTL-L0
PV INPUT	V_{MAX} PV [Vdc]	600			
	I_{SC} PV [A]	15			
	MPP Voltage Range V_{MPP} [Vdc]	90–500V			
	Max. Input Current I_{MAX} [A] for each channel	11			
	MPP Full Power Voltage Range [Vdc]	260-480	210-480	160-480	120-480
	Start PV Voltage[Vdc]	120			
	Stop PV Voltage[Vdc] (PCE Shutdown)	90			
	Backfeed Current [A]	0			
	Overvoltage Category(OVC)	OVC II			
AC OUTPUT	Rated Output Voltage Ur [Vac]	220 V / 230 V / 240 V			
	Rated Output Frequency F_{NETZ}[Hz]	50/60			
	Rated Output Power P_E[W]	5000	4000	3000	2000
	Max. Output Power P_{Emax} [W]	5500	4400	3300	2200
	Max. Apparent power S_{Emax} [VA]	5500	4400	3300	2200
	Rated Output Current Ir[A]	23A@220V 22A@230V 21A@240V	18.2A@220V 17.4A@230V 16.7A@240V	14.0A@220V 13.1A@230V 12.5A@240V	9.1A@220V 8.7A@230V 8.4A@240V
	Max. Output Current Imax[A]	25	20	15	10
	Power Factor cosφ [λ]	[-0.8 , +0.8]			
	Standby Power Consumption [W]	≤10			
	Night Power Consumption [W]	≤ 1			
	THD [V /I] (100% full power)	<3%			
	Acoustic Noise [dB]	25dB (Typ)			
	Overvoltage Category(OVC)	III			
System	Type of inverter	Transformerless			
	MPPT strings	2 strings			
	MPPT tracking	2 tracking group			
	Protective Class	I			
	Enclosure Protection (IP)	IP65			

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Operating Temperature Range [ºC]	-30 to +60
Pollution degree (PD)	PD 3
Altitude [m]	4000
Size [mm]	375 mm x 375 mm x 149.5 mm
Weight [kg]	10.6 approx.
Firmware version	SUN2000L V100R001

Critical Components

Material: e.g. external enclosure, PCB, closed-end connector, sleeves, cord anchorage etc

Components with winding: e.g. motor, transformer, magnetic coil etc.

Other components: e.g. switch, thermostat, heater, plug, internal wire, capacitor, relay, varistor etc.

Object/part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity
Rotary switch-disconnector 16090037	SANTON INTERNATIONAL B.V.	XB3310/2	600VDC,30A	IEC60947-1	DEKRA 2199573.01
Rotary switch-disconnector 16090037	SANTON INTERNATIONAL B.V.	XBE+3310/2	600VDC,30A	EN60947-3	DEKRA 71-103409
PV Connector 14190378	AMPHENOL	HH4CMB4TM	1000VDC,30A	EN50521	TUV R50157783
PV Connector 14190379	AMPHENOL	HH4CFM4DM	1500VDC,30A	EN50521	TUV R50157783
PV Connector 14190377	AMPHENOL	HH4CFC5DM	1500VDC,30A	EN50521	TUV R50157783
PV Connector 14190376	AMPHENOL	HH4CMD5TM	1000VDC,30A	EN50521	TUV R50157783
PV Connector 14190937	AMPHENOL	HH4CFD4TMS	1100VDC-30A	EN50521	TUV R50388083
PV Connector 14190936	AMPHENOL	HH4CMB4TMS	1100VDC-30A	EN50521	TUV R50388083
PV Connector 14190939	AMPHENOL	HH4CMD4TMS	1100VDC-30A	EN50521	TUV R50388083
PV Connector 14190938	AMPHENOL	HH4CFB4TMS	1100VDC-30A	EN50521	TUV R50388083
BATTERY Connector 14191108	AMPHENOL	HH4PMC5TM	1100VDC,30A	EN50521	TUV R50157783
BATTERY Connector 14191106	AMPHENOL	HH4PFC5TM	1100VDC,30A	EN50521	TUV R50157783
BATTERY Connector 14191105	AMPHENOL	HH4PMM4TM	1100VDC,30A	EN50521	TUV R50157783
BATTERY Connector 14191107	AMPHENOL	HH4PFM4TM	1100VDC,30A	EN50521	TUV R50157783
BATTERY Connector 14191327	AMPHENOL	HH4PMM4TMS	1100VDC,30A	EN50521	R50388083
BATTERY Connector 14191328	AMPHENOL	HH4PFC5TMS	1100VDC,30A	EN50521	R50388083
BATTERY Connector 14191329	AMPHENOL	HH4PFM4TMS	1100VDC,30A	EN50521	R50388083

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Date **Name** **Signature**

BATTERY Connector 14191330	AMPHENOL	HH4PMC5TMS	1100VDC,30A	EN50521	R50388083
AC Connector 14190918	PHOENIX	HW-COC-AC-FT-C4-6-3	600V,30A	EN61984	TUV R50357787
AC Connector 14190919	PHOENIX	HW-COC-AC-FC-SPL4-6-3 10-21	600V,30A	EN61984	TUV R50357787
Internal power wire	Various	Various	600V,VW-1, 10AWG,12AWG	UL1015	UL
PCB: END1PWRC/END1PWRB					
X2 Capacitor C173 08030496	XIAMEN FARA ELECTRONIC CO.,LTD	C4B Series	350Vac,1.8uF	EN60384-14 UL60384-14 IEC60384-14	SE/0366-6 E186600 FOWX2/8
Y1 Capacitor C217,C237,C3478,C3480,C3481,C574 08050122	TDK	CD Series	400V,0.0047uF	EN60384-14 UL60384-14	UL E37861
Alternative	WALSIN	AC Series	400V,0.0047uF	EN60384-14 UL60384-14	UL E146544
Alternative	MURATA	RA Series	400V,0.0047uF	EN60384-14 UL60384-14	VDE 40043033 UL E37921
SPD 19020167	SHENZHEN HAIPENGXIN ELECTRONICS CO.,LTD	PV20K510-MH	510Vac,Up:1800V	EN61643-11	TUV 164009476
Alternative	SICHUAN ZHONGGUANG LIGHTNING PROTECTION TECHNOLOGIES CO LTD	PV20K510-ZG	510Vac,Up:1800V	EN61643-11	TUV AN50343255
EMI Choke T24 10040097	SHENZHEN TIANGU ELECTRONICS CO.,LTD	LF28H1837	130℃	EN62109-1	Test with unit
Alternative	Goldriver	HL28R-6	130℃	EN62109-1	Test with unit
Alternative	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB28H6104R	130℃	EN62109-1	Test with unit
EMI inductor T31 10040143	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB13H6849R	130℃	EN62109-1	Test with unit
Alternative	Goldriver	HL13R-14	130℃	EN62109-1	Test with unit
Hall sensor U61 38140047	VAC	T60404-N4646-X661	5V,Ipn:25A,Vo=0.375-4.625	UL508C	UL E317483
Alternative	LEM	CASR 25-NP	5V,Ipn:25A,V-0	UL508C	UL E189713

Film capacitor C309,C622 08030286	XIAMEN FARA ELECTRONIC CO.,LTD	C372J225J90C000	630V,2.2uF,105℃	EN62109-1	Test with unit
Y1 Capacitor C649,C650 08050121	TDK	CD Series	400V,0.00047uF, 125℃	EN60384-14 UL60384-14	UL E37861
Alternative	WALSIN	AC Series	400V,0.00047uF, 125℃	EN60384-14 UL60384-14	UL E146544
Alternative	MURATA	RA Series	400V,0.00047uF, 125℃	EN60384-14 UL60384-14	VDE 40043033 UL E37921
Film capacitor C2899,C2900 08030348	XIAMEN FARA ELECTRONIC CO.,LTD	C322J474K90C000	630V,0.47uF,105℃	EN62109-1	Test with unit
Alternative	EPCOS	B32653A6474K Z1 B32653S6474K523	630V,0.47uF,105℃	EN62109-1	Test with unit
Fuse F1,F2 19040128	LITTELFUSE	0218015.MXEP	250V,15A	UL248-1 UL248-14	UL E10480
Alternative	Conquer Electronics Co.,ltd	UTE-A015	250V,15A	UL248-1 UL248-14	UL E82636
Transformer T21,T30 09040781	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	KB20Q9321R	130℃	EN62109-1	Test with unit
Alternative	PLUSE ELECTRONICS(SINGAPORE)PTE LTD	PG1875NL	130℃	EN62109-1	Test with unit
Alternative	Goldriver	TPQ20-148	130℃	EN62109-1	Test with unit
Hall sensor U86,U87 38140160	LEM	HLSR 20-P	5V,Ipn:25A, Vout:Vref+/-(0.04*Ip)	UL508C	UL E189713
Film capacitor C2955,C2956,C3475,C3476,C644 08030324	XIAMEN FARA ELECTRONIC CO.,LTD	C372J105K60C000	630V,1uF,105℃	EN62109-1	Test with unit
Y2 Capacitor C213, C2620, C2621, C2622, C2834, C2835, C3492, C3493, C3523, C3524, C3525 08050120	TDK	CS45-F2GA103MMVKAP	300V,0.01uF,125℃	EN60384-14 UL60384-14	UL E37861
Alternative	WALSIN	YV1AC103M140DAMD0W	300V,0.01uF,125℃	EN60384-14 UL60384-14	UL E146544
Alternative	MURATA	DE2E3SA103MN4AY81F	300V,0.01uF,125℃	EN60384-14 UL60384-14	VDE 40043033 UL E37921

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Film capacitor C175 08030391	XIAMEN FARA ELECTRONIC CO.,LTD	C6AR8705KF1 0382	380V,7uF,105℃	EN62109-1	Test with unit
Film capacitor C175 08030391	XIAMEN FARA ELECTRONIC CO.,LTD	C6AR8805KF1 0382	380V,8uF,105℃	EN62109-1	Test with unit
Alternative	PANASONIC	EZPQ38805LT A	380V,8uF,105℃	EN62109-1	Test with unit
EMI inductor T1 10040201	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB37H9084R	130℃	EN62109-1	Test with unit
`Alternative	Goldriver	HL36R-6	130℃	EN62109-1	Test with unit
Alternative	SHENZHEN TIANGU ELECTRONICS CO.,LTD	37H6820-L	130℃	EN62109-1	Test with unit
High frequency inductor T22 10011318	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB40H9997R	130℃	EN62109-1	Test with unit
Alternative	Goldriver	HL40TG-32	130℃	EN62109-1	Test with unit
Alternative	SHENZHEN TIANGU ELECTRONICS CO.,LTD	40H6775-L	130℃	EN62109-1	Test with unit
EMI inductor T26 10040200	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB42H6733R	130℃	EN62109-1	Test with unit
Alternative	Goldriver	HL42R-3	130℃	EN62109-1	Test with unit
Alternative	SHENZHEN TIANGU ELECTRONICS CO.,LTD	42H6819-L	130℃	EN62109-1	Test with unit
Industrial frequency inductor T28 10060032	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB68C11346R	130℃	EN62109-1	Test with unit
Alternative	EAGLERISE ELECTRIC &ELECTRONIC(CHIN A)CO.,LTD	BP068002	130℃	EN62109-1	Test with unit
Alternative	Jnmc	LDC-68-2	130℃	EN62109-1	Test with unit
Alternative	Jingquanhua	DQG-EC68-4855A	130℃	EN62109-1	Test with unit
Hall sensor U80 38140246	VAC	T60404-N4646-X921	4.75V-5.25V-50A	EN62109-1	Test with unit

Alternative	LEM	LDSR 0.3-TP/SP1	4.75V-5.25V-50A	EN62109-1	Test with unit
Film capacitor C44,C45 08030441	EPCOS	B32678S3606 K503	250V,60uF,105℃	EN62109-1	Test with unit
Alternative	XIAMEN FARA ELECTRONIC CO.,LTD	C3D2E606KM1 A382	250V,60uF,105℃	EN62109-1	Test with unit
Film capacitor C192,C193 08030418	EPCOS	B32774S8106 K502	800V,10uF,105℃	EN62109-1	Test with unit
Alternative	XIAMEN FARA ELECTRONIC CO.,LTD	C3D2K106JB1 0C00	800V,10uF,105℃	EN62109-1	Test with unit
Alternative	KEMET	C4AEIBU5100 A22JV807	800V,10uF,105℃	EN62109-1	Test with unit
Bus-capacitor C10,C11,C12,C13,C304,C6,C7,C9 08010619	NICHICON CORPORATION	LGX2F122MELAZS	315V,1200 uF,105℃	EN62109-1	Test with unit
Alternative	NANTONG JIANGHAI CAPACITOR CO.,LTD	ECS2FBB122 MLA350050E	315V,1200 uF,105℃	EN62109-1	Test with unit
Alternative	NIPPON CHEMI-CON CORPPRATION	ELXS3B1VSN1 22MA50S	315V,1200 uF,105℃	EN62109-1	Test with unit
Alternative	LELON ELECTRONICS CORP	LSK122M2F--A3548NHW	315V,1200 uF,105℃	EN62109-1	Test with unit
Alternative	EPCOS (XIAMEN)CO.,LTD	B43644S0128 M001X01	315V,1200 uF,105℃	EN62109-1	Test with unit
Varistor RV5,RV6 07040106	EPCOS	B72220U3381 K505V87	385Vac,10KA	UL1449	UL E321126
Alternative	EPCOS (XIAMEN)CO.,LTD	B43644S0128 M001X01	385Vac,10KA	UL1449	UL E321126
Alternative	Thingking	TVR20621KW225M	385Vac,10KA	UL1449	UL E314979
Varistor RV8,RV9 07040104	EPCOS	B72220U3511 K504V87	510Vac,10KA	UL1449	UL E321126
Varistor RV2,RV3,RV4 07040103	EPCOS	B72220U3461 K504V87	460Vac,10KA	UL1449	UL E321126
Alternative	Thingking	TVR20751KW211M	460Vac,10KA	UL1449	UL E314979
Relay K4,K6 11010316	PANASONIC	AHES3391M81	277Vac,35A	UL508 UL60947-1 UL60947-4-1	UL E43149
Alternative	Hongfa	HF170F/12-2HF	277Vac,35A	UL508 UL60947-1 UL60947-4-1	UL E133481
PCB:END1DRVA					

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Industrial frequency inductor T27 10060031	SHENZHEN HIGHLIGHT ELECTRONIC CO.,LTD	LB73C11347R	130℃	EN62109-1	Test with unit
Alternative	EAGLERISE ELECTRIC &ELECTRONIC(CHINA)CO.,LTD	BH070001	130℃	EN62109-1	Test with unit
Alternative	Jingquanhua	DQG-EC74-4988A	130℃	EN62109-1	Test with unit
Alternative	Jnmc	LDC-74-1	130℃	EN62109-1	Test with unit
PCB:END1CTLA					
Fuse F1 19040107	Conquer Electronics Co.,ltd	SET002	125V,2A	UL248-1 UL248-14	UL E82636
Alternative	LITTELFUSE INC	0452002.MRL	125V,2A	UL248-1 UL248-14	UL E10480
Alternative	BEL FUSE INC	SST2	125V,2A	UL248-1 UL248-14	UL E20624
[1]) An asterisk indicates a mark which assures the agreed level of surveillance					
Supplementary information:					

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