TEST REPORT
IEC 62109-1
Safety of Power Converter for use in Photovoltaic Power Systems
Part 1: General requirements

Report Number. ..... :	70.409.19.175.04-03 part 1 of 2
Date of issue ..... :	2022-08-17
Total number of pages ..... :	114
Name of testing laboratory preparing the report ..... :	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
Applicant's name ..... :	Huawei Technologies Co., Ltd.
Address ..... :	Administration Building Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, 518129 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	EN 62109-1:2010
Test procedure ..... :	CE_LVD
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62109_1B
Test Report Form(s) Originator .... :	VDE Testing and Certification Institute
Master TRF ..... :	Dated 2016-04

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description..... :	SOLAR INVERTER
Trade Mark..... :	HUAWEI
Manufacturer ..... :	Huawei Technologies Co., Ltd.
Model/Type reference ..... :	SUN2000-125KTL-M0, SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1, SUN2000-100KTL-INM0, SUN2000-75KTL-M1. SUN2000-115KTL-M2, SUN2000-110KTL-M2, SUN2000-100KTL-M2.
Ratings..... :	See rating labels on page 4 to 6

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

☒	**Name of testing laboratory preparing the report:**	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch	
Location/ address .....:		TÜV SÜD Testing Center, D1 building, No. 63 Chuangqi Road, Shilou Town, Panyu District, Guangzhou 511447, China	
Tested by (name, function, signature).....:		Shan Huang *Project handler*	Shan Huang
Approved by (name, function, signature)...:		Kai Zhao *Designated reviewer*	

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

Tests against: EN 62109-1:2010, EN 62109-2:2011

Total test reports contains 2 parts and 1 attachment listed in below table:

Item	Description	Pages
Part 1	EN 62109-1:2010 test report (Including sample photos and CDF)	114
Part 2	EN 62109-2:2011 test report	42
Attachment	IP 66 test report (report no. GDGT-H/R-2019-459-XG)	7

Summary of testing:

Family design products, full tests were conducted on representative model **SUN2000-125KTL-M0**, additional test of electrical ratings on all other models and heating test were conducted on Max. output current model SUN2000-110KTL-M0 and SUN2000-100KTL-M0. Unless otherwise specified in appendix tables, tests were conducted at rated voltage of 500VAC and 50Hz.

Additional test items for modification specified in General remarks.

All the test results are confirmed to the requirements of the standard.

Tests performed (name of test and test clause):

☒ Visual inspection – clauses as available;
☒ Mains supply electrical data in normal condition & electrical ratings tests – clause 4.2.2.6 & 4.7;
☒ Durability and legibility of marking – clause 5.1.2;
☒ Thermal test and single fault test – clause 4.3 & 4.4;
☒ Humidity preconditioning – clause 4.5;
☒ Voltage Back-feed Protection, as combined with clause 4.4;
☒ Enclosure integrity – clause 6.3;
☒ Non-accessibility – clause 7.3.4.2.3;
☒ Protective bonding – clause 7.3.6.3.3;
☒ Capacitor discharge – clause 7.3.5.3.2 & 7.3.9;
☒ Clearance and creepage distances – clause 7.3.7;
☒ Potting materials – clause 7.3.7.8.6;
☒ Capacitor discharge – clause 7.3.9 & 7.4;
☒ Energy hazards – clause 7.4;
☒ Electrical tests – clause 7.5;
☒ Provisions for lifting and carrying – clause 8.4;
☒ Wall mounting loading – clause 8.5;
☒ Material tests – clause 9.1.3;
☒ Limited power sources – clause 9.2;
☒ Sonic pressure hazards – clause 10;
☒ Actuating parts of controls (Knob pull and limitation of movement) – clause 13.1;
☒ 8 mm stripping test – clause 13.3.3.6;
☒ Deformation tests – clause 13.7;
☒ Annex B operational test as combined with clause 4.4;

Testing location:

Original test:

1. CQC - Trusted(Jiangsu) Testing Technology Co., Ltd.

No.99, Wenlan Road, Xianlin University Zone, Xianlin Street, Qixia District, NanJing, China

All tests except clause 6.3 IP rating test

2. Guangdong Sushi Guangbo Testing Technology Co., Ltd. (CNAS L12110)

Modern enterprise accelerator 4, No. 24 industrial East Road, Songshan Lake High Technology Development Zone, Dongguan, China

Clause 6.3 IP rating test

Tests based on modifications:

CQC - Trusted(Jiangsu) Testing Technology Co., Ltd.

No.99, Wenlan Road, Xianlin University Zone, Xianlin Street, Qixia District, NanJing, China

Summary of compliance with National Differences (List of countries addressed):

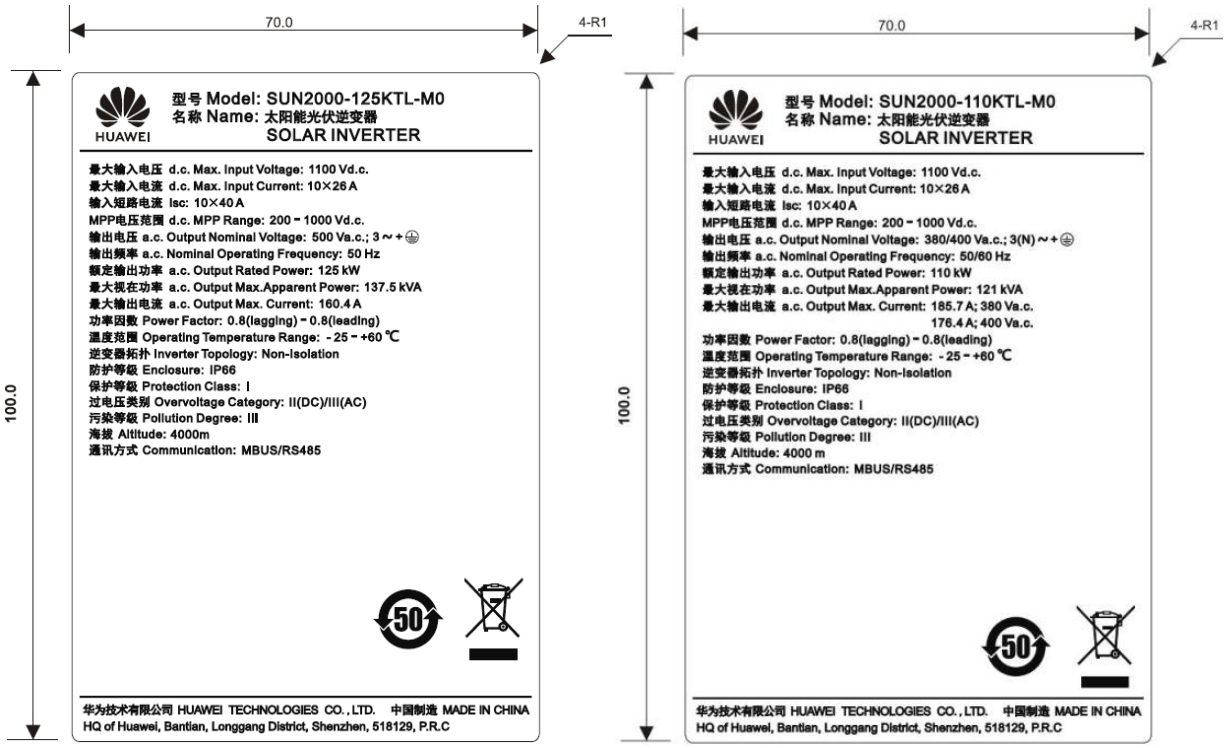
All tests were carried out according to EN 62109-1:2010.

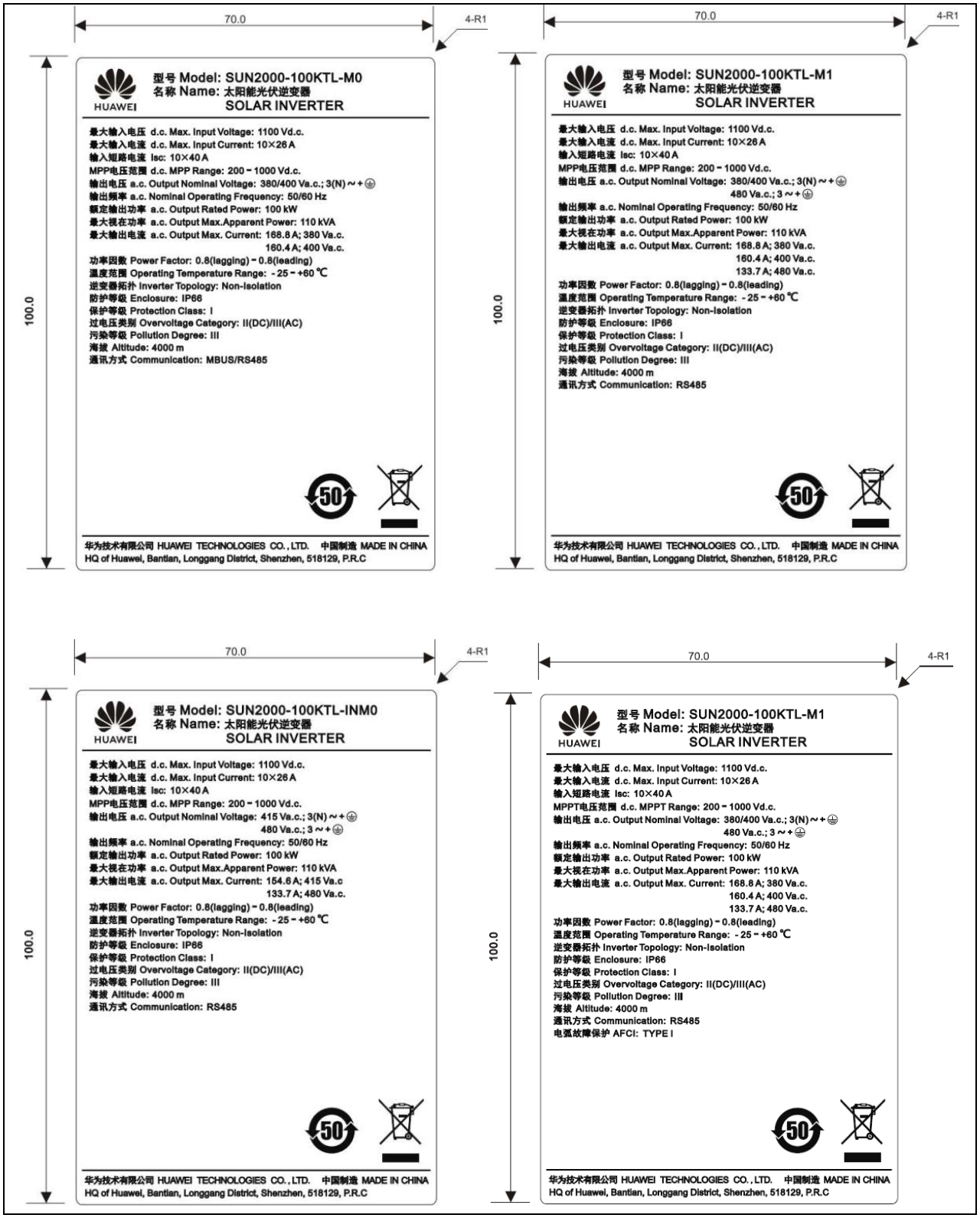
The text of IEC 62109-1:2010 was approved by CENELEC as a European Standard without any modification. Also compliance with EN 62109-1:2010, Annex ZA of EN 62109-1:2010 is recorded at the end of this report.

☒ **The product fulfils the requirements of EN 62109-1:2010**

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 NCBs that own these marks.




70.0
4-R1
100.0
HUAWEI
型号 Model: SUN2000-100KTL-M0
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 1100 Vd.c.
最大输入电流 d.c. Max. Input Current: 10×26 A
输入短路电流 Isc: 10×40 A
MPP电压范围 d.c. MPP Range: 200 ~ 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 380/400 Va.c.; 3(N) ~ + ⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 100 kW
最大视在功率 a.c. Output Max.Apparent Power: 110 kVA
最大输出电流 a.c. Output Max. Current: 168.8 A; 380 Va.c.
160.4 A; 400 Va.c.
功率因数 Power Factor: 0.8(lagging) ~ 0.8(leading)
温度范围 Operating Temperature Range: -25 ~ +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: MBUS/RS485
华为技术有限公司 HUAWEI TECHNOLOGIES CO., LTD. 中国制造 MADE IN CHINA
HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
70.0
4-R1
100.0
HUAWEI
型号 Model: SUN2000-100KTL-M1
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 1100 Vd.c.
最大输入电流 d.c. Max. Input Current: 10×26 A
输入短路电流 Isc: 10×40 A
MPP电压范围 d.c. MPP Range: 200 ~ 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 380/400 Va.c.; 3(N) ~ + ⏚
480 Va.c.; 3 ~ + ⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 100 kW
最大视在功率 a.c. Output Max.Apparent Power: 110 kVA
最大输出电流 a.c. Output Max. Current: 168.8 A; 380 Va.c.
160.4 A; 400 Va.c.
133.7 A; 480 Va.c.
功率因数 Power Factor: 0.8(lagging) ~ 0.8(leading)
温度范围 Operating Temperature Range: -25 ~ +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: RS485
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70.0
4-R1
100.0
HUAWEI
型号 Model: SUN2000-100KTL-INM0
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 1100 Vd.c.
最大输入电流 d.c. Max. Input Current: 10×26 A
输入短路电流 Isc: 10×40 A
MPP电压范围 d.c. MPP Range: 200 ~ 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 415 Va.c.; 3(N) ~ + ⏚
480 Va.c.; 3 ~ + ⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 100 kW
最大视在功率 a.c. Output Max.Apparent Power: 110 kVA
最大输出电流 a.c. Output Max. Current: 154.6 A; 415 Va.c
133.7 A; 480 Va.c.
功率因数 Power Factor: 0.8(lagging) ~ 0.8(leading)
温度范围 Operating Temperature Range: -25 ~ +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: RS485
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HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C
70.0
4-R1
100.0
HUAWEI
型号 Model: SUN2000-100KTL-M1
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 1100 Vd.c.
最大输入电流 d.c. Max. Input Current: 10×26 A
输入短路电流 Isc: 10×40 A
MPPT电压范围 d.c. MPPT Range: 200 ~ 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 380/400 Va.c.; 3(N) ~ + ⏚
480 Va.c.; 3 ~ + ⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 100 kW
最大视在功率 a.c. Output Max.Apparent Power: 110 kVA
最大输出电流 a.c. Output Max. Current: 168.8 A; 380 Va.c.
160.4 A; 400 Va.c.
133.7 A; 480 Va.c.
功率因数 Power Factor: 0.8(lagging) ~ 0.8(leading)
温度范围 Operating Temperature Range: -25 ~ +60 ℃
逆变器拓扑 Inverter Topology: Non-Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: RS485
电弧故障保护 AFCI: TYPE I
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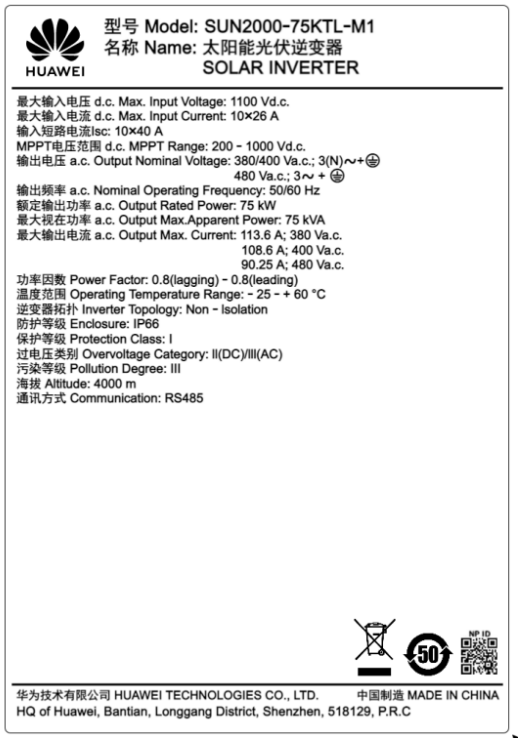
HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C


HUAWEI
型号 Model: SUN2000-75KTL-M1
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c. Max. Input Voltage: 1100 Vd.c.
最大输入电流 d.c. Max. Input Current: 10×26 A
输入短路电流Isc: 10×40 A
MPPT电压范围 d.c. MPPT Range: 200 - 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 380/400 Va.c.; 3(N)~+⏚
480 Va.c.; 3~ + ⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 75 kW
最大视在功率 a.c. Output Max.Apparent Power: 75 kVA
最大输出电流 a.c. Output Max. Current: 113.6 A; 380 Va.c.
108.6 A; 400 Va.c.
90.25 A; 480 Va.c.
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 25 - + 60 °C
逆变器拓扑 Inverter Topology: Non - Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: RS485
华为技术有限公司 HUAWEI TECHNOLOGIES CO., LTD. 中国制造 MADE IN CHINA
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HUAWEI
型号 Model: SUN2000-100KTL-M2
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c.Max.Input Voltage: 1100 Vd.c.
最大输入电流 d.c.Max.Input Current: 10x30 A
输入短路电流 Isc: 10x40 A
MPPT电压范围 d.c. MPPT Range: 200 – 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 380/400 Va.c., 3(N)~ +⏚
480 Va.c., 3~ +⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 100 kW
最大视在功率 a.c. Max.Output Apparent Power: 110 kVA
最大输出电流 a.c. Max.Output Current: 168.8 A; 380 Va.c.
160.4 A; 400 Va.c.
133.7 A; 480 Va.c.
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 25 – + 60 °C
逆变器拓扑 Inverter Topology: Non - Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: RS485
电弧故障保护 AFCI: TYPE I
华为技术有限公司 HUAWEI TECHNOLOGIES CO., LTD. 中国制造 MADE IN CHINA
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HUAWEI
型号 Model: SUN2000-110KTL-M2
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c.Max.Input Voltage: 1100 Vd.c.
最大输入电流 d.c.Max.Input Current: 10x30 A
输入短路电流 Isc: 10x40 A
MPPT电压范围 d.c. MPPT Range: 200 – 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 380/400 Va.c., 3(N)~ +⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 110 KW
最大视在功率 a.c. Max.Output Apparent Power: 121 kVA
最大输出电流 a.c. Max. Output Current: 185.7 A; 380 Va.c.
176.4 A; 400 Va.c.
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 25 – + 60 °C
逆变器拓扑 Inverter Topology: Non - Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: MBUS/RS485
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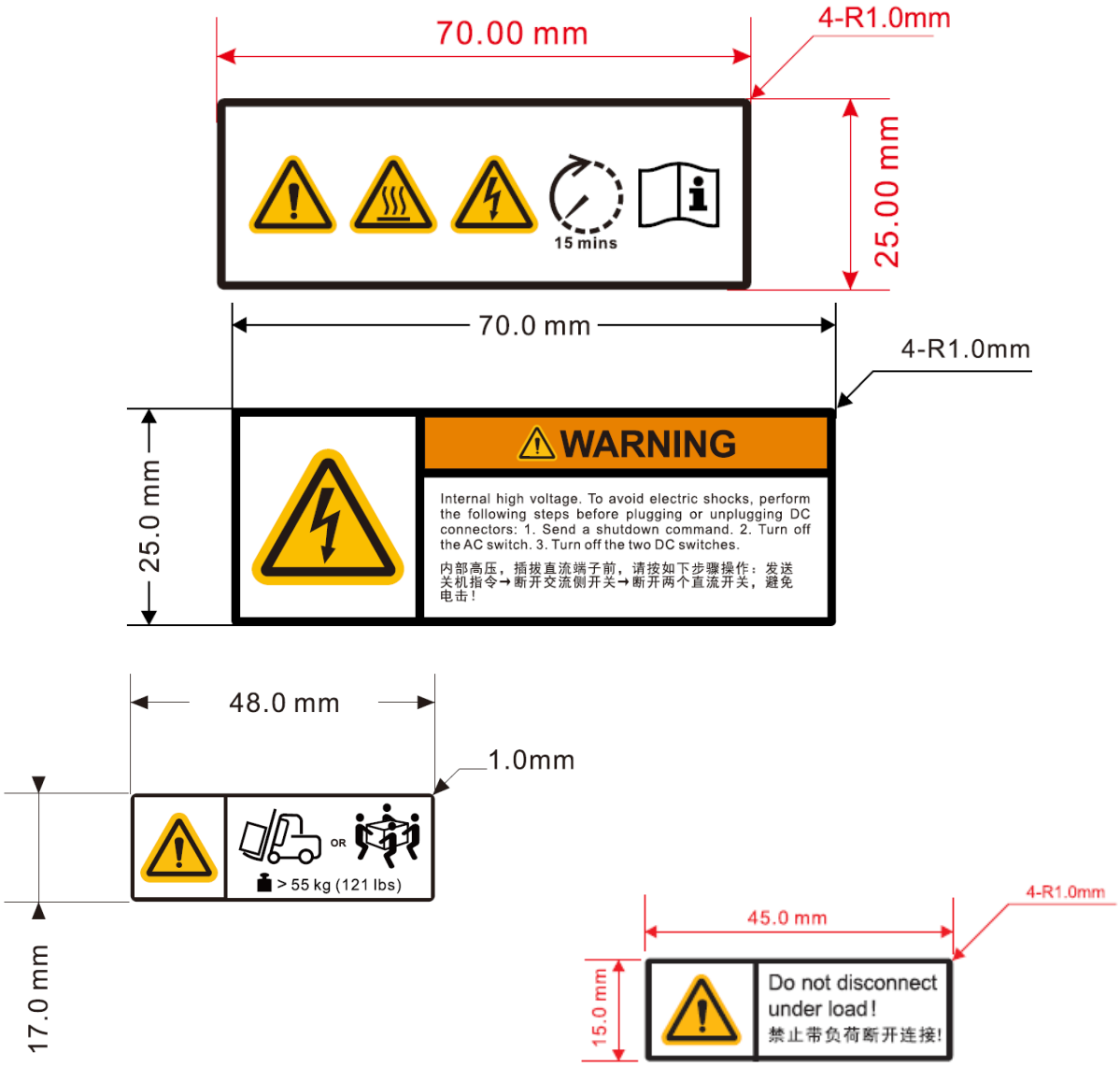
HUAWEI
型号 Model: SUN2000-115KTL-M2
名称 Name: 太阳能光伏逆变器
SOLAR INVERTER
最大输入电压 d.c.Max.Input Voltage: 1100 Vd.c.
最大输入电流 d.c.Max.Input Current: 10x30 A
输入短路电流 Isc: 10x40 A
MPPT电压范围 d.c. MPPT Range: 200 – 1000 Vd.c.
输出电压 a.c. Output Nominal Voltage: 400 Va.c., 3(N)~ +⏚
480 Va.c., 3~ +⏚
输出频率 a.c. Nominal Operating Frequency: 50/60 Hz
额定输出功率 a.c. Output Rated Power: 115 kW
最大视在功率 a.c. Max.Output Apparent Power: 125 kVA
最大输出电流 a.c. Max.Output Current: 182.3 A; 400 Va.c.
151.9 A; 480 Va.c.
功率因数 Power Factor: 0.8(lagging) - 0.8(leading)
温度范围 Operating Temperature Range: - 25 – + 60 °C
逆变器拓扑 Inverter Topology: Non - Isolation
防护等级 Enclosure: IP66
保护等级 Protection Class: I
过电压类别 Overvoltage Category: II(DC)/III(AC)
污染等级 Pollution Degree: III
海拔 Altitude: 4000 m
通讯方式 Communication: RS485
华为技术有限公司 HUAWEI TECHNOLOGIES CO., LTD. 中国制造 MADE IN CHINA
HQ of Huawei, Bantian, Longgang District, Shenzhen, 518129, P.R.C

Additional importer label:

Additional warning labels:



Remark:

1. The reason why there are two kinds of nameplates for model SUN2000-100KTL-M1 is shown in general remarks.

2. Marking plate material: pressure-sensitive unprinted label stocks stamped into aluminum surface; Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and thermal transfer printed label stock applications, -60°C to 95°C, An additional PET film provided to cover label.

Test item particulars.....	
Equipment mobility	☐ movable ☐ hand-held ☐ stationary ☒ fixed ☐ transportable ☐ for building-in
Connection to the mains	☐ pluggable equipment ☐ direct plug-in ☒ permanent connection ☐ for building-in
Environmental category	☒ outdoor ☐ indoor unconditional ☐ indoor conditional
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 (%).....	±10 %
Tested for power systems	IT / TN / TT
Testing of phase-phase voltage (V)	480/500VAC (IT), 380/400/415VAC (TN, TT)
Class of equipment.....	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg)	See page 15
Pollution degree.....	3(external environment), 2(internal environment)
IP protection class.....	IP66
.....	
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement.....	P (Pass)
- test object was not evaluated for the requirement	N/E
- test object does not meet the requirement.....	F (Fail)
Testing.....	
Date of receipt of test item	2019-10-22, 2021-01-27, 2021-11-19, 2022-05-20
Date (s) of performance of tests.....	2019-10-22 to 2019-11-14, 2021-01-27 to 2021-01-30, 2021-11-19 to 2021-11-20, 2022-05-20 to 2022-06-07

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

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

Reports revision history:

1. First revision from test report 70.409.19.175.04-00 updated and replaced by 70.409.19.175.04-01 due to following reasons:

a. two new optional PCBAs are added for new functions AFCI and PID in model SUN2000-100KTL-M1, the input and output parameters are not affected.

b. adds new marking plate and update CDF of model SUN2000-100KTL-M1 for above reason.

Additional tests of clauses 4.3, 4.4, 4.7 and 7.5 were conducted on SUN2000-100KTL-M1.

2. Second revision from test report 70.409.19.175.04-01 updated and replaced by 70.409.19.175.04-02 due to following reasons:

a. adds new model SUN2000-75KTL-M1.

b. adds new second source of component DC switch in CDF table.

Additional tests of Clause 4.7 was conducted on SUN2000-75KTL-M1.

3. Third revision from test report 70.409.19.175.04-02 updated and replaced by 70.409.19.175.04-03 due to following reasons:

a. adds new models SUN2000-115KTL-M2, SUN2000-110KTL-M2, SUN2000-100KTL-M2. The hardware is the same with previously certified models, but power is only differentiated by software to meet the requirements of different target markets.

b. some variations on components and construction as follow table:

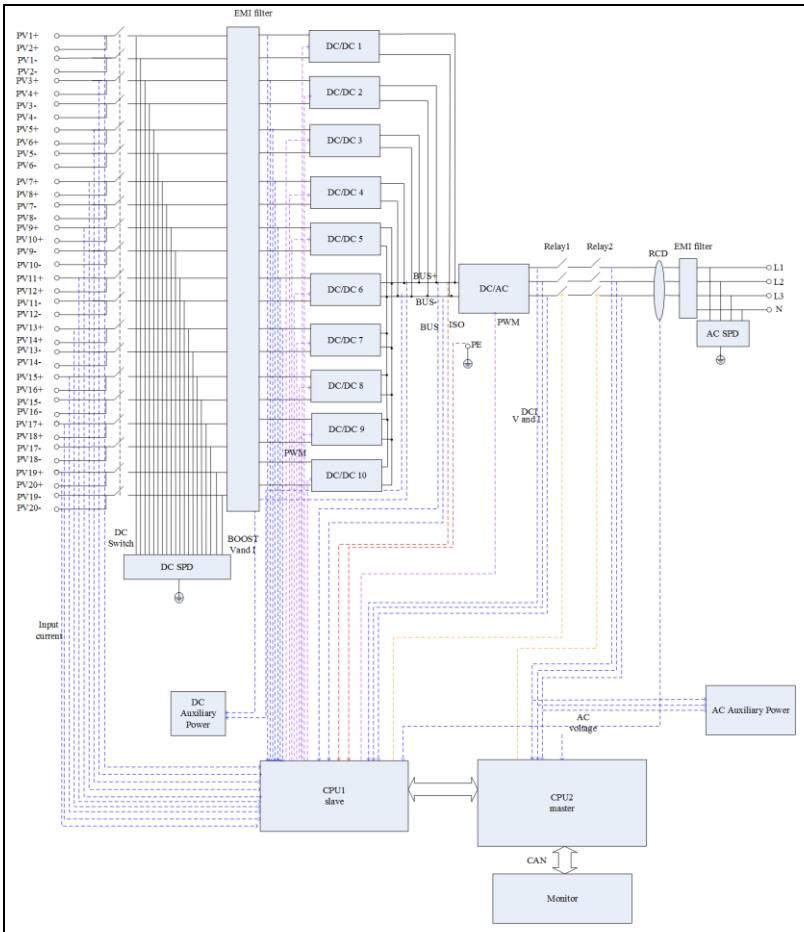
Components and construction	Specification (Original)	Specification (Now)
Module of BST	VT 10-PF12B2A050SH04-LJ89L13T 1200V, 50A	VT 10-PJ12B2A050SH06-LJ89L48T 1200V, 50A
PV cable	UL 10267, 105°C	UL 3817, 125°C
Y Capacitor	WALSIN-C11, C20, C30-YP5AH471K070DAMD0W	WALSIN-C13, C14, C15, C31, C32, C33, C7, C8, C9-YV5AC103M140DAMD0W
Heatsink	Base plate thickness:12 mm, number of cooling fins: 113	Base plate thickness:14 mm, number of cooling fins: 141
Weight	90kg	93kg

Additional tests of clauses 4.3, 4.4, 7.5, 8.4 and 8.5 were conducted on SUN2000-125KTL-M0 and tests of clauses 4.7 for all new added models.

No other critical design and construction changes to the product. So all other tests data are extracted from the former version reports directly.

Manufacturer's Declaration per sub-clause 4.2.5 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)	1) Huawei Machine Co., Ltd. No. 2, New City Avenue, Songshan Lake Sci. & Tech. Industry Park, 523808 Dongguan, Guangdong, PEOPLE'S REPUBLIC OF CHINA 2) Shenzhen Fugui Precision Industry Co., Ltd. D7-2F, D8-1F & 3F Foxconn Science and Technology Industrial Park, East side of Min Qing Road, Longhua Subdistrict, Longhua District 518109 Shenzhen, PEOPLE'S REPUBLIC OF CHINA 3) DongGuan Fuyi Precision Industry Co.,Ltd. Floor 1st-4th, Building 12, No.6, Songshui Road, Songmu Village, Weifeng Industrial City, Dalang Town, 523770 Dongguan, Guangdong, PEOPLE'S REPUBLIC OF CHINA 4) Dongguan Yang Tian Electronic Technology Co., Ltd. (i-Brights) No.152, Luyuan Rd., Keyuancheng, Tangxia Town 523710 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA
General product information: These devices are grid-connected PV inverters(without isolating transformer inside) which converts direct current optimized by photovoltaic DC conditioner to alternating current, and they are intended to be connected in parallel with the public grid via an external isolated transformer depend on the rated output voltage of inverter. The winding ratio is adapted according to the voltage level of inverter output and connection point at public grid. They are intended for professional incorporation into PV system, and they are assessed on a component test basis. Firmware Version: V500R001(all models except -M2 models) V500R023(SUN2000-115KTL-M2, SUN2000-110KTL-M2, SUN2000-100KTL-M2) Topological diagram: (see next page)	



The following documentations are retained on file:
- Photograph;
- Circuit diagrams;
- PCB layout drawing;
- PCB foil pattern assembly drawing;
- Specification sheets for components;
- Instruction manual.
- Manufacturer's work instruction and declaration for 100% routing test as required by EN 62109-1:2010, EN 62109-2:2011.

For model differences:
The relevant models under scoped of the certification having the same hardware topology and firmware of the tested model except model number and output voltage and current for marketing purpose.
pls. see as in table below for details (exact from user manual directly for reference):

DC Input

Technical specifications	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Max. input voltage	1100 V	1100 V	1100 V	1100 V	1100 V
Max. input current (per MPPT circuit)	26 A	26 A	26 A	26 A	26 A
Max. short-circuit current per MPPT route	40 A	40 A	40 A	40 A	40 A

Max. backfeed current to the array	0 A	0 A	0 A	0 A	0 A
Min. start-up voltage	200 V	200 V	200 V	200 V	200 V
MPP voltage range	200-1000 V	200-1000 V	200-1000 V	200-1000 V	200-1000 V
MPP voltage range at full load	625-850 V	540-800 V	540-800 V	540-800 V (@AC 380/400 V) 625-850V (@AC 480 V)	540-800 V (@AC 380/400 V) 625-850V (@AC 480 V)
Rated input voltage	750 V	600 V	600 V	600 V (@AC 380/400 V) 720 V (@AC 480 V)	620 V (@AC 380/400 V) 720 V (@AC 480 V)
Number of inputs	20	20	20	20	20
Number of MPPT circuits	10	10	10	10	10

Technical specifications	SUN2000-75KTL-M1
Max. input voltage	1100 V
Max. input current (per MPPT circuit)	26 A
Max. short-circuit current per MPPT route	40 A
Max. backfeed current to the array	0 A
Min. start-up voltage	200 V
MPP voltage range	200-1000 V
MPP voltage range at full load	540-800 V(@AC 380/400 V), 625-850 V(@AC 480 V)
Rated input voltage	600 V(@AC 380/400 V), 720 V(@AC 480 V)
Number of inputs	20
Number of MPPT circuits	10

Technical specifications	SUN2000-115KTL-M2	SUN2000-110KTL-M2	SUN2000-100KTL-M2
Max. input voltage	1100 V	1100 V	1100 V
Max. input current (per MPPT circuit)	30 A	30 A	30 A
Max. short-circuit current per MPPT route	40 A	40 A	40 A
Max. backfeed current to the array	0 A	0 A	0 A
Min. start-up voltage	200 V	200 V	200 V

MPP voltage range	200-1000 V	200-1000 V	200-1000 V
MPP voltage range at full load	540-800 V (@AC 400 V) 625-850V (@AC 480 V)	540-800 V	540-800 V (@AC 380/400 V) 625-850V (@AC 480 V)
Rated input voltage	600 V (@AC 400 V) 720V (@AC 480 V)	600 V	570 V (@AC 380 V) 600 V (@AC 400 V) 720 V (@AC 480 V)
Number of inputs	20	20	20
Number of MPPT circuits	10	10	10

AC Output

Technical specifications	SUN2000-125KTL-M0	SUN2000-110KTL-M0	SUN2000-100KTL-M0	SUN2000-100KTL-M1	SUN2000-100KTL-INM0
Rated output power	125 kW	110 kW	100 kW	100 kW	100 kW
Max. apparent power	137,5 kVA	121 kVA	110 kVA	110 kVA	110 kVA
Max. output power (cos φ = 1)	137,5 kW	121 kW	110 kW	110 kW	110 kW
Rated output voltage	3~ 500 V	3~ 380/400 V or 3/N/PE~ 380/400 V	3~ 380/400 V or 3/N/PE~ 380/400 V	3/N/PE~ 380/400 V, or 3~ 380/400/480 V	3/N/PE~ 415 V or 3~ 415/480 V
Rated grid frequency	50 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Max. output current	160,4 A	185,7 A (@AC 380 V) 176,4 A (@AC 400 V)	168,8 A (@AC 380 V) 160,4 A (@AC 400 V)	168,8 A (@AC 380 V) 160,4 A (@AC 400 V) 133,7 A (@AC 480 V)	154,6 A (@AC 415 V) 133,7 A (@AC 480 V)
Power factor	0,8 leading … 0,8 lagging				
Max. total harmonic distortion (THD)	< 3%				
Remark: You can determine whether to connect the neutral wire to the SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1 or SUN2000-100KTL-INM0 based on the application					

scenario. If no neutral wire is used, set output mode to three-phase three-wire. If the neutral wire is used, set the output mode to three-phase four-wire.

Technical specifications	SUN2000-75KTL-M1
Rated output voltage	3/N/PE 380/400 V, 3~ 380/400/480 V
Rated grid frequency	50 / 60 Hz
Rated output power	75 kW
Max. output power	75 kW
Max. apparent power	75 kVA
Rated output current	113,6 A(@AC 380 V)/ 108,6 A(@AC 400 V)/ 90,25 A(@AC 480 V)
Max. output current Imax	113,6 A(@AC 380 V)/ 108,6 A(@AC 400 V)/ 90,25 A(@AC 480 V)
Power factor	0,8 leading … 0,8 lagging
Max. total harmonic distortion	< 3%
Remark: You can determine whether to connect the neutral wire to the SUN2000-75KTL-M1 based on the application scenario. If no neutral wire is used, set output mode to three-phase three-wire. If the neutral wire is used, set the output mode to three-phase four-wire.	

Technical specifications	SUN2000-115KTL-M2	SUN2000-110KTL-M2	SUN2000-100KTL-M2
Rated output power	115 kW	110 kW	100 kW
Max. apparent power	125 kVA	121 kVA	110 kVA
Max. output power (cos φ = 1)	125 kW	121 kW	110 kW
Rated output voltage	3/N/PE 400 V or 3~ 400/480 V	3~ 380/400 V or 3/N/PE 380/400 V	3/N/PE 380/400 V or 3~ 380/400/480 V
Rated grid frequency	50/60Hz	50/60Hz	50/60Hz
Max. output current	182,3 A (@AC 400 V) 151,9 A (@AC 480 V)	185,7 A (@AC 380 V) 176,4 A (@AC 400 V)	168,8 A (@AC 380 V) 160,4 A (@AC 400 V) 133,7 A (@AC 480 V)
Power factor	0,8 leading … 0,8 lagging		
Max. total harmonic distortion (THD)	< 3%		
Remark: You can determine whether to connect the neutral wire to the SUN2000-115KTL-M2, SUN2000-110KTL-M2, SUN2000-100KTL-M2 based on the application scenario. If no neutral wire is used, set output mode to three-phase three-wire. If the neutral wire is used, set the output mode to			

three-phase four-wire.

Protection

Technical specifications	All models
Input DC switch	Supported
Anti-islanding protection	Supported
Output overcurrent protection	Supported
Input reverse-connection protection	Supported
PV string fault detection	Supported
DC surge protection	Type II
AC surge protection	Type II
Insulation resistance detection	Supported
Residual current detection	Supported

Display and Communication

Technical specifications	All models
Display	LED indicator, Bluetooth module + app, USB data cable + app
RS485	Supported
MBUS	Supported

General Data

Technical specifications	All models
Dimensions (W x H x D)	1035 mm x 700 mm x 365 mm
Weight	81 kg (SUN2000-125KTL-M0) 90 kg (SUN2000-110KTL-M0, SUN2000-100KTL-M0, SUN2000-100KTL-M1, SUN2000-100KTL-INM0) 93 kg (SUN2000-115KTL-M2, SUN2000-110KTL-M2, SUN2000-100KTL-M2)
Operating temperature	-25°C to +60°C
Cooling	Smart air cooling
Operating altitude	4000 m
Humidity	0%-100% RH
Input terminal	Amphenol Helios H4
Output terminal	OT connector

Protection level	IP66
Protective class	Class I
Topology	Transformerless
Noise	≤ 65 dB(A)
Firmware version	V500R001(all models except -M2 models) V500R023(SUN2000-115KTL-M2, SUN2000-110KTL-M2, SUN2000-100KTL-M2)

The following safety parameters are factory set and fixed per EN 62109-2:2011.

Default interface protection settings

Parameters	Normative requirements		Internal threshold setting	
	Maximum clearance time	Trip limit	Maximum clearance time (factory setting)	Factory setting trip value
PV array Insulation resistance measurement before starting operation	-	≥1100V/30mA= 36,7 kΩ	-	50 kΩ as default Adjustable range: 50 kΩ - 1500 kΩ
Continuous residual current monitoring(functional)	300 ms	10 mA/kVA	300 ms	10 mA RMS per kVA based on inverter ratings
Sudden changes in residual current(functional)	300 ms	30 mA	300 ms	30 mA
	150 ms	60 mA	150 ms	60 mA
	40 ms	150 mA	40 ms	150 mA

Alteration of the above settings or full setting range of the interface protection may cause a breach of the type-certificate marking.

Unauthorised access to factory safety parameters setting and software should be prohibited.

A reset to the factory safety parameters requires retesting and verification in conjunction with the end-use system.

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Clause	Requirement – Test	Result – Remark	Verdict

4	**GENERAL TESTING REQUIREMENTS**		P
4.1	General		P
4.2	General conditions for testing		P
4.2.1	Sequence of tests		P
4.2.2	Reference test conditions		P
4.2.2.1	Environmental conditions		P
4.2.2.2	State of equipment		P
4.2.2.3	Position of equipment	Installed in accordance with the manufacturer's instructions, in the configuration that results in the worst-case test conditions	P
4.2.2.4	Accessories		P
4.2.2.5	Covers and removable parts	No accessories or operator interchangeable parts	N/A
4.2.2.6	Mains supply a) Voltage: b) Frequency: c) Polarity: d) Earthing: e) Over-current Protection:		P
4.2.2.7	Supply ports other than the mains	PV input	P
4.2.2.7.1	Photovoltaic supply sources a) Open circuit voltage: b) Short-circuit current:		P
4.2.2.7.2	Battery inputs	No batteries for energy storage	N/A
4.2.2.8	Conditions of loading for output ports	DC-AC inverter. a.c. output port was loaded with linear loads to obtain the maximum rated output power. Continuous operation ratings, until steady conditions are established.	P
4.2.2.9	Earthing terminals		P
4.2.2.10	Controls		P
4.2.2.11	Available short circuit current		P
4.3	Thermal testing	(see appended table 4.3)	P
4.3.1	General		P
4.3.2	Maximum temperatures		P
4.3.2.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.3.2.2	Touch temperatures		P
4.3.2.3	Temperature limits for mounting surfaces		P
4.4	Testing in single fault condition	(see appended table 4.4)	P
4.4.1	General		P
4.4.2	Test conditions and duration for testing under fault conditions		P
4.4.2.1	General		P
4.4.2.2	Duration of tests		P
4.4.3	Pass/fail criteria for testing under fault conditions		P
4.4.3.1	Protection against shock hazard		P
4.4.3.2	Protection against the spread of fire		P
4.4.3.3	Protection against other hazards		P
4.4.3.4	Protection against parts expulsion hazards		P
4.4.4	Single fault conditions to be applied		P
4.4.4.1	Component fault tests		P
4.4.4.2	Equipment or parts for short-term or intermittent operation	Not for short-term or intermittent operation	N/A
4.4.4.3	Motors		P
4.4.4.4	Transformer short circuit tests		P
4.4.4.5	Output short circuit		P
4.4.4.6	Backfeed current test for equipment with more than one source of supply		P
4.4.4.7	Output overload		P
4.4.4.8	Cooling system failure		P
4.4.4.9	Heating devices	No heating device	N/A
4.4.4.10	Safety interlock systems	No safety interlock	N/A
4.4.4.11	Reverse d.c. connections		P
4.4.4.12	Voltage selector mismatch	No voltage selector	N/A
4.4.4.13	Mis-wiring with incorrect phase sequence or polarity		P
4.4.4.14	Printed wiring board short-circuit test		P
4.5	Humidity preconditioning	(see appended table 7.5)	P
4.5.1	General		P
4.5.2	Conditions		P
4.6	Backfeed voltage protection		P
4.6.1	Backfeed tests under normal conditions		P
4.6.2	Backfeed tests under single-fault conditions		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.6.3	Compliance with backfeed tests		P
4.7	Electrical ratings tests	(see appended table 4.7)	P
4.7.1	Input ratings		P
4.7.1.1	Measurement requirements for DC input ports		P
4.7.2	Output ratings		P
5	**MARKING AND DOCUMENTATION**		P
5.1	Marking		P
5.1.1	General	The markings on external surface of enclosure, side enclosure with rating label and warning substance, warning symbols, and installation indication or switch position provided at close up of external connection interface. Graphic symbols per Annex C or IEC 60417, refer to section “copy of marking plate”	P
	Equipment shall bear markings as specified in 5.1 and 5.2		P
	Graphic symbols may be used and shall be in accordance with Annex C or IEC 60417 as applicable.		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		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	Tested with Isopropyl alcohol for 30s	P
5.1.3	Identification		P
	The equipment shall, as a minimum, be permanently marked with:		P
	a) the name or trade mark of the manufacturer or supplier	Refer to section “copy of marking plate”	P
	b) model number, name or other means to identify the equipment	Refer to section “copy of marking plate”	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.	Marking on equipment	P
5.1.4	Equipment ratings	Replaced, refer to EN 62109-2:2011 test report	N/A

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	Unless otherwise specified in another part of IEC 62109, the following ratings, as applicable shall be marked on the equipment:		N/A
	– input voltage, type of voltage (a.c. or d.c.), frequency, and max. continuous current for each input		N/A
	– 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 for each output		N/A
	– the ingress protection (IP) rating as in 6.3 below		N/A
5.1.5	Fuse identification		P
	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.		P
	Where fuses with special fusing characteristics such as time delay or breaking capacity are necessary, the type shall also be indicated		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.		P
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.	PV input: twenty inputs at ten MPP trackers marked with PV1 to PV20, MPPT1 to MPPT10, polarity + and -. Three DC switches are integrated in inverter, marked with DC switch 1 to 3. ON/OFF position is marked with ON/OFF. The AC output is connected by non-detachable cable with cable gland. For installation, pls. refer to installation manual. The symbol from Table C-7 is used for the PE and green-yellow wire used as well.	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.	Indicator lamps used for dangerous failure	P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	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 non-permanent 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		N/A
5.1.6.1	Protective Conductor Terminals	Symbol 7 of Annex C adjacent to earth terminal	P
	The means of connection for the protective earthing conductor shall be marked with:		P
	– symbol 7 of Annex C; or		P
	– the letters “PE“; or		N/A
	– the colour coding green-yellow.		N/A
5.1.7	Switches and circuit-breakers	The components DC switch is integrated in inverter. Output overcurrent protection maybe provided by external circuit breaker specified in user manual in additional to the internal protection of inverter.	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 for DC switch	P
5.1.8	Class II Equipment	Class I	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.		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		N/A
5.1.9	Terminal boxes for External Connections		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	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:		P
	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	Symbol 9 of Table C marked on label	P
5.2	Warning markings		P
5.2.1	Visibility and legibility requirements for warning markings		P
	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.		P
	If it is necessary to refer to the instruction manual to preserve the protection afforded by the equipment, the equipment shall be marked with symbol 9 of Annex C		P
	Symbol 9 of Annex C is not required to be used adjacent to symbols that are explained in the manual	Explained in the manual	P
5.2.2	Content for warning markings	See warning marking and user manual	P
5.2.2.1	Ungrounded heat sinks and similar parts	With grounded heat sink and similar metal 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 heat sink and shall be clearly visible when the PCE is disassembled to the extent that a risk of contact with the heat sink 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.	“hot surface” symbol used in warning marking	P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
5.2.2.3	Coolant	Air cooling	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:		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.	Symbol  used for warning on marking plate for installation, operation and maintenance	P
5.2.2.5	Motor guarding	No energy with power source removed for internal cooling fan	N/A
	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).		P
5.2.3	Sonic hazard markings and instructions	Measured <<80dBA@1m, no 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 ensure 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	PV and mains as sources of supply	P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	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.	Symbol 13 of Annex C used, and with the following substance in manual: Both ac and dc voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing. When the photovoltaic array is exposed to light, it supplies a dc voltage to this equipment.	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.	Located outside of the unit	P
5.2.5	Excessive touch current	Max. measured >3,5mA r.m.s. Permanently connected wiring and a cross-section of the protective earthing conductor of at least 10 mm^2 if copper, or 16 mm^2 if aluminum required in user manual; additional second protective earthing terminal provided on enclosure as well	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.	Symbol 15 of Annex C marked information refer to user manual	P
5.3	Documentation		P
5.3.1	General		P
	The documentation provided with the PCE shall provide the information needed for the safe operation, installation, and (where applicable) maintenance of the equipment. The documentation shall include the items required in 5.3.2 through 5.3.4, and the following:		P
	a) explanations of equipment makings, including symbols used	Refer to user manual	P
	b) location and function of terminals and controls		P
	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:	As specified in user manual, refer to “Technical data”	P
	– ENVIRONMENTAL CATEGORY as per 6.1	Meet requirements for outdoor use	P
	– WET LOCATIONS classification fort he intended external environment as per 6.1	Meet requirements for wet location use	P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	– POLLUTION DEGREE classification for the intended external environment as per 6.2	3	P
	– INGRESS PROTECTION rating as per 6.3	IP66	P
	– Ambient temperature and relative humidity ratings	-25˚C...+60˚C Relative humidity:0…100%	P
	– MAXIMUM altitude rating	4000m	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;	PV: II Mains: III	P
	d) a warning that when the photovoltaic array is exposed to light, it supplies a d.c. voltage to the PCE	Refer to user manual	P
5.3.1.1	Language	English	P
	Instructions related to safety shall be in a language that is acceptable in the country where the equipment is to be installed.		P
5.3.1.2	Format	Documentation provided in printed form and is to be delivered with the equipment	P
	In general, the documentation must be provided in printed form and is to be delivered with the equipment.		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.		N/A
5.3.2	Information related to installation	As specified in user manual, refer to information related to installation	P
	The documentation shall include installation and where applicable, specific commissioning instructions and, if necessary for safety, warnings against hazards which could arise during installation or commissioning of the equipment. The information provided shall include:		P
	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

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Clause	Requirement – Test	Result – Remark	Verdict
	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;		P
	g) instructions and information relating to sound pressure level if required by 10.2.1;	Measured <<80dBA@1m	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 such components	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 exceed the max. rated current of the circuit, as per 4.4.4.6;		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 integrated in 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
	n) where required by 7.3.8, the installation instructions shall include the following or equivalent wording:		N/A
	“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.”		N/A
	o) for PCE intended to charge batteries, the battery nominal voltage rating, size, and type	No charged battery	N/A
	p) PV array configuration information, such as ratings, whether the array is to be grounded or floating, any external protection devices needed, etc.		P

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Clause	Requirement – Test	Result – Remark	Verdict
5.3.3	Information related to operation	As specified in user manual, refer to information related to operation	P
	Instructions for use shall include any operating instructions necessary to ensure safe operation, including the following, as applicable:		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	Maintenance made only by professional service personal who is familiar with product	P
	Maintenance instructions shall include the following:		P
	– 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
	– Part numbers and instructions for obtaining any required operator replaceable parts;		P
	– 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	Without battery	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:		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	– 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
	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
6	**ENVIRONMENTAL REQUIREMENTS AND CONDITIONS**		P
	The manufacturer shall rate the PCE for the following environmental conditions:		P
	– ENVIRONMENTAL CATEGORY, as in 6.1 below	Meet requirements for outdoor use	P
	– Suitability for WET LOCATIONS or not	Meet requirements for wet location use	P
	– POLLUTION DEGREE rating in 6.2 below	PD 3 external, PD 2 internal	P
	– INGRESS PROTECTION (IP) rating, as in 6.3 below	IP66	P

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Clause	Requirement – Test	Result – Remark	Verdict
	– Ultraviolet (UV) exposure rating, as in 6.4 below	Metal enclosure used except with plastic window, DC switch, DC connector, AC cable gland, communication coupler with polymeric material UV resistant	P
	– Ambient temperature and relative humidity ratings, as in 6.5 below	-25˚C...+60˚C Relative humidity:0…100%	P
6.1	Environmental categories and minimum environmental conditions		P
6.1.1	Outdoor		P
6.1.2	Indoor, unconditioned		N/A
6.1.3	Indoor, conditioned		N/A
6.2	Pollution degree		P
6.3	Ingress Protection		P
6.4	UV exposure		P
6.5	Temperature and humidity		P
7	**PROTECTION AGAINST ELECTRIC SHOCK AND ENERGY HAZARDS**		P
7.1	General	See 7.3.7 Table: Clearance and creepage distance measurement “insulation diagram”	P
7.2	Fault conditions	Refer to subclause and table 4.4.4.	P
7.3	Protection against electric shock		P
7.3.1	General		P
7.3.2	Decisive voltage classification	Accessible communication circuit: DVC A; Power circuit and other circuits: DVC B, DVC C	P
7.3.2.1	Use of decisive voltage class (DVC)		P
7.3.2.2	Limits of DVC (according table 6)		P
7.3.2.3	Short-terms limits of accessible voltages under fault conditions		P
7.3.2.4	Requirements for protection (according table 7)	See 7.3.7 Table: Clearance and creepage distance measurement “insulation diagram”	P
7.3.2.5	Connection to PELV and SELV circuits		P
7.3.2.6	Working voltage and DVC		P
7.3.2.6.1	General		P
7.3.2.6.2	AC working voltage (see Figure 2)	AC Vmax: 500V considered for insulation with tolerance ±10%	P

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.2.6.3	DC working voltage (see Figure 3)	DC Vmax: 1100V considered for insulation	P
7.3.2.6.4	Pulsating working voltage (see Figure 4)		N/A
7.3.3	protective separation		P
	Protective separation shall be achieved by:		P
	▪ double or reinforced insulation, or		P
	▪ protective screening, i.e. by a conductive screen connected to earth by protective bonding in the PCE, or connected to the protective earth conductor itself, whereby the screen is separated from live parts by at least basic insulation, or		P
	▪ protective impedance comprising limitation of current per 7.3.5.3 and of discharged energy per 7.3.5.4, or		N/A
	▪ limitation of voltage according to 7.3.5.4.		N/A
	The protective separation shall be fully and effectively maintained under all conditions of intended use of the PCE		P
7.3.4	Protection against direct contact	Protection against eclectic shock by means of earthed metal enclosure	P
7.3.4.1	General		P
	Protection against direct contact is employed to prevent persons from touching live parts that do not meet the requirements of 7.3.5 and shall be provided by one or more of the measure given in 7.3.4.2 (enclosures and barriers) and 7.3.4.3 (insulation).		P
	Open type sub-assemblies and devices do not require protective measures against direct contact but the instruction provided with the equipment must indicate that such measures must be provided in the end equipment or in the installation.		N/A
	Product intended for installation in CLOSED ELECTRICAL OPERATING AREAS, (see 3.9) need not have protective measures against direct contact, except as required by 7.3.4.2.4.		N/A
7.3.4.2	Protection by means of enclosures and barriers	Protection against eclectic shock by means of earthed metal enclosure	P
	The following requirements apply where protection against contact with live parts is provided by enclosures or barriers, not by insulation in accordance with 7.3.4.3.		P
7.3.4.2.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Parts of enclosures and barriers that provide protection in accordance with these requirements shall not be removable without the use of a tool (see 7.3.4.2.3).		P
	Polymeric materials used to meet these requirements shall also meet the requirements of 13.6	Plastic panel for light indicator	P
7.3.4.2.2	Access probe criteria		P
	Protection is considered to be achieved when the separation between the test probes and live parts, when tested as described below, is as follows:		P
	a) decisive voltage classification A, (DVC A) - the probe may touch the live parts	Communication interface	P
	b) decisive voltage classification B, (DVC B) - the probe must not touch bare live parts	Not access	P
	c) decisive voltage classification C, (DVC C) – the probe must have adequate clearance to live parts, based on the clearance for Basic insulation using the recurring peak working voltage involved,	Not access	P
7.3.4.2.3	Access probe tests		P
	Compliance with 7.3.4.2.1 is checked by all of the following:		P
	a) Inspection; and		P
	b) Tests with the test finger (Figure D.1) and test pin (Figure D.2) of 0E, the results of which shall comply with the requirements of 7.3.4.2.1 a), b), and c) as applicable. Probe tests are performed on openings in the enclosures after removal of parts that can be detached or opened by an operator without the use of a tool, including fuseholders, and with operator access doors and covers open. It is permitted to leave lamps in place for this test. Connectors that can be separated by an operator without use of a tool, shall also be tested during and after disconnection. Any movable parts are to be put in the most unfavourable position.	IP66 without openings on enclosure, for mechanical enclosure test finger cannot access to live parts and approved external connecting device used	P
	The test finger and the test pin are applied as above, without appreciable force, in every possible position, except that floor-standing equipment having a mass exceeding 40 kg is not tilted.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Equipment intended for building-in or rack mounting, or for incorporation in larger equipment, is tested with access to the equipment limited according to the method of mounting detailed in the installation instructions.		N/A
	c) Openings preventing the entry of the jointed test finger (Figure E-1 of 0E) during test b) above, are further tested by means of straight unjointed test finger (Figure E-3 of 0E), applied with a force of 30 N. If the unjointed finger enters, the test with the jointed finger is repeated except that the finger is applied using any necessary force up to 30 N.		P
	d) In addition to a) – c) above, top surfaces of enclosure shall be tested with the IP3X probe of IEC 60529. The test probe shall not penetrate the top surface of the enclosure when probed from the vertical direction ±5 ° only.	No openings on top enclosure	N/A
7.3.4.2.4	Service access areas	The manufacturer's manual with the following substance: No use-serviceable parts inside, before servicing and in the event of internal malfunction the unit, send the inverter to authorized representative or manufacture! Never operate this product and change any part of inverter by yourself. Only trained and authorized professional personnel who are familiar with the requirements of safety is allowed to perform servicing and maintenance work. Always disconnect the unit from the MAINS and PV supply by the external customer installed disconnecting devices before installation, servicing and maintenance works	N/A
7.3.4.3	Protection by means of insulation of live parts	See 7.3.7 Table: Clearance and creepage distance measurement "insulation diagram"	P
	Where the requirements of 7.3.4.2 are not met, live parts shall be provided with insulation if:		P
	– their working voltage is greater than the maximum limit of decisive voltage class A, or		P

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Clause	Requirement – Test	Result – Remark	Verdict
	– for a DVC A or B circuit, protective separation from adjacent circuit of DVC C is not provided (see note "‡" under Table 7)		P
7.3.5	Protection in case of direct contact		P
7.3.5.1	General		P
	Protection in case of direct contact is required to ensure that contact with live parts does not produce a shock hazard.		P
	The protection against direct contact according to 7.3.4 is not required if the circuit contacted is separated from other circuits according to 7.3.2.3, and:		P
	– is of decisive voltage class A and complies with 7.3.5.2, or		P
	– is provided with protective impedance according to 7.3.5.3, or		N/A
	– is limited in voltage according to 7.3.5.4		N/A
	In addition to the measures as given in 7.3.5.2 to 7.3.5.4, it shall be ensured that in the event of error or polarity reversal of connectors no voltages that exceed DVC A can be connected into a circuit with protective separation. This applies for example to plug-in-sub-assemblies or other plug-in devices which can be plugged-in without the use of a tool (key) or which are accessible without the use of a tool.		P
	Conformity is checked by visual inspection and trial insertion.		P
7.3.5.2	Protection using decisive voltage class A	Communication interface	P
7.3.5.3	Protection by means of protective impedance		N/A
	Circuits and conductive parts do not require protection against direct contact if any connection to circuits of DVC-B or DVC-C is through protective impedance, and the accessible circuit or part is otherwise provided with protective separation from circuits of DVC-B or DVC-C according 7.3.3.		N/A
7.3.5.3.1	Limitation of current through protective impedance		N/A
	The current available through protective impedance to earth and between simultaneously accessible parts, measured at the accessible live parts, shall not exceed a value of 3,5 mA a.c. or 10 mA d.c. under normal and single-fault conditions.		N/A
7.3.5.3.2	Limitation of discharging energy through protective impedance		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The discharging energy available between simultaneously accessible parts protected by protective impedance shall not exceed the charging voltage and capacitance limits given in Table 9, which applies to both wet and dry locations, under normal and single fault conditions. Refer to figure 8.		N/A
7.3.5.4	Protection by means of limited voltages		N/A
	That portion of a circuit that has its voltage reduced to DVC-A by a voltage divider that complies with the following requirements, and that is otherwise provided with protective separation from circuits of DVC-B or DVC-C according to 7.3.3, does not require protection against direct contact.		N/A
	The voltage divider shall be designed so that under normal and single fault conditions, including faults in the voltage division circuit, the voltage across the output of the voltage divider does not exceed the limit for DVC-A.		N/A
	This type of protection shall not be used in case of protective class II or unearthed circuits, because it relies on protective earth being connected.		N/A
7.3.6	Protection against indirect contact		P
7.3.6.1	General		P
	Protection against indirect contact is required to prevent shock- hazardous current being accessible from conductive parts during an insulation failure. This protection shall comply with the requirements for protective class I (basic insulation plus protective earthing), class II (double or reinforced insulation) or class III (limitation of voltages)	Protective class I part: basic insulation plus protective earthing. protective class II part(PV connector, DC switch, LED cover): reinforced insulation protective class III part (operator access communication port): DVC A	P
	That part of a PCE meets the requirements of 7.3.6.2 and 7.3.6.3 is defined as protective class I		P
	That part of a PCE meets the requirements of 7.3.6.4 is defined as protective class II.	Plastic panel, DC switch and PV connector	P
	That part of PCE which meets the requirements of decisive voltage class A and in which no hazardous voltages are derived, is defined as protective class III. No shock hazard is present in such circuits.		P
	Where protection against indirect contact is dependent on means provided during installation, the installation instructions shall provide details of the required means and shall indicate the associated hazards.		N/A
7.3.6.2	Insulation between live parts and accessible conductive parts	See 7.3.7 Table: Clearance and creepage distance measurement “insulation diagram”	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Accessible conductive parts of equipment shall be separated from live parts by insulation meeting the requirements of Table 7 or by clearances as specified in 7.3.7.4 and creepages as specified in 7.3.7.5		P
7.3.6.3	Protective class I – Protective bonding and earthing		P
7.3.6.3.1	General		P
	Equipment of protective class I shall be provided with protective earthing, and with protective bonding to ensure electrical contact between accessible conductive parts and the means of connection for the external protective earthing conductor, except bonding is not required for:	PE arrangement: external protective earthing is to be connected to terminal near AC terminal block, and an second protective earthing conductor is bonded to metal case, refer to installation manual	P
	a) accessible conductive parts that are protected by one of the measures in 7.3.5.2 to 7.3.5.4, or		P
	b) accessible conductive parts are separated from live parts of DVC-B or -C using double or reinforced insulation.		P
7.3.6.3.2	Requirements for protective bonding		P
	Electrical contact with the means of connection of the external protective earthing conductor shall be achieved by one or more of the following means:		P
	a) through direct metallic contact;	As tightening with torque specified in user manual	P
	b) through other conductive parts which are not removed when the PCE or sub-units are used as intended ;		N/A
	c) through a dedicated protective bonding conductor;		P
	d) through other metallic components of the PCE		N/A
	Where direct metallic contact is used and one or both of the parts involved is painted or coated, the paint or coating shall be removed in the area of contact, or reliably penetrated, to ensure metal to metal contact.	The paint removed in the area of contact	P
	For moving or removable parts, hinges or sliding contacts designed and maintained to have a low resistance are examples of acceptable means if they comply with the requirements of 7.3.6.3.3.		N/A
	Metal ducts of flexible or rigid construction and metallic sheaths shall not be used as protective bonding conductors, unless the device or material has been investigated as suitable for protective bonding purposes.		N/A
7.3.6.3.3	Rating of protective bonding		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Protective bonding shall withstand the highest thermal and dynamic stresses that can occur to the PCE item(s) concerned when they are subjected to a fault connecting live parts to accessible conductive parts. The protective bonding shall remain effective for as long as a fault to the accessible conductive parts persists or until an upstream protective device removes power from the part.		P
	Protective bonding shall meet following requirements:		P
	a) For PCE with an overcurrent protective device rating of 16 A or less, the impedance of the protective bonding means shall not exceed 0,1 Ω during or at the end of the test below.		N/A
	b) For PCE with an overcurrent protective device rating of more than 16 A, the voltage drop in the protective bonding test shall not exceed 2,5 V during or at the end of the test below.		N/A
	As alternative to a) and b) the protective bonding may designed according to the requirements for the external protective earthing conductor in 7.3.6.3.5, in which case no testing is required.		P
	The impedance of protective bonding means shall be checked by passing a test current through the bond for a period of time as specified below. The test current is based on the rating of the overcurrent protection for the equipment or part of the equipment under consideration, as follows:		N/A
	a) For pluggable equipment type A, the overcurrent protective device is that provided external to the equipment (for example, in the building wiring, in the mains plug or in an equipment rack);		N/A
	b) For pluggable equipment type B and fixed equipment, the maximum rating of the overcurrent protective device specified in the equipment installation instructions to be provided external to the equipment;		N/A
	c) For a circuit or part of the equipment for which an overcurrent protective device is provided as part of the equipment, the rating of the provided overcurrent device.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Voltages are measured from the protective earthing terminal to all parts whose protective bonding means are being considered. The impedance of the protective earthing conductor is not included in the measurement. However, if the protective earthing conductor is supplied with the equipment, it is permitted to include the conductor in the test circuit but the measurement of the voltage drop is made only from the main protective earthing terminal to the accessible part required to be earthed.		N/A
	On equipment where the protective earth connection to a subassembly or to a separate unit is part of a cable that also supplies power to that subassembly or unit, the resistance of the protective bonding conductor in that cable is not included in the protective bond impedance measurements for the subassembly or separate unit, as shown in Figure 11. However, this option is only permitted if the cab le is protected by a suitably rated protective device that takes into account the size of the conductor. Otherwise the impedance of the protective bonding conductor between the separate units is to be included, by measuring to the protective earthing terminal where the power source enters the first unit in the system, as shown in Figure 12.		N/A
7.3.6.3.3.1	Test current, duration, and acceptance criteria		N/A
	The test current, duration of the test and acceptance criteria are as follows:		N/A
	a) For PCE with an overcurrent protective device rating of 16 A or less, the test current is 200% of the overcurrent protective device rating, but not less than 32 A, applied for 120s. The impedance of the protective bonding means during and at the end of the test shall not exceed 0,1 Ω.		N/A
	b) For PCE with an overcurrent protective device rating of more than 16 A, the test current is 200% of the overcurrent protective device rating and the duration of the test is as shown in Table 10 below. The voltage drop in the protective bonding means, during and at the end of the test, shall not exceed 2,5 V.		N/A
	c) During and after the test, there shall be no melting, loosening, or other damage that would impair the effectiveness of the protective bonding means.		N/A
	The test current is derived from an a.c or d.c supply source, the output of which is not earthed.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	As an alternative to Table 10, where the time-current characteristic of the overcurrent protective device that limits the fault current in the protective bonding means is known because the device is either provided in the equipment or fully specified in the installation instructions, the test duration may be based on that specific device's time-current characteristic. The tests are conducted for a duration corresponding to the 200% current value on the time-current characteristic.		N/A
7.3.6.3.4	Protective bonding impedance (routine test)	Manufacturer's work instruction and declaration based on this clause	N/A
	If the continuity of the protective bonding is achieved at any point by a single means only (for example a single conductor or single fastener), or if the PCE is assembled at the installation location, then the impedance of the protective bonding shall also be tested as a routine test. The test shall be as in 7.3.6.3.3, except for the following:		N/A
	▪ the test current may be reduced to any convenient value greater than 10 A sufficient to allow measurement or calculation of the impedance of the protective bonding means:		N/A
	▪ the test duration may be reduced to no less than 2 s		N/A
	For equipment subject to the type test in 7.3.6.3.3.1a), the impedance during the routine test shall not exceed 0,1Ω.		N/A
	For equipment subject to the type test in 7.3.6.3.3.1b) the impedance during the routine test shall not exceed 2,5 V divided by the test current required by 7.3.6.3.3.1b).		N/A
7.3.6.3.5	External protective earthing conductor	Required >35 mm^2 (copper) or >50 mm^2 (Aluminum or Aluminum Alloy) detail refer to user manual	P
	A protective earthing conductor shall be connected at all times when power is supplied to PCE of protective class I. Unless local wiring regulations state otherwise, the protective earthing conductor cross-sectional area shall be determined from Table 11 or by calculation according to IEC 60364-5-54.		P
	If the external protective earthing conductor is routed through a plug and socket or similar means of disconnection, it shall not be possible to disconnect it unless power is simultaneously removed from the part to be protected.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The cross-sectional area of every external protective earthing conductor which does not form part of the supply cable or cable enclosure shall, in any case, be not less than:	External cable prepared by Installer, should follow with this rule and user manual	P
	▪ 2,5 mm² if mechanical protection is provided;		N/A
	▪ 4 mm² if mechanical protection is not provided.		P
	For cord-connected equipment, provisions shall be made so that the external protective earthing conductor in the cord shall, in the case of failure of the strain-relief mechanism, be the last conductor to be interrupted.		P
7.3.6.3.6	Means of connection for the external protective earthing conductor	Connection means for main earthing conductor: separate terminal provided near the AC terminal block Connection means for second earthing conductor: terminal provided on enclosure through locking washer, nut, isolating washer and UL approved ring terminal	P
7.3.6.3.6.1	General		P
	The means of connection for the external protective earthing conductor shall be located near the terminals for the respective live conductors. The means of connections shall be corrosion-resistant and shall be suitable for the connection of cables according to 7.3.6.3.5. The means of connection for the protective earthing conductor shall not be used as a part of the mechanical assembly of the equipment or for other connections. A separate means of connection shall be provided for each external protective earthing conductor. Connection and bonding points shall be so designed that their current-carrying capacity is not impaired by mechanical, chemical, or electrochemical influences. Where enclosures and/or conductors of aluminium or aluminium alloys are used, particular attention should be given to the problems of electrolytic corrosion.		P
	The means of connection for the protective earthing conductor shall be permanently marked with:		P
	• symbol 7 of Annex C; or		P
	• the colour coding green-yellow		N/A
	Marking shall not be done on easily changeable parts such as screws.		P

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.6.3.7	Touch current in case of failure of the protective earthing conductor		P
	The requirements of this sub-clause shall be satisfied to maintain safety in case of damage to or disconnection of the protective earthing conductor.		P
	For pluggable equipment type A, the touch current measured in accordance with 7.5.4 shall not exceed 3,5 mA a.c. or mA d.c.	Not a pluggable type A equipment	N/A
	For all other PCE, one or more of the following measure shall be applied, unless the touch current measured in accordance with 7.5.4 using the test network of IEC 60990 test figure 4 shall not exceed 3,5 mA a.c. or 10 mA d.c.	Max. measured >3,5mA r.m.s. after IP test, thermal testing, single fault, and humidity preconditioning, See 7.3.6.3.7 Table	P
	a) Permanently connected wiring, and:		P
	• a cross-section of the protective earthing conductor of at least 10 mm² Cu or 16 mm² Al; or		P
	• automatic disconnection of the supply in case of discontinuity of the protective earthing conductor; or		N/A
	• provision of an additional terminal for a second protective earthing conductor of the same cross-sectional area as the original protective earthing conductor and installation instruction requiring a second protective earthing conductor to be installed or	A second protective earthing terminal provided on the enclosure	P
	b) Connection with an industrial connector according to IEC 60309 and a minimum protective earthing conductor cross-section of 2,5 mm² as part of a multi-conductor power cable. Adequate strain relief shall be provided.		N/A
	In addition, the caution symbol 15 of Annex C shall be fixed to the product and the installation manual shall provide details of the protective earthing measures required in the installation as required in 5.3.2.	Symbol 15 used in warning marking	P
	When it is intended and allowed to connect two or more PCEs in parallel using one common PE conductor, the above touch current requirements apply to the maximum number of the PCEs to be connected in parallel, unless one of the measures in a)	Not allowed	N/A
	or b) above is used. The maximum number of parallel PCEs is used in the testing and has to be stated in the installation manual.		N/A
7.3.6.4	Protective Class II – Double or Reinforced Insulation		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Equipment or parts of equipment designed for protective class II shall have insulation between live parts and accessible surfaces in accordance with 7.3.4.3. The following requirements also apply:		P
	• equipment designed to protective class II shall not have means of connection for the external protective earthing conductor. However this does not apply if the external protective earthing conductor is passed through the equipment to equipment series-connected beyond it. In the latter event, the external protective earthing conductor and its means for connection shall be insulated with basic insulation from the accessible surface of the equipment and from circuits that employ protective separation, extra-low voltage, protective impedance and limited discharging energy, according to 7.3.5. This basic insulation shall correspond to the rated voltage of the series-connected equipment;		P
	• metal-encased equipment of protective class II may have provision on its enclosure for the connection of an equipotential bonding conductor;		N/A
	• equipment of protective class II may have provision for the connection of an earthing conductor for functional reasons or for damping of overvoltages; it shall, however, be insulated as though it is a live part;		N/A
	• equipment employing protective class II shall be marked according to 5.1.8.	Class I equipment	N/A
7.3.7	Insulation Including Clearance and Creepage Distance	See 7.3.7 Table: Clearance and creepage distance measurement “insulation diagram”	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	PD 3 external, PD 2 internal	P
	• overvoltage category	PV: II; Mains: III	P
	• supply earthing system	TN, TT, IT	P
	• insulation voltage	1100VDC(PV) and 500VAC(Mains)	P

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Clause	Requirement – Test	Result – Remark	Verdict
	• location of insulation	See 7.3.7 Table: Clearance and creepage distance measurement “insulation diagram”	P
	• type of insulation	See 7.3.7 Table: Clearance and creepage distance measurement “insulation diagram”	P
	Compliance of insulation, creepage distances, and clearance distances, shall be verified by measurement or visual inspection, and the tests of 7.5.		P
7.3.7.1.3	Supply earthing systems		P
	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 system: 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		P
	Table 12 makes use of the circuit system voltage and overvoltage category to define the impulse withstands voltage and the temporary overvoltage.		P
7.3.7.2	Insulation between a circuit and its surroundings		P
7.3.7.2.1	General	500 V(IT), OVC III (4000 V impulse voltage, 1500 Vrms temporary overvoltage) for the AC output terminal and 1100 V, OVC II (4772 V impulse voltage, no temporary overvoltage) for the PV input terminal	P
7.3.7.2.2	Circuits connected directly to the mains		P
7.3.7.2.3	Circuits other than mains circuits		P
7.3.7.2.4	Insulation between circuits		P

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.7.3	Functional insulating		P
7.3.7.4	Clearance distances		P
7.3.7.4.1	Determination		P
7.3.7.4.2	Electric field homogeneity	Inhomogeneous electric field is considered for PCE	N/A
7.3.7.4.3	Clearance to conductive enclosures		P
7.3.7.5	Creepage distances	(see appended table 7.3.7)	P
7.3.7.5.1	General	PV Maximum 1100 Vd.c. system voltage is used for the RMS voltage across insulation	P
7.3.7.5.2	Voltage		P
7.3.7.5.3	Materials	Certified PWB used. Other material are considered IIIb The inside parts are considered pollution degree 2	P
7.3.7.6	Coating	No coating provided insulation	N/A
7.3.7.7	PWB spacings for functional insulating		P
7.3.7.8	Solid insulating	(see appended table 7.3.7)	P
7.3.7.8.1	General		P
7.3.7.8.2	Requirements for electrical withstand capability of solid insulation		P
7.3.7.8.2.1	Basic, supplemental, reinforced, and double insulation		P
7.3.7.8.2.2	Functional insulation		P
7.3.7.8.3	Thin sheet or tape material		P
7.3.7.8.3.1	General		P
7.3.7.8.3.2	Material thickness not less than 0,2 mm		P
7.3.7.8.3.3	Material thickness less than 0,2 mm		P
7.3.7.8.3.4	Compliance		P
7.3.7.8.4	Printed wiring boards		P
7.3.7.8.4.1	General		P
7.3.7.8.4.2	Use of coating materials		N/A
7.3.7.8.5	Wound components		P
7.3.7.8.6	Potting materials	For potting material used cover protective optocoupler, used as solid insulation	P
7.3.7.9	Insulation requirements above 30 kHz	Evaluated according to Annex G	P
7.3.8	Residual Current-operated protective (RCD) or monitoring (RCM) device compatibility	RCMU integrated for PV side protection, refer to EN 62109-2:2011 test report	P

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Clause	Requirement – Test	Result – Remark	Verdict
	RCD and RCM are used to provide protection against insulation faults in some domestic and industrial installations, additional to that provided by the installed equipment.	If an external RCD or residual current breaker is required, must follow with local regulation, type B should be used for main side.	P
7.3.9	Capacitor discharge		P
7.3.9.1	Operator access area		P
	Equipment shall be so designed that there is no risk of electric shock in operator access areas from charge stored on capacitors after disconnection of the PCE.	Not access for operator from outside. Symbol  used for warning on marking plate for installation, operation and maintenance.	P
7.3.9.2	Service access areas		P
	Capacitors located behind panels that are removable for servicing, installation, or disconnection shall present no risk of electric shock or energy hazard from charge stored on capacitors after disconnection of the PCE.	For repairing and internal maintenance, only by professional service personal who is familiar with product. Symbol  used for warning on marking plate for installation, operation and maintenance.	P
7.4	Protection against energy hazards		P
7.4.1	Determination of hazardous energy level		P
	A hazardous energy level is considered to exist if		P
	a) The voltage is 2 V or more, and power available after 60 s exceeds 240 VA.	Access to internal power circuit, tool required. No user serviceable parts inside the device per manufacturer's manual. Operator access: communication interface circuit, external connecting device for PV generator and MAINs connection: approved installation coupler used or cable gland used	P
	b) The stored energy in a capacitor is at a voltage. U of 2 V or more, and the stored energy. E, calculated from the following equation, exceeds 20J: $E = 0,5\ CU^2$		P
7.4.2	Operator Access Areas		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Equipment shall be so designed that there is no risk of energy hazard in operator access areas from accessible circuits.	Only access DVC A circuit(communication interface), no risk of energy hazard in operator access area from accessible circuits.	P
7.4.3	Services Access Areas	For repairing and internal maintenance, only by professional service personal who is familiar with product.  Symbol used for warning on marking plate for installation, operation and maintenance. <20J after 15 min inside	P
7.5	Electrical tests related to shock hazard	(see appended table 7.5)	P
7.5.1	Impulse voltage test (type test)		P
7.5.2	Voltage test (dielectric strength test)		P
7.5.2.1	Purpose of test		P
7.5.2.2	Value and type of test voltage		P
7.5.2.3	Humidity pre-conditioning		P
7.5.2.4	Performing the voltage test		P
7.5.2.5	Duration of the a.c. or d.c. voltage test		P
7.5.2.6	Verification of the a.c. or d.c. voltage test		P
7.5.3	Partial discharge test	(see appended table 7.5)	N/A
7.5.4	Touch current measurement (type test)		P
	The touch current shall be measured if required by 7.3.6.3.7 and shall not be greater than 3.5 mA a.c. or 10 mA d.c. or special measures of protection as given in 7.3.6.3.7 are required.		P
	For type tests on PCE for which wet locations requirements apply according to 6.1, the humidity pre-conditioning of 4.5 shall be performed immediately prior to the touch current test.		P
7.5.5	Equipment with multiple sources of supply		P
8	**PROTECTION AGAINST MECHANICAL HAZARDS**		P
8.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Operation shall not lead to a mechanical HAZARD in NORMAL CONDITION or SINGLE FAULT CONDITION. Edges, projections, corners, openings, guards, handles and the like, that are accessible to the operator shall be smooth and rounded so as not to cause injury during normal use of the equipment.	Edges, projections, corners, openings, guards, handles and the like, that are accessible to the OPERATOR are smooth and rounded	P
	Conformity is checked as specified in 8.2 to 8.6.		P
8.2	Moving parts		N/A
	Moving parts shall not be able to crush, cut or pierce parts of the body of an OPERATOR likely to contact them, nor severely pinch the OPERATOR's skin. Hazardous moving parts of equipment, that is moving parts which have the potential to cause injury, shall be so arranged, enclosed or guarded as to provide adequate protection against the risk of personal injury.	No moving parts are accessible from outside	P
8.2.1	Protection of service persons	Power sources need to be removed when servicing and no moving part inside	N/A
	Protection shall be provided such that unintentional contact with hazardous moving parts is unlikely during servicing operations. If a guard over a hazardous moving part may need to be removed for servicing, the marking of symbol 15 of Table D-1 shall be applied on or near the guard.		N/A
8.3	Stability		N/A
	Equipment and assemblies of equipment not secured to the building structure before operation shall be physically stable in NORMAL USE.	Wall mounting	N/A
8.4	Provisions for lifting and carrying		P
	If carrying handles or grips are fitted to, or supplied with, the equipment, they shall be capable of withstanding a force of four times the weight of the equipment.	Weight: 90kg×4 for from zero to full load in 5 s to 10 s, then maintained for 1 min, handles/grips not break loose from the equipment and not be any permanent distortion, cracking or other evidence of failure.	P
	Equipment or parts having a mass of 18 kg or more shall be provided with a means for lifting and carrying or directions shall be given in the manufacturer's documentation.		P
8.5	Wall mounting		P
	Mounting brackets on equipment intended to be mounted on a wall or ceiling shall withstand a force of four times the weight of the equipment.	Weight: 90kg×4 for from zero to full load in 5 s to 10 s, then maintained for 1 min, no damage to mounting brackets	P
8.6	Expelled parts		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Equipment shall contain or limit the energy of parts that could cause a HAZARD if expelled in the event of a fault.	No such parts	N/A
9	**PROTECTION AGAINST FIRE HAZARDS**		P
9.1	Resistance to fire		P
	This subclause specifies requirements intended to reduce the risk of ignition and the spread of flame, both within the equipment and to the outside, by the appropriate use of materials and components and by suitable construction.		P
9.1.1	Reducing the risk of ignition and spread of flame	Method 1 used	P
	For equipment or a portion of equipment, there are two alternative methods of providing protection against ignition and spread of flame that could affect materials, wiring, wound components and electronic components such as integrated circuits, transistors, thyristors, diodes, resistors and capacitors.		P
9.1.2	Conditions for a fire enclosure		P
	A FIRE ENCLOSURE is required for equipment or parts of equipment for which Method 2 is not fully applied and complied with.		P
9.1.2.1	Parts requiring a fire enclosure		P
	Except where Method 2 is used, or as permitted in 9.1.2.2, the following are considered to have a risk of ignition and, therefore, require a FIRE ENCLOSURE:		P
	– components in PRIMARY CIRCUITS		P
	– components in SECONDARY CIRCUITS supplied by power sources which exceed the limits for a LIMITED POWER SOURCE as specified in 9.2;		N/A
	– components in SECONDARY CIRCUITS supplied by a LIMITED POWER SOURCE as specified in 9.2, but not mounted on a material of FLAMMABILITY CLASS V-1;		N/A
	– components within a power supply unit or assembly having a limited power output complying with the criteria for a LIMITED POWER SOURCE as specified in 9.2, including overcurrent protective devices, limiting impedances, regulating networks and wiring, up to the point where the LIMITED POWER SOURCE output criteria are met;		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	– components having unenclosed arcing parts, such as open switch and relay contacts and commutators, in a circuit at HAZARDOUS VOLTAGE or at a HAZARDOUS ENERGY LEVEL; and	DC switch with open-contacts and plastic components of fire enclosure located more than 13 mm through air from parts that arc under normal conditions	P
	– insulated wiring, except as permitted in 9.1.2.2.		P
9.1.2.2	Parts not requiring a fire enclosure		N/A
9.1.3	Materials requirements for protection against fire hazard		P
9.1.3.1	General		P
	ENCLOSURES, components and other parts shall be so constructed, or shall make use of such materials, that the propagation of fire is limited.		P
9.1.3.2	Materials for fire enclosures		P
	If an enclosure material is not classified as specified below, a test may be performed on the final enclosure or part of the enclosure, in which case the material shall additionally be subjected to periodic SAMPLE testing.		N/A
9.1.3.3	Materials for components and other parts outside fire enclosures	V-0 material used	P
	Except as otherwise noted below, materials for components and other parts (including MECHANICAL ENCLOSURES, ELECTRICAL ENCLOSURES and DECORATIVE PARTS); located outside FIRE ENCLOSURES, shall be of FLAMMABILITY CLASS HB.	Fire enclosure also as mechanical enclosure and electrical enclosure	P
9.1.3.4	Materials for components and other parts inside fire enclosures	All internal components are rated V-2 or better or mounded on PCB rated V-0.	P
9.1.3.5	Materials for air filter assemblies		N/A
9.1.4	Openings in fire enclosures	IP66 electrical enclosure without openings	N/A
9.1.4.1	General		N/A
	For equipment that is intended to be used or installed in more than one orientation as specified in the product documentation, the following requirements apply in each orientation.		N/A
	These requirements are in addition to those in the following sections:		N/A
	– 7.3.4, Protection against direct contact;		N/A
	– 7.4, Protection against energy hazards;		N/A
	– 13.5, Openings in enclosures		N/A
9.1.4.2	Side openings treated as bottom openings		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
9.1.4.3	Openings in the bottom of a fire enclosure		N/A
	The bottom of a FIRE ENCLOSURE or individual barriers, shall provide protection against emission of flaming or molten material under all internal parts, including partially enclosed components or assemblies, for which Method 2 of 9.1.1 has not been fully applied and complied with.		N/A
9.1.4.4	Equipment for use in a CLOSED ELECTRICAL OPERATING AREA		N/A
	The requirements of 9.1.4.3 do not apply to FIXED EQUIPMENT intended only for use in a CLOSED ELECTRICAL OPERATING AREA and to be mounted on a concrete floor or other non-combustible surface. Such equipment shall be marked as follows:		N/A
	WARNING: FIRE HAZARD SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY		N/A
9.1.4.5	Doors or covers in fire enclosures		P
9.1.4.6	Additional requirements for openings in transportable equipment		N/A
9.2	LIMITED POWER SOURCES		P
9.2.1	General		P
9.2.2	Limited power source tests	(see appended table 9.2.2)	P
9.3	Short-circuit and overcurrent protection		P
9.3.1	General		P
	The PCE shall not present a hazard, under short-circuit or overcurrent conditions at any port, including phase-to-phase, phase-to-earth and phase-to-neutral, and adequate information shall be provided to allow proper selection of external wiring and external protective devices.		P
9.3.2	Protection against short-circuits and overcurrents shall be provided for all input circuits, and for output circuits that do not comply with the requirements for limited power sources in 9.2, except for circuits in which no overcurrent hazard is presented by short-circuits and overloads.		P

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Clause	Requirement – Test	Result – Remark	Verdict
9.3.3	Protective devices provided or specified shall have adequate breaking capacity to interrupt the maximum short circuit current specified for the port to which they are connected. If protection that is provided integral to the PCE for an input port is not rated for the short-circuit current of the circuit in which it is used, the installation instructions shall specify that an upstream protective device, rated for the prospective short-circuit current of that port, shall be used to provide backup protection.		P
10	**PROTECTION AGAINST SONIC PRESSURE HAZARDS**		P
10.1	General		P
	The equipment shall provide protection against the effect of sonic pressure. Conformity tests are carried out if the equipment is likely to cause such HAZARDS.		P
10.2	Sonic pressure and Sound level	Measured <<80dBA@1m	P
10.2.1	Hazardous Noise Levels		N/A
11	**PROTECTION AGAINST LIQUID HAZARDS**		N/A
11.1	Liquid Containment, Pressure and Leakage	Without liquid containment system	N/A
	The liquid containment system components shall be compatible with the liquid to be used.		N/A
	There shall be no leakage of liquid onto live parts as a result of:		N/A
	a) Normal operation, including condensation;		N/A
	b) Servicing of the equipment; or		N/A
	c) Inadvertent loosening or detachment of hoses or other cooling system parts over time.		N/A
11.2	Fluid pressure and leakage		N/A
11.2.1	Maximum pressure		N/A
11.2.2	Leakage from parts		N/A
11.2.3	Overpressure safety device		N/A
11.3	Oil and grease	Not used	N/A
12	**CHEMICAL HAZARDS**		N/A
12.1	General		N/A
13	**PHYSICAL REQUIREMENTS**		P
13.1	Handles and manual controls		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Handles, knobs, grips, levers and the like shall be reliably fixed so that they will not work loose in normal use, if this might result in a hazard. Sealing compounds and the like, other than self-hardening resins, shall not be used to prevent loosening. If handles, knobs and the like are used to indicate the position of switches or similar components, it shall not be possible to fix them in a wrong position if this might result in hazard.	DC switch, PV connector and Communication connector on bottom and cable gland	P
13.1.1	Adjustable controls	Without adjustable controls	N/A
13.2	Securing of parts		P
13.3	Provisions for external connections		P
13.3.1	General		P
13.3.2	Connection to an a.c. Mains supply	Terminal block for AC cable connection with cable gland for tightening	P
13.3.2.1	General		P
	For safe and reliable connection to a MAINS supply, equipment shall be provided with one of the following:		P
	– terminals or leads or a non-detachable power supply cord for permanent connection to the supply; or		P
	– a non-detachable power supply cord for connection to the supply by means of a plug		N/A
	– an appliance inlet for connection of a detachable power supply cord; or		N/A
	– a mains plug that is part of direct plug-in equipment as in 13.3.8		N/A
13.3.2.2	Permanently connected equipment		P
13.3.2.3	Appliance inlets		N/A
13.3.2.4	Power supply cord		N/A
13.3.2.5	Cord anchorages and strain relief	Not provided together with power cord for connecting to AC terminals, for installer, should be followed with user manual and test maybe confirmed	N/A
	For equipment with a non-detachable power supply cord, a cord anchorage shall be supplied such that:		N/A
	– the connecting points of the cord conductors are relieved from strain; and		N/A
	– the outer covering of the cord is protected from abrasion.		N/A
13.3.2.6	Protection against mechanical damage		P

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Clause	Requirement – Test	Result – Remark	Verdict
13.3.3	Wiring terminals for connection of external conductors		P
13.3.3.1	Wiring terminals		P
13.3.3.2	Screw terminals		P
13.3.3.3	Wiring terminal sizes		P
13.3.3.4	Wiring terminal design		P
13.3.3.5	Grouping of wiring terminals		P
13.3.3.6	Stranded wire		P
13.3.4	Supply wiring space		P
13.3.5	Wire bending space for wires 10 mm² and greater		P
13.3.6	Disconnection from supply sources	Disconnect the unit from the MAINS by automatic disconnecting relays in all live conductor and PV supply by the DC integrated switches	P
13.3.7	Connectors, plugs and sockets	Approved PV connector used	P
13.3.8	Direct plug-in equipment		P
13.4	Internal wiring and connections		P
13.4.1	General		P
13.4.2	Routing		P
13.4.3	Colour coding	Conductor having green-and-yellow insulation is used only for protective earthing and bonding connection	P
13.4.4	Splices and connections		P
13.4.5	Interconnections between parts of the PCE		P
13.5	Openings in enclosures		N/A
13.5.1	Top and side openings		N/A
	Openings in the top and sides of ENCLOSURES shall be so located or constructed that it is unlikely that objects will enter the openings and create hazards by contacting bare conductive parts.		N/A
13.6	Polymeric Materials		P
13.6.1	General	UL approved material used. plastic cover of LED cover, DC switch, DC connector, communication port coupler, cable gland: V-0, suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C	P

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Clause	Requirement – Test	Result – Remark	Verdict
13.6.1.1	Thermal index or capability	Thermal index of Polymeric Materials used higher than the maximum measured operating temperature in heating test	P
13.6.2	Polymers serving as enclosures or barriers preventing access to hazards		N/A
13.6.2.1	Stress relief test		N/A
13.6.3	Polymers serving as solid insulation		P
13.6.3.1	Resistance to arcing		P
13.6.4	UV resistance		P
	Polymeric parts of an OUTDOOR ENCLOSURE required for compliance with this standard shall be sufficiently resistance to degradation by ultra-violet (UV) radiation		P
13.7	Mechanical resistance to deflection, impact, or drop		P
13.7.1	General		P
13.7.2	250-N deflection test for metal enclosures		P
13.7.3	7-J impact test for polymeric enclosures	LED cover	P
13.7.4	Drop test		N/A
13.8	Thickness requirements for metal enclosures		P
13.8.1	General	Conformity is checked by the test as specified in clause 13.7	P
13.8.2	Cast metal		P
13.8.3	Sheet metal		N/A

14	**COMPONENTS**		P
14.1	General	(see appended table 14)	P
	Where safety is involved, components shall be used in accordance with their specified RATINGS unless a specific exception is made. They shall conform to one of the following:		P
	a) applicable safety requirements of a relevant IEC standard. Conformity with other requirements of the component standard is not required. If necessary for the application, components shall be subjected to the test of this standard, except that it is not necessary to carry out identical or equivalent tests already performed to check conformity with the component standard;		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	b) the requirements of this standard and, where necessary for the application, any additional applicable safety requirements of the relevant IEC component standard;		P
	c) if there is no relevant IEC standard, the requirements of this standard;		P
	d) applicable safety requirements of a non-IEC standard which are at least as high as those of the applicable IEC standard, provided that the component has been approved to the non-IEC standard by a recognized testing authority.		P
	Components such as optocouplers, capacitors, transformers, and relays connected across basic, supplemental, reinforced, or double insulation shall comply with the requirements applicable for the grade of insulation being bridged, and if not previously certified to the applicable component safety standard shall be subjected to the voltage test of 7.5.2 as routine test.		P
14.2	Motor Over Temperature Protection		N/A
	Motors which, when stopped or prevented from starting (see 4.4.4.3), would present an electric shock HAZARD, a temperature HAZARD, or a fire HAZARD, shall be protected by an over temperature or thermal protection device meeting the requirements of 14.3.		N/A
14.3	Over temperature protection devices	Power limited by temperature control in single fault condition or high temperature environment condition	P
14.4	Fuse holders	Not replaced by operator	N/A
14.5	MAINS voltage selecting devices		N/A
14.6	Printed circuit boards		P
	Printed circuit boards shall be made of material with a flammability classification of V-1 of IEC 60707 or better.	PCB material approved by UL with UL94 V-0 rating	P
	This requirement does not apply to thin-film flexible printed circuit boards that contain only circuits powered from limited power sources meeting the requirements of 9.2.		N/A
	Conformity of the flammability RATING is checked by inspection of data on the materials. Alternatively, conformity is checked by performing the V-1 tests specified in IEC 60707 on three samples of the relevant parts.		P
14.7	Circuits or components used as transient overvoltage limiting devices		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	If control of transient overvoltage is employed in the equipment, any overvoltage limiting component or circuit shall be tested with the applicable impulse withstand voltage of Table 7-10 using the test method from 7.5.1 except 10 positive and 10 negative impulses are to be applied and may be spaced up to 1 min apart.		P
14.8	Batteries		N/A
	Equipment containing batteries shall be designed to reduce the risk of fire, explosion and chemical leaks under normal conditions and after a single fault in the equipment including a fault in circuitry within the equipment battery pack.		N/A
14.8.1	Battery Enclosure Ventilation		N/A
14.8.1.1	Ventilation requirements		N/A
14.8.1.2	Ventilation testing		N/A
14.8.1.3	Ventilation instructions		N/A
14.8.2	Battery Mounting		N/A
	Compliance is verified by the application of the force to the battery's mounting surface. The test force is to be increased gradually so as to reach the required value in 5 to 10 s, and is to be maintained at that value for 1 min. A non-metallic rack or tray shall be tested at the highest normal condition operating temperature.		N/A
14.8.3	Electrolyte spillage		N/A
	Battery trays and cabinets shall have an electrolyte-resistant coating.		N/A
	The ENCLOSURE or compartment housing a VENTED BATTERY shall be constructed so that spillage or leakage of the electrolyte from one battery will be contained within the ENCLOSURE and be prevented from:		N/A
	a) reaching the PCE outer surfaces that can be contacted by the USER		N/A
	b) contaminating adjacent electrical components or materials; and		N/A
	c) bridging required electrical distances		N/A
14.8.4	Battery Connections		N/A
	Reverse battery connection of the terminals shall be prevented if reverse connection could result in a hazard within the meaning of this Standard		N/A
14.8.5	Battery maintenance instructions		N/A

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	The information and instructions listed in 5.3.4.1 shall be included in the operator manual for equipment in which battery maintenance is performed by the operator, or in the service manual if battery maintenance is to be performed by service personnel only.		N/A
14.8.6	Battery accessibility and maintainability		N/A
	Battery terminals and connectors shall be accessible for maintenance with the correct TOOLS. Batteries with liquid electrolyte, requiring maintained shall be so located that the battery cell caps are accessible for electrolyte tests and readjusting of electrolyte levels.		N/A
15	Software and firmware performing safety functions	IEC 60730-1 Annex H considered	P

	EN 62109-1:2010		P
Annex ZA	Normative references to international publications with their corresponding European publications	Considered	P

Original tests:

4.7	TABLE: Mains supply electrical data in normal condition & electrical ratings tests					P
Type	U dc (V)	I dc (A)	P dc (W)	U ac (L1-N, L2-N, L3-N) (V)	I ac (L1, L2, L3) (A)	P ac (W/VA)
SUN2000-125KTL-M0@500V						
Min. full load MPP voltage	622,24	204,62	127315	288,32	143,44	124073 W
				288,32	143,44	
				288,34	143,43	
Max. full load MPP voltage	848,93	150,21	127471	288,21	144,01	124516 W
				288,32	143,96	
				288,24	143,99	
Rated full load MPP voltage	749,01	170,09	127428	288,32	143,44	125194 W
				288,39	143,44	
				288,29	143,43	
Verification for max. Idc and max. active power	621,57	225,57	140210	288,32	158,85	137395 W
				288,32	158,85	
				288,34	158,83	
Verification for max. Iac and apparent power indicated on marking plate	694,57	161,49	112168	288,32	158,87	137415 VA (PF=0,8)
				288,32	158,86	
				288,34	158,83	
Max. inrush current at start up and shut down	10,1A peak@12,1ms					
SUN2000-110KTL-M0@380V						
Min. full load MPP voltage	540,73	204,64	112819	220,33	166,77	110233 W
				220,41	166,71	
				220,26	166,82	
Max. full load MPP voltage	799,67	141,07	112803	220,42	165,97	109749 W
				220,39	165,99	
				220,28	166,07	
Rated full load MPP voltage	600,25	186,61	111933	220,37	165,22	109231 W
				220,41	165,19	
				220,31	165,27	
Verification for max. Idc and max. active power	540,21	231,58	125101	220,37	183,17	121098 W
				220,41	183,14	
				220,31	183,22	
Verification for max. Iac and apparent power indicated on marking plate	588,86	171,34	100895	220,37	184,51	121973 VA (PF=0,8)
				220,41	184,46	
				220,31	184,53	
Max. inrush current at start up and shut down	8,9A peak@15,1ms					
SUN2000-110KTL-M0@400V						
Min. full load MPP voltage	540,73	204,64	112820	230,51	159,40	110232 W
				230,35	159,52	
				230,44	159,45	
Max. full load MPP voltage	799,67	141,07	112800	230,28	158,86	109753 W
				230,36	158,81	
				230,28	158,86	
Rated full load MPP voltage	600,25	186,61	111930	230,37	158,05	109231 W
				230,47	157,98	
				230,41	158,02	
Verification for max. Idc	540,21	231,58	125101	230,37	175,22	121098 W

and max. active power				230,41	175,19	
				230,31	175,27	
Verification for max. Iac and apparent power indicated on marking plate	588,86	171,34	100895	230,37	175,90	121564 VA (PF=0,8)
				230,41	175,84	
				230,31	175,91	
Max. inrush current at start up and shut down	8,9A peak@15,1ms					
SUN2000-100KTL-M0@380V						
Min. full load MPP voltage	540,46	190,60	103011	220,26	152,01	100443 W
				220,23	152,03	
				220,41	151,90	
Max. full load MPP voltage	801,13	128,58	102974	220,63	151,68	100395 W
				220,14	152,02	
				220,29	151,91	
Rated full load MPP voltage	600,89	171,34	102889	220,31	151,78	100318 W
				220,52	151,64	
				220,67	151,54	
Verification for max. Idc and max. active power	540,46	209,31	113121	220,53	166,29	110014 W
				220,61	166,23	
				220,71	166,15	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	220,53	166,66	110296 VA (PF=0,8)
				220,61	166,71	
				220,71	166,49	
Max. inrush current at start up and shut down	10,6A peak@16,1ms					
SUN2000-100KTL-M0@400V						
Min. full load MPP voltage	540,46	190,6	103011	230,26	145,40	100443 W
				230,23	145,42	
				230,41	145,31	
Max. full load MPP voltage	801,13	128,58	102974	230,63	145,10	100395 W
				230,14	145,41	
				230,29	145,31	
Rated full load MPP voltage	600,89	171,34	102889	230,31	145,19	100318 W
				230,52	145,06	
				230,67	144,96	
Verification for max. Idc and max. active power	540,46	209,31	113121	230,53	159,07	110014 W
				230,61	159,02	
				230,71	158,94	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	230,53	159,41	110277 VA (PF=0,8)
				230,61	159,41	
				230,71	159,28	
Max. inrush current at start up and shut down	10,6A peak@16,1ms					
SUN2000-100KTL-M1@380V						
Min. full load MPP voltage	540,46	190,60	103011	220,26	152,01	100443 W
				220,23	152,03	
				220,41	151,90	
Max. full load MPP voltage	801,13	128,58	102974	220,63	151,68	100395 W
				220,14	152,02	
				220,29	151,91	
Rated full load MPP voltage	600,89	171,34	102889	220,31	151,78	100318 W
				220,52	151,64	
				220,67	151,54	

Verification for max. Idc and max. active power	540,46	209,31	113121	220,53	166,29	110014 W
				220,61	166,23	
				220,71	166,15	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	220,53	166,83	110414 VA (PF=0,8)
				220,61	166,80	
				220,71	166,77	
Max. inrush current at start up and shut down	9A peak@13,7ms					
SUN2000-100KTL-M1@400V						
Min. full load MPP voltage	540,46	190,6	103011	230,26	145,40	100443 W
				230,23	145,42	
				230,41	145,31	
Max. full load MPP voltage	801,13	128,58	102974	230,63	145,10	100395 W
				230,14	145,41	
				230,29	145,31	
Rated full load MPP voltage	600,89	171,34	102889	230,31	145,19	100318 W
				230,52	145,06	
				230,67	144,96	
Verification for max. Idc and max. active power	540,46	209,31	113121	230,53	159,07	110014 W
				230,61	159,02	
				230,71	158,94	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	230,53	159,35	110237 VA (PF=0,8)
				230,61	159,31	
				230,71	159,31	
Max. inrush current at start up and shut down	9A peak@13,7ms					
SUN2000-100KTL-M1@480V						
Min. full load MPP voltage	540,46	190,6	103011	277,26	120,81	100443 W
				277,23	120,63	
				277,41	120,59	
Max. full load MPP voltage	801,13	128,58	102974	277,63	120,62	100395 W
				277,14	120,75	
				277,29	120,73	
Rated full load MPP voltage	600,89	171,34	102889	277,31	120,42	100318 W
				277,52	120,36	
				277,67	120,64	
Verification for max. Idc and max. active power	540,46	209,31	113121	277,53	131,95	110014 W
				277,61	132,18	
				277,71	132,06	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	277,53	132,98	110565 VA (PF=0,8)
				277,61	133,12	
				277,71	132,81	
Max. inrush current at start up and shut down	9A peak@13,7ms					
SUN2000-100KTL-INM0@415V						
Min. full load MPP voltage	540,46	190,6	103011	240,64	139,13	100443 W
				240,79	139,05	
				240,16	139,41	
Max. full load MPP voltage	801,13	128,58	102974	240,64	139,07	100395 W
				240,97	138,88	
				240,15	139,35	
Rated full load MPP	600,89	171,34	102889	240,26	139,18	100318 W

voltage				240,77	138,88	
				240,69	138,93	
Verification for max. Idc and max. active power	540,46	209,31	113121	240,31	152,60	110014 W
				240,61	152,41	
				240,88	152,24	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	240,13	152,61	110156 VA (PF=0,8)
				240,61	152,60	
				240,55	152,53	
Max. inrush current at start up and shut down	9,4A peak@13,3ms					
SUN2000-100KTL-INM0@480V						
Min. full load MPP voltage	540,46	190,6	103011	277,26	120,81	100443 W
				277,23	120,63	
				277,41	120,59	
Max. full load MPP voltage	801,13	128,58	102974	277,63	120,62	100395 W
				277,14	120,75	
				277,29	120,73	
Rated full load MPP voltage	600,89	171,34	102889	277,31	120,42	100318 W
				277,52	120,36	
				277,67	120,64	
Verification for max. Idc and max. active power	540,46	209,31	113121	277,53	131,95	110014 W
				277,61	132,18	
				277,71	132,06	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	277,19	133,35	110815 VA (PF=0,8)
				277,22	133,12	
				277,13	133,11	
Max. inrush current at start up and shut down	9,4A peak@13,3ms					
Supplementary information:						

4.3	**TABLE: heating temperature rise measurements (SUN2000-100KTL-M0)**						**P**
Test voltage(PV Input)(V)	540	800	540	800	540	800	-
Test voltage(AC Output)(V)	380	380	380	380	380	380	-
Test frequency(Hz)	50	50	50	50	50	50	-
Test condition	(1)	(2)	(3)	(4)	(5)	(6)	-
maximum temperature T of part/at:	T (°C)						TMAX (°C)
Ambient temperature	40,0	40,0	60,0	60,0	60,0	40,0	-
Mounting surface	43,2	42,5	63,8	62,3	62,8	41,7	90
LED indicator panel	40,9	40,8	56,4	60,1	64,0	40,5	85
Metal enclosure	53,4	50,2	69,4	72,9	71,7	42,7	90
Boost inductor	102,0	79,6	92,3	80,3	99,6	63,7	130(Class F)
PCB	85,0	83,0	85,6	84,2	87,2	50,2	130
BST conductor	84,2	84,3	85,8	85,1	80,2	47,9	105
ISO relay coil(K1)	87,4	89,6	87,6	88,9	90,6	49,5	130(Class F)
DC switch (outside)	41,8	41,8	60,5	61,5	62,1	41,2	85
Drive transformer winding(T5)	89,7	92,7	89,5	90,6	94,3	68,3	130(Class F)
Optocoupler(U13)	92,6	95,4	91,6	93,1	96,1	70,5	100

SPD(F13)	84,2	84,8	83,2	82,7	82,4	51,9	85
Filter capacitor(C407)	84,4	90,3	87,4	88,4	87,9	55,9	105
Current hall(U51)	93,8	90,5	90,2	90,3	87,5	58,7	105
Filter capacitor(C10)	78,9	81,4	82,1	82,9	87,9	55,9	105
Current hall(U62)	85,7	86,8	86,7	86,6	88,5	59,1	105
INV module(U1)	98,0	97,3	94,9	97,5	95,4	53,5	130
INV module(U2)	98,8	97,2	96,2	98,0	104,1	58,3	130
INV module(U3)	96,5	95,0	95,3	96,7	93,5	61,6	130
Boost module(U4)	81,2	65,8	84,8	76,5	94,3	69,7	130
Boost module(U5)	82,1	67,3	85,1	77,2	95,1	71,2	130
Boost module(U6)	85,4	67,4	85,4	77,7	92,6	68,8	130
Boost module(U7)	82,2	67,4	85,7	77,0	87,8	55,7	130
Boost module(U8)	82,8	66,1	86,6	77,2	87,9	55,1	130
Y Capacitor(C294)	86,9	88,6	87,2	87,5	87,3	54,5	125
Drive transformer winding(T3)	88,7	92,1	88,6	90,2	94,3	68,3	130(Class F)
Current hall(U9)	92,6	95,4	91,6	93,1	95,8	66,6	105
Output wire	90,4	92,8	87,7	89,1	95,3	52,0	105
INV inductor (Phase A)	121,8	142,2	95,3	105,2	106,3	61,5	150(Class H)
INV inductor (Phase B)	125,3	139,8	93,5	101,3	104,7	58,5	150(Class H)
INV inductor (Phase C)	121,9	133,7	90,8	100,8	109,1	61,2	150(Class H)
INV conductor	93,8	96,8	90,4	91,9	98,5	62,5	105
Output terminal	47,6	42,2	62,2	60,8	61,8	41,1	105
PV input wire (near switch)	86,8	89,2	86,8	87,8	86,1	53,1	105
Cooling fan	78,3	75,6	75,7	74,2	79,2	48,7	85
Current hall(U85)	86,4	89,4	88,4	86,9	86,5	52,7	105
Relay(K10)	82,0	84,3	81,2	83,1	84,7	50,5	85
PV input connector	44,5	42,3	61,0	59,9	60,8	41,6	85
AC aux transformer winding(T2)	98,3	96,5	93,1	91,0	93,5	62,3	130(Class F)
AC aux transformer bobbin(T2)	86,0	83,7	81,1	79,1	85,8	56,3	130(Class F)
DSP(U100)	89,6	93,4	90,3	91,9	97,8	66,8	105
DSP(U101)	92,0	96,1	92,3	94,2	95,6	65,6	105
CPLD(U102)	88,4	92,2	88,9	90,6	91,7	61,4	105
DC aux transformer winding(T1)	95,4	92,4	99,2	97,0	98,6	62,5	130(Class F)
DC aux transformer bobbin(T1)	85,0	82,0	88,4	86,8	89,1	58,8	130(Class F)
Optocoupler(U13)	89,9	93,9	90,6	92,3	94,5	62,8	130
BUS capacitor(C32)	83,6	92,2	81,2	82,3	85,2	49,9	105
RCD Hall(U34)	101,2	102,3	93,7	96,5	86,9	50,7	105
Filter capacitor(C734)	85,2	83,1	80,2	80,6	87,9	58,6	105
X Capacitor(C501)	81,6	78,6	79,9	78,1	81,6	49,9	105

Supplementary information:
(1)Lowest full load MPP voltage with rated power output @40°C (without power derating)
(2)Highest full load MPP voltage with rated power output @40°C (without power derating)
(3)Lowest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(4)Highest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(5)Lowest full load MPP voltage and blanketing with rated power output @60°C (power derating to thermal steady)
(6)Highest full load MPP voltage and cooling fan disconnected with rated power output @40°C (power derating to thermal steady)

4.3	**TABLE: heating temperature rise measurements (SUN2000-110KTL-M0)**							**P**
Test voltage(PV Input)(V)	540	600	800	540	600	800	540	-
Test voltage(AC Output)(V)	380	380	380	380	380	380	380	-
Test frequency(Hz)	50	50	50	50	50	50	50	-
Test condition	(1)	(2)	(3)	(4)	(5)	(6)	(7)	-
maximum temperature T of part/at:	T (°C)							TMAX (°C)
Ambient temperature	41,5	41,1	40,3	59,2	59,1	58,3	39,9	-
BST inductor	87,9	47,7	47,0	80,5	63,5	62,7	56,2	150(Class H)
SPD(F3)	77,1	71,7	69,8	77,5	76,5	74,1	50,1	85
Filter capacitor(C407)	81,1	77,8	76,6	79,8	79,9	77,6	56,9	105
Current hall(U51)	81,1	77,0	75,2	80,1	79,7	77,3	58,8	105
BUS capacitor(C32)	77,4	76,4	82,1	77,8	78,9	79,7	59,8	105
Drive transformer winding(T3)	90,0	86,8	84,2	86,4	86,8	83,6	74,5	130(Class F)
Relay(K1)	80,3	77,2	74,3	79,8	79,9	76,8	53,9	85
DC wire (near K1)	85,7	81,9	78,7	81,9	81,9	78,4	57,4	105
Relay(K2)	80,7	77,6	75,2	79,8	79,9	77,0	54,9	85
Filter capacitor(C10)	71,6	68,3	65,8	75,0	74,6	72,1	45,6	105
BUS wire	75,8	74,2	76,2	77,2	77,6	76,8	62,1	105
Filter capacitor(C5)	71,1	67,9	65,1	74,8	74,4	71,7	45,5	125
Filter capacitor(C15)	69,6	66,8	64,2	74,3	73,9	71,2	45,5	105
DC wire (near switch)	84,3	80,1	76,5	81,0	80,8	77,4	57,5	105
PWB board(near AC relay)	117,0	111,2	102,4	97,4	100,3	90,8	103,6	130
Inductor(L2)	114,3	111,9	105,3	94,1	97,0	90,2	90,4	130
AC output wire(B phase)	100,0	97,5	90,0	86,7	88,6	82,2	68,6	105
AC current hall(U85)	91,3	88,1	84,1	85,0	86,2	81,6	76,5	105
AC output relay(K10)	82,0	79,2	77,0	79,3	80,0	76,8	81,2	85
CPLD(U102)	84,8	81,9	79,9	84,5	84,9	82,1	69,0	105
AC output relay(K9)	83,2	80,4	77,8	80,9	81,6	78,4	72,4	105
RCD hall(U34)	91,2	88,6	85,3	83,2	84,6	80,8	75,6	105
DC aux transformer winding(T1)	86,0	83,0	82,3	86,4	86,4	85,0	63,0	130(Class F)
Optocoupler(U56)	84,9	81,6	80,1	83,9	84,3	81,6	67,6	110
Inductor coil(T7)	116,9	114,9	104,2	93,7	96,9	88,5	81,3	130(Class F)
Inductor coil(L6)	116,9	115,6	108,4	94,2	97,4	91,3	81,6	130(Class F)
Capacitor(C190)	79,9	77,0	75,0	79,4	79,6	76,9	56,8	125
DSP(U100)	90,3	87,6	85,8	90,1	90,6	88,2	74,3	105
DSP(U101)	89,1	86,2	84,0	88,4	89,0	86,2	74,7	105
INV inductor (Phase A)	110,1	114,6	111,7	90,1	95,7	90,2	61,6	150(Class H)

INV inductor (Phase B)	104,9	104,9	101,3	89,8	92,7	88,2	65,6	150(Class H)
INV inductor (Phase C)	111,7	111,6	108,2	93,5	96,9	92,3	67,2	150(Class H)
Y-cap(C294)	83,5	79,9	77,9	81,4	81,3	78,5	54,0	105
SPD(F13)	77,7	72,1	70,6	78,3	77,2	74,9	51,5	85
Capacitor(C49)	84,2	81,4	78,4	80,5	81,3	77,8	69,9	105
INV module(U1)	102,9	98,9	93,8	91,0	91,8	86,7	90,8	130
INV module(U3)	106,3	101,4	94,9	92,6	93,2	87,2	88,7	130
ISO relay coil(K1)	82,1	79,0	77,1	80,4	80,7	78,3	60,5	130
INV module(U2)	107,3	102,2	96,3	93,0	93,9	87,7	90,3	130
SPD(F3)	75,5	68,5	66,8	76,8	75,0	72,6	50,0	85
Drive transformer winding(T5)	83,3	79,8	78,4	81,5	81,5	79,0	68,9	150(Class H)
Front panel	54,8	53,6	52,5	65,8	65,9	64,7	44,2	70
Metal enclosure	44,0	43,1	41,9	60,5	60,3	59,5	41,6	70
Mounting surface	48,1	46,9	45,6	62,1	61,9	60,9	42,1	90
PV input connector	53,2	49,4	48,4	66,2	64,4	63,4	47,9	85

Supplementary information:
(1)Lowest full load MPP voltage with rated power output @40°C (without power derating)
(2)Rated full load MPP voltage with rated power output @40°C (without power derating)
(3)Highest full load MPP voltage with rated power output @40°C (without power derating)
(4)Lowest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(5)Rated full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(6)Highest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(7)Lowest full load MPP voltage and cooling fan disconnected with rated power output @40°C (power derating to thermal steady)

4.3	**TABLE: heating temperature rise measurements (SUN2000-125KTL-M0)**						**P**
Test voltage(PV Input)(V)	625	850	625	850			-
Test voltage(AC Output)(V)	500	500	500	500			-
Test frequency(Hz)	50	50	50	50			-
Test condition	(1)	(2)	(3)	(4)			-
maximum temperature T of part/at:	T (°C)						TMAX (°C)
Ambient temperature	40,0	40,0	60,0	60,0			-
Heat sink	77,2	77,9	89,3	80,9			90
Drive transformer T5	73,8	74,3	90,0	83,6			130(Class F)
Optocoupler U13	75,5	73,4	92,2	83,1			100
SPD F13	69,9	65,9	84,6	76,4			85
Filter capacitor C407	71,4	70,6	86,6	82,9			105
Current hall U51	71,3	70,6	87,1	80,8			105
Film capacitor C2	61,6	58,6	78,3	68,1			105
Film capacitor C334	69,8	70,0	84,7	79,1			105
Optocoupler U9	74,4	76,1	88,7	82,6			100
PCB	78,6	78,5	92,5	80,1			105
SPD F2	69,7	66,2	84,9	76,8			85
INV conductor	77,5	80,2	89,4	84,2			105
BST conductor	65,0	59,0	82,9	70,7			105
Y capacitor C407	65,0	60,1	80,0	69,9			105

Y capacitor C294	75,8	77,1	88,6	87,8			105
INV wire	76,9	79,8	92,6	96,1			105
PV input conductor	69,0	66,4	83,7	74,9			105
BUS capacitor	67,8	72,8	81,5	84,0			105
Y capacitor C946	70,3	69,3	85,2	78,6			105
Current hall U85	78,1	77,2	93,2	81,8			105
Relay K10 coil	77,0	76,8	90,7	86,7			130(Class F)
AC aux power transformer T2 winding	69,7	72,0	83,9	82,3			130(Class F)
DSP U100	80,1	73,4	93,9	81,5			105
DSP U101	81,4	74,1	95,5	82,8			105
CPLD U102	75,3	73,1	88,4	81,5			105
DC aux power transformer T1 winding	77,0	79,2	92,4	95,0			130(Class F)
DC aux power transformer T1 bobbin	70,9	75,4	84,4	84,6			130(Class F)
Optocoupler U110	72,2	73,0	86,4	83,3			110
Inductor T7	83,7	94,7	92,7	96,5			150(Class H)
Inductor L6	79,2	96,4	88,9	101,6			150(Class H)
RCD hall U34	78,1	79,7	89,0	87,4			105
Filter capacitor C501	71,0	72,3	83,9	82,9			105
Output conductor	76,2	77,9	87,3	84,1			105
Internal fan	66,8	67,3	81,6	79,0			85
DC switch (inside)	67,4	64,9	81,6	75,6			85
PV input connector (inside)	64,6	57,4	81,1	67,8			85
X capacitor C01	68,8	71,2	82,6	83,4			105
INV module U2	75,4	75,3	90,1	85,6			130
Boost module U4	77,2	77,1	92,4	89,4			130
ISO relay coil	76,3	82,2	91,7	103,6			130
INV inductor	115,3	130,7	113,0	111,0			150(Class H)
BST inductor	120,9	136,6	117,0	112,0			150(Class H)

supplementary information:
(1)Lowest full load MPP voltage with rated power output @40°C (without power derating)
(2)Highest full load MPP voltage with rated power output @40°C (without power derating)
(3)Lowest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(4)Highest full load MPP voltage with rated power output @60°C (power derating to thermal steady)

4.4	**TABLE: fault condition tests**		P
	ambient temperature (°C) :	N/A(at the prevailing ambient temperature)	—

No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	Result

1	Complete PCE	overload	MAINS:500 PV: 750	Steady condition	-	-	Refer to table 4.7, For a specified overload current (160,4A) is reached, the overload is slowly increased to the point of maximum output power (137,5kW). No excessive temperature observed. Temperature of components: INV inductor 125°C, BST inductor 122°C, INV IGBT 91°C, BST IGBT 90°C. No other hazard.
2	Output L1 to G	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit without obvious impact current. No output no power feed into grid. No component damage, no hazard.
	Output L2 to G	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit without obvious impact current. No output no power feed into grid. No component damage, no hazard.
	Output L3 to G	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit without obvious impact current. No output no power feed into grid. No component damage, no hazard.
	Output L1/L2/L3 to N	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit without obvious impact current. No output no power feed into grid. No component damage, no hazard. (for 380/400/415V model)
3	Output L1 to L2	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit. Max. current: 126,1A r.m.s. as the 3-cycle RMS value No output no power feed into grid. No component damage, no hazard.
	Output L1 to L3	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit. Max. current: 138,1A r.m.s. as the 3-cycle RMS value No output no power feed into grid. No component damage, no hazard.
	Output L2 to L3	Short, note 3	MAINS:500 PV: 750	10 min	-	-	The inverter shutdown immediately after short-circuit. Max. peak current: 124,2A, total impulse duration: approx. 1ms No output no power feed into grid. No component damage, no hazard.

4	DC+ to DC -	Short	MAINS:500 PV: 750	10min	-	-	The inverter shutdown for a few seconds after short-circuit. No backfeed current observed to PV side. No output no power feed into grid. No component damage, no hazard.
		standby, software fault	MAINS:500 PV: 750	10min	-	-	Start-up normally. Then inverter shutdown after a few seconds. Again, start-up repeated. No backfeed current observed to PV side. No output no power feed into grid. No component damage, no hazard.
5	DC source disconnected	Disconnected without additional fault	MAINS:500 PV: 750	10min	-	-	The inverter shutdown immediately due to DC under voltage. No backfeed voltage observed onto PV side. Only energy stored in bus capacitor discharge voltage remained on DC terminals, but not access for operator. No output no power feed into grid. No component damage, no hazard.
		IGBT shorted, short one relay contacts as well	MAINS:500 PV: 750	10min	-	-	The inverter damaged and shutdown immediately. No backfeed voltage observed onto PV side. No component damage, no hazard.
	Mains outage	disconnected	MAINS:500 PV: 750	10min	-	-	The inverter shutdown for immediately due to islanding detection. No backfeed voltage observed onto Mains side. No output no power feed into grid. No component damage, no hazard.
		IGBT shorted, short one relay contacts as well	MAINS:500 PV: 750	10min	-	-	The inverter damaged and shutdown immediately. No backfeed voltage observed onto Mains side. No output no power feed into grid. No component damage, no hazard.
6	L1/L2/L3	reversed	MAINS:500 PV: 750	10min	-	-	The inverter operated normally.
7	AC output	Over-voltage	MAINS:550 PV: 750				The inverter shutdown immediately. No component damage, no hazard.
8	DC input	Over-voltage	MAINS:500 PV: 1150				The inverter shutdown immediately. No component damage, no hazard.

9	Inverter	Cooling system failure, fan blocked, blanketing	MAINS:500 PV: 750	7h	-	-	The inverter protected by over-temperature protection and until thermal steady. All external surface did not exceed 90°C. No damage, no hazard.
10	Bus-capacitor, C23	short	MAINS:500 PV: 750	30min	-	-	The inverter shut down. Bus-capacitor break down, 30A fuse not open, no damage, no hazard.
11	Half-bus	short	MAINS:500 PV: 750	30min	-	-	The inverter shut down. Bus-capacitor break down, 30A fuse not open, no damage, no hazard.
12	SPD, F12	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard
13	Boost IGBT U4, pin 3 – pin 7	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. U6 breakdown. No other component damage, 30A fuse not open, no hazard.
	Boost IGBT U4, pin 5 – pin 6	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. U6 breakdown. No other component damage, 30A fuse not open, no hazard.
14	INV IGBT U1, pin 3 – pin 7	short	MAINS:500 PV: 750	10min	-	-	PV inverter shut down. U1 breakdown. No other component damage, 30A fuse not open, no hazard.
	INV IGBT U1, pin 5 – pin 6	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. U1 breakdown. No other component damage, 30A fuse not open, no hazard.
15	Q37, D-S	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. U1,U2,U3 Relay breakdown. No other component damage, 30A fuse not open, no hazard.
16	Q3, D-S	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. R442,R443,R444 and Q1 breakdown. No other component damage, 30A fuse not open, no hazard.
17	T1, pin 1 – pin 2	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	T1, pin 4 – pin 7	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	T1, pin 9 – pin 12	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	T1, pin 13 – pin 14	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	T1, pin 20 – pin 22	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.

	T1, pin 22 – pin 24	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
18	T2, pin 1 – pin 2	short	MAINS:500 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T2, pin 3 – pin 4	short	MAINS:500 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T2, pin 5 – pin 6	short	MAINS:500 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T2, pin 7 – pin 9	short	MAINS:500 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T2, pin 9 – pin 12	short	MAINS:500 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T2, pin 15 – pin 16	short	MAINS:500 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
19	AC relay K5, contacts	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. Then start-up again with same result. No component damage, no hazard.
	Relay monitoring and control, C956	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relay in open status. No components damage, no hazard.
	Relay monitoring and control, Q5, G-S	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relay in open status. No components damage, no hazard.
	Relay monitoring and control, Q5, G-S	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	Relay monitoring and control, Q14, G-S	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relay in open status. No components damage, no hazard.
	Relay monitoring and control, Q14, G-S	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	Relay monitoring and control, R104	open before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relay in open status. No components damage, no hazard.
	Relay monitoring and control, R104	open	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	Relay monitoring and control, C28	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relay in open status. No components damage, no hazard.
20	PV array insulation resistance monitoring, R1058	open before start-up	MAINS:500 PV: 750	10min	-	-	The inverter operated normally with ISO checking function normally.

	PV array insulation resistance monitoring, R1058	open	MAINS:500 PV: 750	10min	-	-	The inverter operated normally with ISO checking function normally.
	PV array insulation resistance monitoring, Q7, C-E	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter operated normally with ISO checking function normally.
	PV array insulation resistance monitoring, Q7, C-E	short	MAINS:500 PV: 750	10min	-	-	The inverter operated normally with ISO checking function normally.
	PV array insulation resistance monitoring, D98	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter operated normally with ISO checking function normally.
	PV array insulation resistance monitoring, D98	short	MAINS:500 PV: 750	10min	-	-	The inverter operated normally with ISO checking function normally.
21	RCMU detect, Q14, D-S	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relays in open status. No component damage, no hazard.
	RCMU detect, Q14, D-S	short	MAINS:500 PV: 750	10min	-	-	The inverter operated normally. No component damage, no hazard.
	RCMU detect, R126	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relays in open status. No component damage, no hazard.
	RCMU detect, R126	short	MAINS:500 PV: 750	10min	-	-	The inverter shutdown. AC relays in open status. No component damage, no hazard.
	RCMU detect, R461	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relays in open status. No component damage, no hazard.
	RCMU detect, R461	short	MAINS:500 PV: 750	10min	-	-	The inverter shutdown. AC relays in open status. No component damage, no hazard.
	RCMU detect, U34	short before start-up	MAINS:500 PV: 750	10min	-	-	The inverter could not start up. AC relays in open status. No component damage, no hazard.
	RCMU detect, U34	short	MAINS:500 PV: 750	10min	-	-	The inverter shutdown. AC relays in open status. No component damage, no hazard.

22	CPU, U1	+3,3V power decrease continuously	MAINS:500 PV: 750	10min	-	-	The inverter shut down. DSP protect by itself for low voltage No component damage, no hazard. Inverter can be restarted and operated normally when the fault was removed.
	CPU, U1	+3,3V power rise continuously	MAINS:500 PV: 750	10min	-	-	The inverter shut down. DSP broken at last. No components damage, no hazard.
	CPU, U1	Oscillator disabled	MAINS:500 PV: 750	10min	-	-	The inverter shut down. DSP protect by itself. No components damage, no hazard. Inverter can be restarted and operated normally when the fault was removed.
23	CPU, U2	+3,3V power decrease continuously	MAINS:500 PV: 750	10min	-	-	The inverter shut down. DSP protect by itself for low voltage. No components damage, no hazard. Inverter can be restarted and operated normally when the fault was removed.
	CPU, U2	+3,3V power rise continuously	MAINS:500 PV: 750	10min	-	-	The inverter shut down. DSP broken at last. No other components damage, no hazard.
	CPU, U2	Oscillator disabled	MAINS:500 PV: 750	10min	-	-	The inverter shut down. DSP protect by itself. No component damage, no hazard. Inverter can be restarted and operated normally when the fault was removed
24	Communication between CPUs	Disconnect	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
25	Oscillator, U1	Short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No component damage, no hazard.
	Oscillator, U2	Short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. No other components damage, no hazard

Supplementary information
Note 1: Abnormal and component failure tests were conducted with the AC output protected by external circuit breaker (rated 250A) provided in all live connections to the AC supply as specified in user manual. A 30A non-time-delay fuse connected between the protective earthing terminal and the protective earthing conductor to determined that the fault did not result in any damage to the protective earthing conductor or terminal, or to protective bonding means.
Note 2: The equipment was placed on white tissue-paper covering a softwood surface and covering the equipment with cheesecloth during the fault testing, no emission of molten metal, burning insulation, or flaming or glowing particles from the fire enclosure, and there was no charring, glowing, or flaming of the cheesecloth.
Note 3: No other hazard(e.g. chemical, expulsion) observed after each test.

7.3.6.3.7	**TABLE: touch current measurement**	P (Note 2)

Measured between:	Measured (mA)	Limit (mA)	Comments/conditions
means of connection for the external protective earthing conductor and the external protective earthing conductor itself	4,6	3,5	Max. current recorded after clause 4.3, thermal testing and 4.5, single fault condition test, humidity pre-conditioning and IP66 test

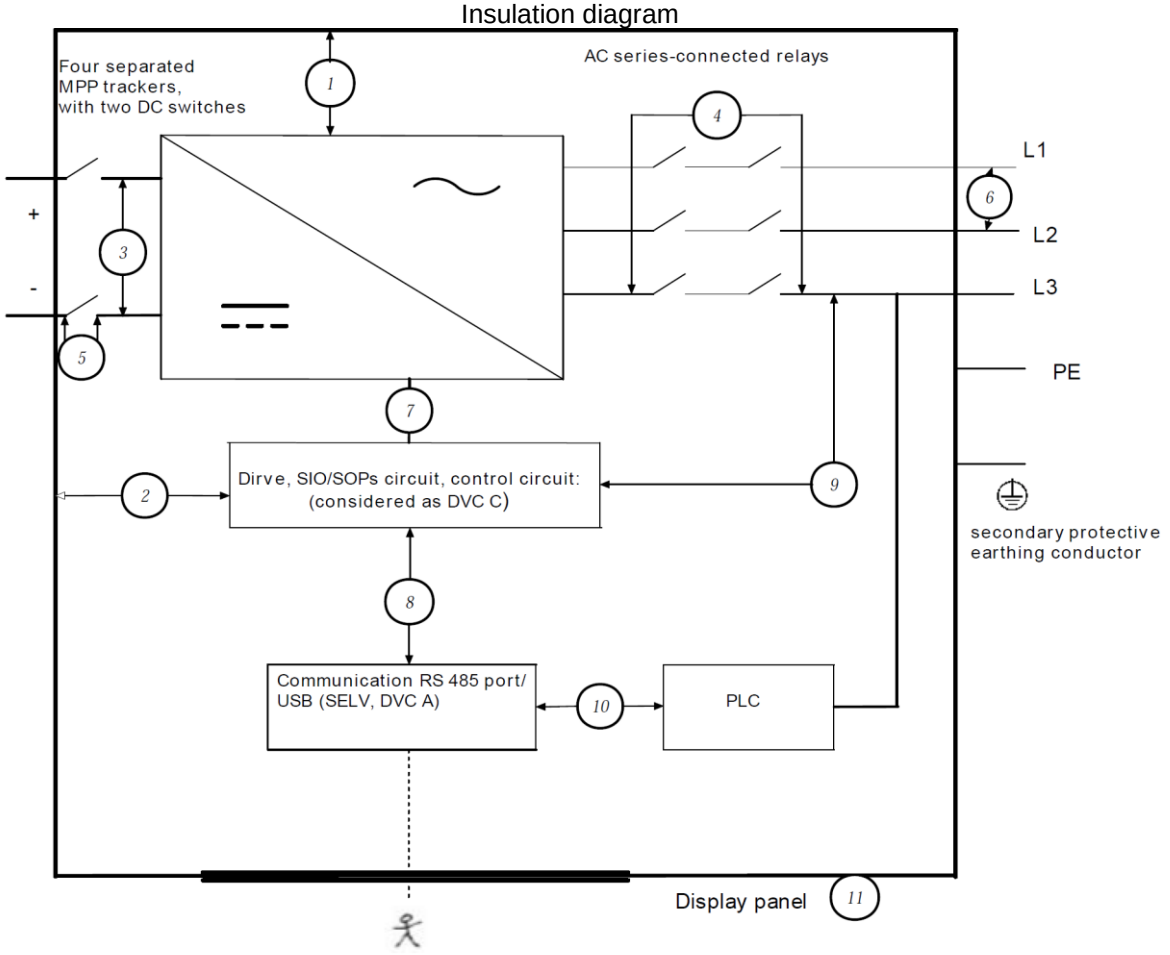
supplementary information:

Note 1: Max. current recorded after all models test. For a PCE to be connected to an isolated system or impedance system, the neutral shall be connected through a resistance of 1 kΩ to the external protective earthing conductor, which shall be connected to each input phase in turn. The highest value will be taken as the definitive result.

Note 2: External protective earthing conductor cross-section required in user manual as >35 mm^2 (copper) or >50 mm^2 (Aluminum), and a second protective earthing terminal provided on the enclosure.

7.3.7	**TABLE: clearance and creepage distance measurements**	P

Insulation diagram



Transformer-less inverter insulation diagram

Isolation components and areas:

Area	Insulation related information					
Insulation area 1: Across power circuit(DC/AC) to earth(BI);		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	4772	1100	
	Mains	III	288(rated voltage 500V, IT system)	4000	550	
Insulation area 2: Across drive, SIO/SOPs circuit, control circuit to earth(BI);		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	4772	1100	
	Mains	III	288(rated voltage 500V, IT system)	4000	550	
Insulation area 3: Between PV different polarities (FI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	I	1100	3078	1100	
	Mains	II	288(rated voltage 500V, IT system)	2500	-	
Insulation area 4: Across contacts of relays (BI+SI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	4772	1100	
	Mains	III	288(rated voltage 500V, IT system)	4000	550	
Insulation area 6: Across contacts of DC switch (BI/SI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	4772	1100	
	Mains	III	288(rated voltage 500V, IT system)	4000	550	

Insulation area 7: Between PV circuit and Drive, SIO/SOPs circuit, control circuit (FI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	I	1100	3078	1100	
	Mains	II	288(rated voltage 500V, IT system)	2500	550	
Insulation area 8: Between drive, SIO/SOPs circuit, control circuit and communication RS485 port/USB (DI/RI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	6772	1100	
	Mains	III	288(rated voltage 500V, IT system)	6000	550	
Insulation area 9: Between drive, SIO/SOPs circuit, control circuit and AC circuit after AC relay (FI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	I	1100	3078	-	
	Mains	II	288(rated voltage 500V, IT system)	2500	550	
Insulation area 10: Between AC live conductors and communication RS485 port/USB (RI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	6772	-	
	Mains	III	288(rated voltage 500V, IT system)	6000	550	
Insulation area 11: Between internal live parts to Display panel/LCD cover (RI)		OVC	System voltage(V)	Impulse voltage to determine cl. (V)	Max. working voltage to determine cr. (V)	
	PV	II	1100	6772	1100	
	Mains	III	288(rated voltage 500V, IT system)	6000	550	

clearance cl and creepage distance dcr at / of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Insulation area 1 and 2: Across power circuit(DC/AC)/ drive, SIO/SOPs circuit, control circuit to earth(BI);	Refer to above table	Refer to above table	5,2	↓	PV side: PCB: 5,5 other insulator:11,0 Mains side: PCB: 5,2 other insulator:5,5	↓

- PV circuit to earthed metal enclosure and accessible surface(not on PCB)	↑	↑	↑	>20	↑	>20
- Mains circuit to earthed metal enclosure and accessible surface(not on PCB)	↑	↑	↑	>20	↑	>20
- PV circuit to earthed metal enclosure and accessible surface(on PCB)	↑	↑	↑	≥5,6	↑	≥5,6
- Mains circuit to earthed metal enclosure and accessible surface(on PCB)	↑	↑	↑	≥5,6	↑	≥5,6
On boost inductor	↑	↑	↑	potting material filled, verified by impulse and dielectric strength test	↑	potting material filled, verified by impulse and dielectric strength test
On conversion inductor	↑	↑	↑	potting material filled, verified by impulse and dielectric strength test	↑	potting material filled, verified by impulse and dielectric strength test
IGBT module	↑	↑	↑	verified by impulse and dielectric strength test	↑	verified by impulse and dielectric strength test
Insulation area 3: Between PV different polarities (FI)	Refer to above table	Refer to above table	2,7	↓	PCB: 5,5 other insulator:11,0	↓
- on DC switch body	↑	↑	↑	≥11,0	↑	≥11,0
Remark: DC switch approved by TUV, outer cl. and cr. was checked and inner cl. and cr. was not checked						
- PV circuit (on PCB)	↑	↑	↑	≥5,5	↑	≥5,5
Insulation area 4: Across contacts of series connected relays (BI+SI)	Refer to above table	Refer to above table	5,2 (BI/SI)	↓	5,5	↓

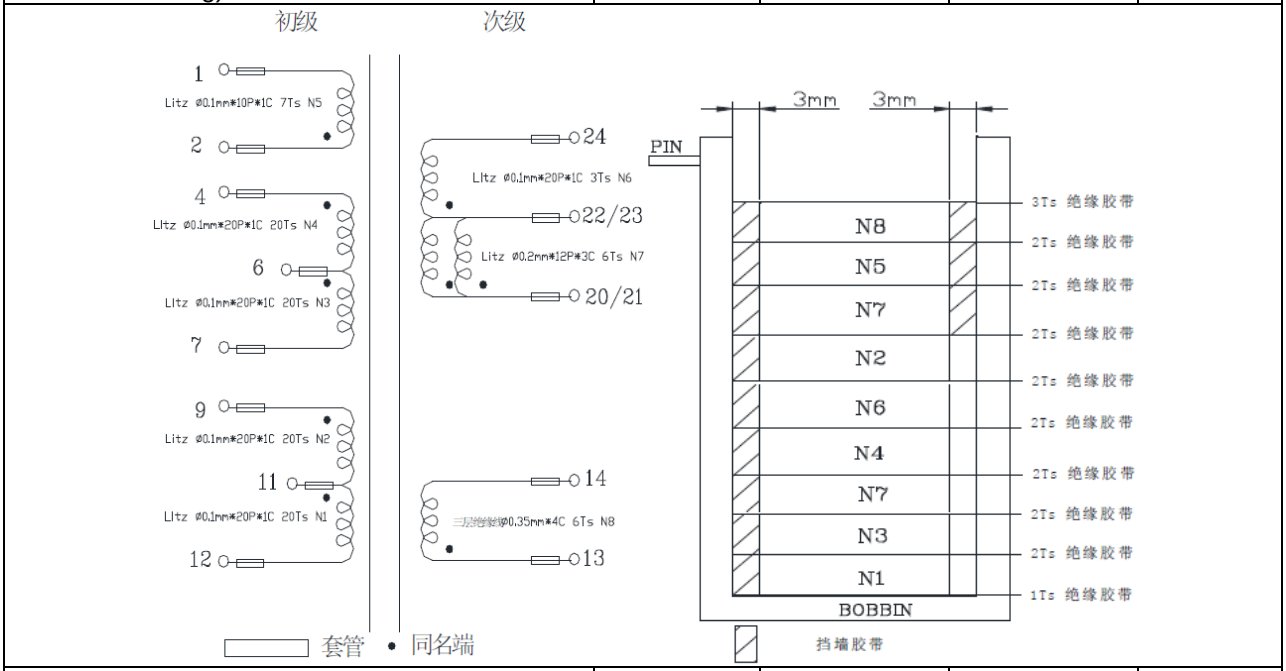
- on AC relays	↑	↑	↑	cl.=3,6mm between each pair contacts Approved by third party	↑	cr.>5,5mm Approved by third party
Insulation area 5: Across contacts of DC switch (BI/SI)	Refer to above table	Refer to above table	5,2 (BI/SI)	↓	11,0	↓
- on DC switch	↑	↑	↑	Approved by third party	↑	Approved by third party
Insulation area 6: Between AC live conductors (FI)	Refer to above table	Refer to above table	2,7	↓	Mains side: PCB: 2,8 other insulator: 5,5	↓
- shortest distance across AC live conductors (Mains side, not on PCB)	↑	↑	↑	>20	↑	>20
- shortest distance PCB foil trace and on components (Mains side, on PCB)	↑	↑	↑	>2,8	↑	>2,8
Insulation area 7: Between PV circuit and Drive, SIO/SOPs circuit, control circuit (FI)	Refer to above table	Refer to above table	2,7	↓	PCB: 5,5 other insulator:11,0	↓
Insulation area 9: Between drive, SIO/SOPs circuit, control circuit and AC circuit after AC relay (FI)	Refer to above table	Refer to above table	2,7	↓	PCB: 5,5 other insulator:11,0	↓
Remark: the insulation between PV circuit and AC circuit after AC relay shall be at least basic insulation and provided by insulation area 7 plus insulation area 9, and passed the impulse and hi-pot test of basic insulation requirements						
Insulation area 8: Between drive, SIO/SOPs circuit, control circuit and communication RS485 port/USB (DI/RI)	Refer to above table	Refer to above table	8,4	↓	PV side: PCB: 11,0	↓
- shortest distance PCB foil trace and on components on PCB (control to SELV)	↑	↑	↑	11,2	↑	11,2
Insulation area 10: Between AC live conductors and communication RS485 port/USB (RI)	Refer to above table	Refer to above table	8,4	↓	Mains side: PCB: 8,4	↓

- shortest distance PCB foil trace and on components on PCB (Mains to SELV)	↑	↑	↑	8,5	↑	8,5
Insulation area 11: Between internal live parts to Display panel/LED cover (RI)	Refer to above table	Refer to above table	8,4	↓	22,0	↓
- internal live parts to Display panel/LED cover	↑	↑	↑	>8,4 verified by impulse and dielectric strength test	↑	>22,0 verified by impulse and dielectric strength test

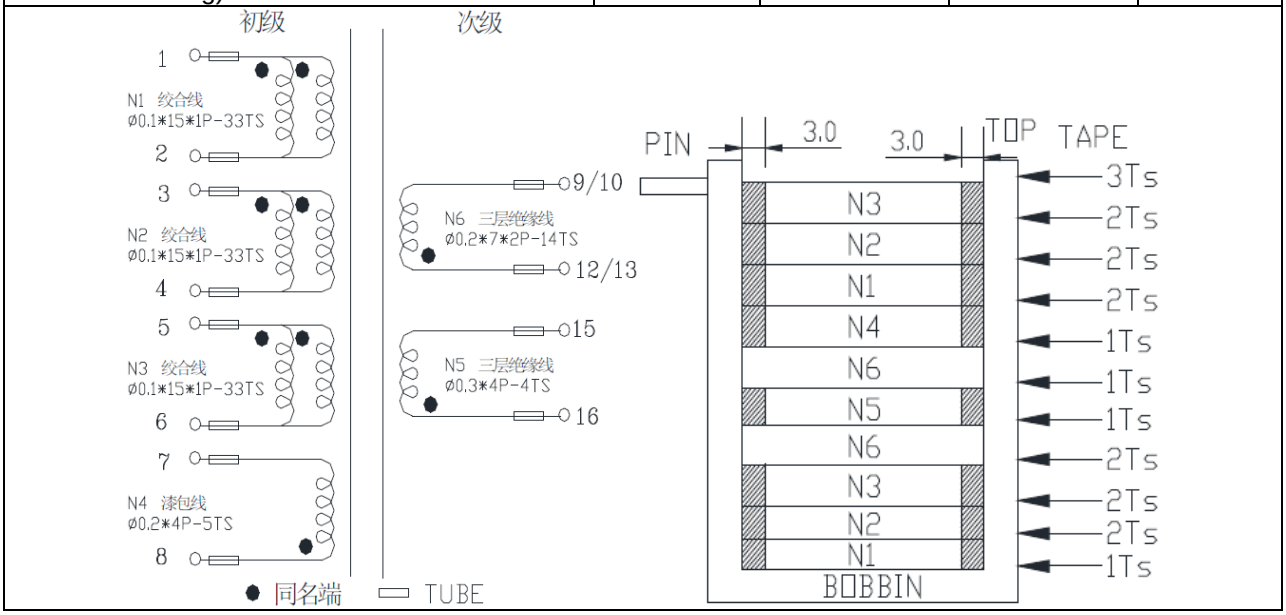
Supplementary information:

1) Maximum operation altitude: 4000 m was taken into consideration, because requirements specified in EN 62109-1:2010 are only included for adjustment of clearance distances for higher elevations, but not for other factors related to elevation, such as thermal considerations.
2) Symbol ↑means to refer to cell above this arrow, symbol ↓means to refer to cell under this arrow.
3) For Cl. and Cr. in circuit of insulation above 30 kHz are found less severity of above table by evaluating according to Annex G, and harmonized to above table.
4) Spacings for functional insulation on a PWB which do not comply with 7.3.7.4 and 7.3.7.5 are permitted because of all the following are satisfied:
   - the PWB has flammability rating of V-0 (see IEC 60695-11-10)
   - the PWB base material has a minimum CTI of 175
   - the equipment complies with the PWB short-circuit test

7.3.7	TABLE: distance through insulation measurement			P
distance through insulation di at/of:	U r.m.s. (V)	test voltage (V)	required di (mm)	di (mm)
LED cover(RI)	<DC1100 <AC500/288	AC 3400/ DC 4808	0,2	3,0
Insulation sheet between primary winding and secondary winding of isolating transformer T1(DI, three layers insulation sheet + triple insulated winding)	<DC1100 <AC500/288	Ditto	-	-



Insulation sheet between primary winding and secondary winding of isolating transformer T2(DI, three layers insulation sheet + triple insulated winding)	<DC1100 <AC500/288	Ditto	-	-



Potting material filling protection area of optocoupler	<DC1100 <AC500/288	Ditto	0,2	>0,4
Epoxy resin used to fill inverter and boost inductor(BI)	<DC1100 <AC500/288	AC 1700/ DC 2404	-	-
Insulation sheet cover inverter and boost inductor(BI)	<DC1100 <AC500/288	Ditto	-	-
Insulation sheet between IGBT, MOSFET, DIODE body and heatsink(BI)	<DC1100 <AC500/288	Ditto	-	-
Supplementary information: other components, such as optocoupler, power module are checked by certificates and specification.				

7.5	**TABLE: electric strength measurements, impulse voltage test and partial discharge test**	P

test voltage applied between:	test voltage (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	result
Insulation area 1: Across power circuit(DC/AC) to earth(BI), note 1	AC 1700/ DC 2404, note 6, note 3	4772, note 6, note 3	N/A, note 4	P
Insulation area 2: Across drive, SIO/SOPs circuit, control circuit to earth(BI); note 1	AC 1700/ DC 2404, note 6, note 3	4772, note 6, note 3	N/A, note 4	P
Insulation area 3: Between PV different polarities (FI); note 1	N/A, note 5	N/A, note 5	N/A, note 5	N/A, note 5
Insulation area 4: Across contacts of relays (BI+SI); note 1	AC 1700/ DC 2404, note 6, note 3	4772, note 6, note 3	N/A, note 4	P
Insulation area 5: Across contacts of DC switch (BI/SI); note 1	AC 3400/ DC 4808, note 6, note 3	4772, note 6, note 3	N/A, note 4	P
Insulation area 6: Between AC live conductors (FI); note 1	N/A, note 5	N/A, note 5	N/A, note 5	N/A, note 5
Insulation area 7: Between PV circuit and Drive, SIO/SOPs circuit, control circuit (FI); note 1	N/A, note 5	N/A, note 5	N/A, note 5	N/A, note 5
Insulation area 8: Between drive, SIO/SOPs circuit, control circuit and communication RS485 port/USB (DI/RI); note 1	AC 3400/ DC 4808, note 6, note 3	6772, note 2, note 3	Upd:1100V for isolating components, note 4	P
Insulation area 9: Between drive, SIO/SOPs circuit, control circuit and AC circuit after AC relay (FI); note 1	N/A, note 5	N/A, note 5	N/A, note 5	N/A, note 5

Insulation area 10: Between AC live conductors and communication RS485 port/USB (RI); note 1	AC 3400/ DC 4808, note 6, note 3	6772, note 2, note 3	N/A, note 4	P
Insulation area 11: Between internal live parts to Display panel/LED cover (RI); note 1	AC 3400/ DC 4808, note 6, note 3	6772, note 2, note 3	N/A, note 4	P
Supplementary information: Note 1: See also insulation diagram incorporated in table clearance and creepage distance measurements. Note 2: Impulse withstand voltage is 6772(for cl. verification and components test), and dielectric strength test voltage is AC 3400V/DC 4808V, the test voltage in above table shows the actual voltage applied for described insulation barriers. Note 3: Voltage test (dielectric strength test) was performed after: 1) Humidity pre-conditioning as specified in clause 4.5 of EN 62109-1:2010; The device is classed IP66 for outdoor use. The Voltage test was performed immediately after the humidity pre-conditioning. 2) Thermal testing as specified in clause 4.3 of EN 62109-1:2010; 3) Testing in single fault condition as specified in clause 4.4 of EN 62109-1:2010; 4) IP66 test as specified in clause 6.3 of EN 62109-1:2010; 5) Mechanical resistance to deflection, impact, or drop as specified in clause 13.7 of EN 62109-1:2010. Note 4: Protection separation shall withstand the partial discharge test according to 7.5.3, only if the recurring peak working voltage across the insulation is greater than 700 V and the voltage stress on the insulation is greater than 1 kV/mm, so rated discharge voltage is equal to sum of the recurring peak voltages in each of the circuits separated by the insulation. Note 5: Functional insulation shall comply with the requirements of clause 7.3.7.3. For parts or circuits in overvoltage category II, III, or IV, functional insulation is designed according to the applicable impulse voltage as determined by 7.3.7.1.4. Testing is not required. See cl. and cr. distance for functional insulation. Note 6: Impulse withstand voltage is 4772(for cl. verification and components test), and dielectric strength test voltage is AC 1700V/DC 2404V, the test voltage in above table shows the actual voltage applied for described insulation barriers. Note 7: To make sure that this voltage in not stress on basic or supplementary insulation barriers and non-applied insulating area are accidentally tested, this test is applied on individual parts only.				

8&13.7&13.3.3.6	**TABLE: Protection against mechanical hazards, Mechanical strength**	P

Part under test	Test (impact, drop, force, handle, rough handling, mobile)	Remarks
Mounting brackets, handle loading	Weight: 90kg×4 for 70s	No damage
Metal enclosure	Deflection test: 5s@250N	No damage
Cover for display	7J@-25°C	No hazard observed
Strand wire	8mm stripping, bent free	Not touch accessible metal parts
Supplementary information: Equipment weight: 90kg		

Dielectric strength – Pass, see Table Safety related electrical (dielectric) tests.

9.2	**TABLE: Limited power sources**					P
Circuit output tested: USB						
Note: Measured Uoc (V) with all load circuits disconnected:						
Components	Sample No.	Uoc (V)	I_{sc} (A)		VA	
			Meas.	Limit	Meas.	Limit
USB power	1	5,0	0,8	8,0	4,0	5*Uoc
supplementary information:						
SC=Short circuit, OC=Open circuit						

Additional tests for Modification 1 (First revision)

4.7	TABLE: Mains supply electrical data in normal condition & electrical ratings tests					P
Type	U dc (V)	I dc (A)	P dc (W)	U ac (L1-N, L2-N, L3-N) (V)	I ac (L1, L2, L3) (A)	P ac (W/VA)
SUN2000-100KTL-M1@380V with AFCI and PID functions						
Min. full load MPP voltage	540,56	190,53	103014	220,56	151,81	100533 W
				220,53	151,83	
				220,45	151,90	
Max. full load MPP voltage	800,03	129,38	102974	220,48	153,05	100848 W
				220,55	152,39	
				220,50	152,24	
Rated full load MPP voltage	596,32	172,27	102889	220,48	152,49	100203 W
				220,52	151,64	
				220,67	151,54	
Verification for max. Idc and max. active power	539,06	209,31	113121	220,53	166,29	110114 W
				220,61	166,23	
				220,71	166,15	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90502	220,71	133,26	110012 VA (PF=0,8)
				220,61	133,32	
				220,53	133,37	
SUN2000-100KTL-M1@400V with AFCI and PID functions						
Min. full load MPP voltage	540,46	190,6	103604	230,46	145,31	100604 W
				230,53	145,42	
				230,46	144,76	
Max. full load MPP voltage	799,93	128,63	103000	230,46	145,73	100805 W
				230,53	145,41	
				230,49	145,31	
Rated full load MPP voltage	600,89	171,34	102889	230,31	145,19	100318 W
				230,52	145,06	
				230,67	144,96	
Verification for max. Idc and max. active power	540,46	209,31	113113	230,53	159,07	110132 W
				230,61	159,01	
				230,71	158,94	
Verification for max. Iac and apparent power indicated on marking plate	699,14	129,44	90495	230,53	127,58	110002 VA (PF=0,8)
				230,61	127,54	
				230,71	127,48	
SUN2000-100KTL-M1@480V with AFCI and PID functions						
Min. full load MPP voltage	540,46	190,6	103011	277,26	120,81	100443 W
				277,23	120,63	
				277,41	120,59	
Max. full load MPP voltage	801,13	128,58	102974	277,63	120,62	100395 W
				277,14	120,75	
				277,29	120,73	
Rated full load MPP voltage	600,89	171,34	102889	277,31	120,42	100318 W
				277,52	120,36	
				277,67	120,64	
Verification for max. Idc	540,26	209,31	113221	277,53	131,95	110094 W

and max. active power				277,61 277,71	132,18 132,06	
Verification for max. Iac and apparent power indicated on marking plate	699,21	129,44	90511	277,53	106,11	110002 VA (PF=0,8)
Supplementary information:						

4.3	**TABLE: heating temperature rise measurements (SUN2000-100KTL-M1)[8]**						**P**
Test voltage(PV Input)(V)	540	620	540	800	620	800	0	-
Test voltage(AC Output)(V)	400	400	400	400	400	400	400	-
Test frequency(Hz)	50	50	50	50	50	50	50	-
Test condition	(1)	(2)	(3)	(4)	(5)	(6)	(7)	-
maximum temperature T of part/at:	T (°C)							TMAX (°C)
Ambient temperature	40,0	40,0	60,0	60,0	60,0	40,0	40,0	-
Mounting surface	43,2	42,5	62,3	62,8	63,8	41,7	40,3	90
LED indicator panel	42,9	41,8	72,9	71,7	69,4	41,5	40,9	85
Metal enclosure	53,4	50,2	80,3	79,6	72,3	50,2	41,7	90
Boost inductor	102,0	101,6	94,2	97,2	95,6	99,7	41,3	130(Class F)
PCB	85,0	84,8	88,7	85,3	88,3	80,6	41,1	130
BST conductor	85,0	83,0	85,1	80,2	85,8	79,2	40,8	105
ISO relay coil(K1)	75,5	75,4	82,0	79,8	81,9	72,7	41,9	130(Class F)
DC switch (outside)	41,2	41,8	60,1	61,2	61,4	41,5	41,9	85
Drive transformer winding(T5)	78,2	78,3	84,9	82,4	84,9	75,4	42,3	130(Class F)
Optocoupler(U13)	79,3	79,2	86,0	83,5	85,9	76,1	42,5	100
SPD(F13)	71,9	71,6	79,2	76,9	79,0	68,6	40,7	85
Filter capacitor(C407)	74,2	74,2	81,2	79,0	81,0	71,4	41,5	105
Current hall(U51)	73,0	71,4	78,5	74,8	77,7	66,7	39,5	105
Filter capacitor(C10)	69,2	68,7	77,4	74,9	77,1	65,6	39,1	105
Current hall(U62)	76,3	75,5	82,6	79,5	82,2	71,6	40,8	105
INV module(U1)	89,1	89,4	92,9	91,2	92,9	87,8	40,6	130
INV module(U2)	92,9	93,1	95,7	93,5	95,6	91,1	40,7	130
INV module(U3)	92,0	92,1	95,1	93,1	95,0	90,1	40,6	130
Boost module(U4)	79,7	76,9	86,2	80,8	85,0	70,9	40,7	130
Boost module(U5)	79,0	76,2	85,9	80,3	84,5	70,0	40,6	130
Boost module(U6)	82,8	79,4	88,4	82,3	86,9	72,7	40,6	130
Boost module(U7)	81,9	78,5	87,9	81,9	86,4	71,9	40,6	130
Boost module(U8)	81,0	77,7	87,4	81,5	86,0	71,3	40,6	130
Y capacitor(C294)	74,7	74,6	81,3	78,9	81,2	71,6	40,5	125
Drive transformer winding(T3)	70,2	70,1	78,1	75,9	77,9	67,2	46,9	130(Class F)
Current hall(U9)	76,3	75,5	82,6	79,5	82,2	71,6	40,8	105
Output wire	81,9	81,1	82,3	77,8	81,7	75,1	40,3	105
INV inductor (Phase A)	121,8	105,2	105,2	105,2	106,3	95,3	40,3	150(Class H)

INV inductor (Phase B)	125,3	101,3	101,3	101,3	104,7	93,5	40,6	150(Class H)
INV inductor (Phase C)	121,9	133,7	102,6	100,8	109,1	90,8	40,7	150(Class H)
Output terminal	81,9	81,6	82,5	77,9	81,9	75,5	40,5	105
PV input wire (near switch)	67,5	69,5	76,3	74,4	76,3	67,2	40,3	105
Cooling fan	69,5	69,5	76,3	74,4	76,3	67,2	40,3	85
Current hall(U85)	76,3	75,5	82,6	79,5	82,2	71,6	40,8	105
Relay(K10)	77,5	77,4	82,6	79,7	82,4	73,8	40,2	85
PV input connector	73,3	73,0	80,1	77,7	79,9	69,9	40,9	85
AC aux transformer winding(T2)	81,0	82,0	87,3	85,1	85,1	76,2	48,3	130(Class F)
AC aux transformer bobbin(T2)	79,0	79,0	85,3	83,1	85,1	76,2	48,3	130(Class F)
DSP(U100)	89,6	93,1	86,8	89,1	88,4	76,8	42,1	105
DSP(U101)	92,0	96,1	92,3	94,5	90,6	75,6	41,8	105
CPLD(U102)	88,4	92,2	82,3	85,2	81,2	81,4	41,7	105
DC aux transformer winding(T1)	76,0	76,6	83,1	84,4	83,7	76,7	39,8	130(Class F)
DC aux transformer bobbin(T1)	76,0	76,6	83,1	84,4	83,7	76,7	39,8	130(Class F)
Optocoupler(U13)	79,3	79,2	86,0	83,5	85,9	76,1	42,5	130
BUS capacitor(C32)	70,6	71,6	78,5	77,8	78,9	71,1	41,4	105
RCD hall(U34)	97,2	92,3	90,1	96,5	86,9	93,7	41,2	105
Filter capacitor(C734)	69,8	69,3	77,7	75,1	77,4	66,0	39,2	105
X capacitor(C501)	69,8	69,3	77,7	75,1	77,4	66,0	39,2	105
AFCI BUCK(U8)	84,5	84,5	91,7	89,3	91,6	81,7	41,2	105
AFCI MCU(U1)	85,9	85,8	93,5	90,9	93,3	82,7	41,1	105
AFCI TL431(U7)	77,8	77,6	85,0	82,7	84,9	74,8	41,0	105
AFCI PCB	77,2	77,3	84,5	82,2	84,3	74,4	41,0	130
PID 12V to12V transformer(T1)	67,5	67,3	75,7	73,7	75,4	64,8	45,8	130(Class F)
PID 12V to 550V transformer(T2)	65,8	65,6	74,0	71,9	73,7	63,1	42,9	130(Class F)
PID IGBT(Q3)	68,2	68,6	78,9	77,3	79,2	67,1	67,1	130

Supplementary information:
(1)Lowest full load MPP voltage with rated power output @40°C (without power derating)
(2)Highest full load MPP voltage with rated power output @40°C (without power derating)
(3)Lowest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(4)Highest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(5)Lowest full load MPP voltage and blanketing with rated power output @60°C (power derating to thermal steady)
(6)Highest full load MPP voltage and cooling fan disconnected with rated power output @40°C (power derating to thermal steady)
(7)PID worked in night with rated output @40°C (PV- to PE 550V)
(8)Test with components on optional AFCI and PID PCBA.

4.4	**TABLE: fault condition tests**						P
	ambient temperature (°C)			:	N/A(at the prevailing ambient temperature)		—

No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	Result

1	C36	short	MAINS:480 PV: 750	10 min	-		The inverter operated normally.
2	T3, pin 1 – pin 2	short	MAINS:480 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T3, pin 3 – pin 4	short	MAINS:480 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T3, pin 5 – pin 6	short	MAINS:480 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T3, pin 7 – pin 9	short	MAINS:480 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T3, pin 9 – pin 12	short	MAINS:480 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
	T3, pin 15 – pin 16	short	MAINS:480 PV: 750	10min	-	-	Alternative power supply. The inverter operated normally.
Supplementary information							

7.5	**TABLE: electric strength measurements, impulse voltage test and partial discharge test**			P
test voltage applied between:	test voltage[2] (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	result
Across power circuit (DC/AC) to earth(BI)	DC 2375	4772	N/A	P
Across power circuit (DC/AC) to communication RS485 port/USB (RI)	DC 4750	6772	N/A	P
Supplementary information: 1. test conducted after single fault and abnormal test. 2. 480V system voltage for model SUN2000-100KTL-M1 was considered for determination of temporary overvoltage, the r.m.s. value of the rated voltage between phases.				

Additional tests for Modification 2 (Second revision):

4.7	TABLE: Mains supply electrical data in normal condition & electrical ratings tests					P
Type	U dc (V)	I dc (A)	P dc (W)	U ac (L1-N, L2-N, L3-N) (V)	I ac (L1, L2, L3) (A)	P ac (W/VA)
SUN2000-75KTL-M1@380V						
Min. full load MPP voltage	536,31	143,18	77036	220,61	113,50	74984 W
				220,52	113,10	
				220,30	113,46	
Max. full load MPP voltage	802,32	95,67	76767	221,22	113,26	74841 W
				220,81	113,36	
				221,60	113,21	
Rated MPP voltage at max. power	608,37	125,61	76483	221,21	113,35	74905 W
				220,93	113,00	
				221,64	113,29	
Verification for max. Idc and max. active power	536,31	143,18	77036	220,62	113,50	74984 W
				220,54	113,10	
				220,33	113,46	
Verification for max. Iac and apparent power indicated on marking plate	586,45	106,69	62287	220,73	113,37	75024 VA (PF=0,8)
				220,13	112,96	
				221,31	113,31	
SUN2000-75KTL-M1@400V						
Min. full load MPP voltage	542,90	141,77	76972	230,03	108,56	74979 W
				229,98	108,16	
				230,14	108,50	
Max. full load MPP voltage	806,50	95,07	76675	230,02	108,14	74993 W
				229,96	107,89	
				230,11	108,16	
Rated full load MPP voltage	611,98	124,90	76338	229,98	108,38	74870 W
				229,93	108,34	
				230,12	108,34	
Verification for max. Idc and max. active power	542,90	141,77	76972	230,03	108,56	74979 W
				229,98	108,16	
				230,14	108,50	
Verification for max. Iac and apparent power indicated on marking plate	586,70	108,18	62132	229,96	108,30	74947 VA (PF=0,8)
				230,03	107,94	
				229,98	108,28	
SUN2000-75KTL-M1@480V						
Min. full load MPP voltage	609,07	128,35	76622	277,09	89,90	74980 W
				277,01	89,58	
				277,22	89,92	
Max. full load MPP voltage	866,20	88,17	76366	277,07	90,19	75017 W
				277,02	89,85	
				277,19	90,04	
Rated full load MPP voltage	729,19	104,50	76204	277,07	89,88	75038 W
				276,99	89,88	
				277,22	90,08	

Verification for max. Idc and max. active power	609,07	128,35	76622	277,09	89,90	74980 W
				277,01	89,58	
				277,22	89,92	
Verification for max. Iac and apparent power indicated on marking plate	788,10	78,88	62101	277,03	89,89	75087 VA (PF=0,8)
				276,99	89,95	
				277,12	89,92	
Supplementary information:						

Additional tests for Modification 3 (Third revision):

4.7	**TABLE: : Electrical ratings tests**					P
Type	U dc (V)	I dc (A)	P dc (W)	U ac (V)	I ac (A)	P ac (W/VA)-
SUN2000-100KTL-M2@380V						
Min. full load MPP voltage	539,39	191,78	103434	220,90	152,11	100616 W
				220,91	151,89	
				220,77	151,63	
Max. full load MPP voltage	796,69	130,09	103637	220,85	152,64	100886 W
				220,87	152,39	
				220,73	152,18	
Rated MPP voltage at max. power	568,86	181,97	103504	220,90	152,36	100757 W
				220,90	152,04	
				220,77	151,88	
Verification for max. Idc and max. active power	538,00	210,71	113399	220,95	166,59	110170 W
				220,95	166,29	
				220,81	165,91	
Verification for max. Iac and apparent power indicated on marking plate	589,10	154,87	91105	220,94	166,29	109982 VA (PF=0,8)
				220,94	166,16	
				220,81	165,63	
SUN2000-100KTL-M2@400V						
Min. full load MPP voltage	538,22	192,24	103464	230,39	145,67	100728 W
				230,89	145,49	
				230,75	145,25	
Max. full load MPP voltage	796,79	130,08	103640	230,87	146,30	101081 W
				230,87	146,04	
				230,73	145,89	
Rated MPP voltage at max. power	598,00	172,94	103516	230,89	146,12	101024 W
				230,89	145,87	
				230,75	145,71	
Verification for max. Idc and max. active power	538,25	210,69	113400	230,94	159,49	110271 W
				230,94	159,25	
				230,79	158,93	
Verification for max. Iac and apparent power indicated on marking plate	589,10	154,58	91066	230,93	159,02	109962 VA (PF=0,8)
				230,93	158,93	
				230,80	158,49	
SUN2000-100KTL-M2@480V						
Min. full load MPP voltage	623,41	166,12	103554	277,89	121,64	101228 W
				277,87	121,47	
				277,72	121,34	
Max. full load MPP voltage	848,22	122,21	103661	277,88	122,26	101686 W
				277,86	122,06	
				277,71	121,96	
Rated MPP voltage at max. power	718,20	144,27	103605	277,89	122,11	101613 W
				277,87	121,89	
				277,73	121,84	
Verification for max. Idc and max. active power	623.27	182.13	113506	277.92	133.20	110863 W
				277.91	133.01	
				277.76	132.86	

Verification for max. Iac and apparent power indicated on marking plate	682.57	132.66	90544	277.91	132.18	110028 VA (PF=0,8)
				277.90	132.18	
				277.76	131.86	
SUN2000-110KTL-M2@380V						
Min. full load MPP voltage	537,80	211,33	113644	220,96	166,79	110348 W
				220,97	166,59	
				220,83	166,18	
Max. full load MPP voltage	798,77	142,06	113464	220,92	166,88	110324 W
				220,94	166,61	
				220,79	166,28	
Rated MPP voltage at max. power	598,20	190,1	113715	220,98	167,56	110855 W
				220,99	167,32	
				220,85	166,96	
Verification for max. Idc and max. active power	541,39	229,80	124383	221,03	182,67	120645 W
				221,03	182,10	
				220,88	181,27	
Verification for max. Iac and apparent power indicated on marking plate	621,17	161,93	100580	221,02	183,34	121083 VA (PF=0,8)
				221,03	182,92	
				220,90	181,85	
SUN2000-110KTL-M2@400V						
Min. full load MPP voltage	543,32	209,61	113881	230,96	160,10	110713 W
				230,95	159,86	
				230,81	159,57	
Max. full load MPP voltage	798,79	142,40	113739	230,93	160,10	110775 W
				230,94	160,02	
				230,79	159,79	
Rated MPP voltage at max. power	606,04	187,34	113529	230,96	160,11	110714 W
				230,96	159,85	
				230,82	159,58	
Verification for max. Idc and max. active power	600,50	206,51	123962	231,00	174,48	120569 W
				231,01	174,09	
				230,86	173,55	
Verification for max. Iac and apparent power indicated on marking plate	562,48	178,84	100591	231,01	174,94	120892 VA (PF=0,8)
				231,02	174,67	
				230,89	173,97	
SUN2000-115KTL-M2@400V						
Min. full load MPP voltage	543,89	218,42	118797	230,96	166,94	115413 W
				230,94	166,66	
				230,80	166,30	
Max. full load MPP voltage	798,80	148,42	118552	230,92	167,03	115406 W
				230,93	166,74	
				230,77	166,44	
Rated MPP voltage at max. power	606,94	194,99	118328	230,96	166,97	115436 W
				230,95	166,70	
				230,81	166,33	
Verification for max. Idc and max. active power	540,82	236,96	128122	231,01	180,03	124327 W
				231,01	179,56	
				230,85	179,80	
Verification for max. Iac	562,50	184,82	103958	230,99	180,96	124330 VA

and apparent power indicated on marking plate				231,00	180,59	(PF=0,8)
				230,86	179,68	
SUN2000-115KTL-M2@480V						
Min. full load MPP voltage	646,26	174,16	112549	277,92	132,23	110048 W
				277,88	132,04	
				277,73	131,90	
Max. full load MPP voltage	847,91	134,85	114338	277,91	134,70	112071 W
				277,90	134,49	
				277,74	134,44	
Rated MPP voltage at max. power	720,74	158,40	114155	277,92	134,44	111887 W
				277,90	134,22	
				277,75	134,12	
Verification for max. Idc and max. active power	627,99	205,49	129043	277,97	151,28	125907 W
				277,95	151,07	
				277,79	150,79	
Verification for max. Iac and apparent power indicated on marking plate	651,75	157,62	102727	277,96	149,58	124515 VA (PF=0,8)
				277,94	149,54	
				277,79	149,18	
Supplementary information:						

4.3	**TABLE: heating temperature rise measurements (SUN2000-110KTL-M2)**							**P**
Test voltage(PV Input)(V)	540	800	540	800	600	600		-
Test voltage(AC Output)(V)	380	380	380	380	380	380		-
Test frequency(Hz)	50	50	50	50	50	50		-
Test condition	(1)	(2)	(3)	(4)	(5)	(6)		-
maximum temperature T of part/at:	T (°C)							TMAX (°C)
Cable of BST inductor	72.7	54.9	76.5	67.1	67.7	57.3	-	105
IGBT module DT of BST	76.6	51.6	81.2	65.7	67.4	49.5	-	130
IGBT module HT of BST	70.9	52.2	83.5	65.6	73.9	50.0	-	130
Diode H21 of BST	70.9	55.1	82.7	66.8	74.5	54.2	-	130
Diode D21 of BST	79.3	55.1	82.1	66.7	69.8	54.8	-	130
IGBT module T1 of INV	87.5	71.5	90.8	72.9	86.1	79.8	-	130
IGBT module T5 of INV	84.8	70.5	90.2	72.8	87.9	77.4	-	130
Cable of INV inductor	88.1	70.9	88.6	72.9	95.0	83.9	-	105
ISO relay K1	76.6	64.5	81.8	71.4	80.3	71.6	-	85
PWM driver IC U7 on INV driver board	100.8	87.0	104.4	91.2	103.1	95.3	-	110
PWM driver optical coupler U8 on driver board	88.5	75.5	92.5	80.2	90.5	83.3	-	100
Capacitor C300 on power board	88.5	71.8	89.3	72.3	89.3	85.5	-	95
Optical coupler U13 on BST driver board	83.7	70.2	88.3	76.9	85.8	78.1	-	100
PWM driver IC U7 on BST driver board	97.6	80.1	101.6	86.9	98.2	87.4	-	130
Q27 on BST driver board	92.4	71.7	99.4	76.9	92.9	78.3	-	130

Q40 on BST driver board	93.7	71.2	97.1	78.3	95.5	79.0	-	130
Inductor coil T7	101.0	79.0	95.7	75.1	107.4	100.6	-	110
AC current hall U34	77.1	64.5	81.6	71.2	82.5	72.5	-	85
Output power relay K5	76.5	64.4	81.4	71.5	82.5	72.4	-	85
Inductor core T7	86.1	70.8	87.3	76.5	89.9	85.0	-	110
Inductor L2 coil	88.2	76.0	88.1	79.2	94.5	94.1	-	110
MOS Q37 on DC Aux-Power board	78.9	69.3	84.6	77.4	81.5	75.6	-	130
E-cap C1006 on DC Aux-Power board	79.2	67.6	85.0	75.6	83.3	74.1	-	105
BUS+ cable	74.5	67.0	80.2	71.3	78.7	77.7	-	105
X-cap on filter board C27	69.8	58.8	77.3	68.9	72.3	64.3	-	110
E-cap C1	73.1	63.9	79.1	70.4	76.1	74.4	-	105
E-cap C2	72.9	64.2	79.1	70.3	75.5	76.7	-	105
Output cable of B phase	97.6	74.8	93.3	72.1	105.1	93.4	-	105
MCU on monitor board U18	78.6	67.1	83.2	73.6	81.9	73.4	-	125
Main DSP U101	76.8	65.3	82.4	73.3	81.5	72.8	-	125
DC switch(outer of enclosure)	46.5	42.8	61.7	62.0	37.8	38.0	-	85
Heatsink	62.2	53.8	71.6	66.7	71.9	56.2	-	100
Mounting surface	53.9	45.7	69.1	62.1	57.6	41.9		90
PV connector	47.1	43.7	62.5	62.3	47.5	38.1	-	85
DC switch(inner of enclosure)	46.4	43.4	62.1	62.2	34.1	37.8	-	85
INV inductor coil of C phase	110.0	87.3	100.7	75.7	120.1	116.2	-	150
SPD F9	74.5	62.5	80.5	70.3	77.9	69.4	-	85
Capacitor C407 on power board	76.1	63.9	81.2	71.2	79.3	71.3	-	110
AMB.	45.4	42.7	61.2	61.9	31.0	36.9	-	\

Supplementary information:
(1)Lowest full load MPP voltage with rated power output @40°C (without power derating)
(2)Highest full load MPP voltage with rated power output @40°C (without power derating)
(3)Lowest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(4)Highest full load MPP voltage with rated power output @60°C (power derating to thermal steady)
(5)Lowest full load MPP voltage and blanketing with rated power output @30°C (without power derating)
(6)Highest full load MPP voltage and cooling fan disconnected with rated power output @35°C (power derating to thermal steady)

4.4	**TABLE: fault condition tests**						P
ambient temperature (°C) :		N/A(at the prevailing ambient temperature)					—
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	Result
1	Boost IGBT U4, pin 3 – pin 7	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. U6 breakdown. No other component damage, 30A fuse not open, no hazard.

	Boost IGBT U4, pin 5 – pin 6	short	MAINS:500 PV: 750	10min	-	-	The inverter shut down. U6 breakdown. No other component damage, 30A fuse not open, no hazard.
Supplementary information 1. Abnormal and component failure tests were conducted with the AC output protected by external circuit breaker (rated 250A) provided in all live connections to the AC supply as specified in user manual. A 30A non-time-delay fuse connected between the protective earthing terminal and the protective earthing conductor to determined that the fault did not result in any damage to the protective earthing conductor or terminal, or to protective bonding means. 2. The equipment was placed on white tissue-paper covering a softwood surface and covering the equipment with cheesecloth during the fault testing, no emission of molten metal, burning insulation, or flaming or glowing particles from the fire enclosure, and there was no charring, glowing, or flaming of the cheesecloth. 3. No other hazard(e.g. chemical, expulsion) observed after each test.							

7.5	**TABLE: electric strength measurements, impulse voltage test and partial discharge test**			P
test voltage applied between:	test voltage[2] (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	result
Across power circuit (DC/AC) to earth(BI)	DC 2404	4772	N/A	P
Across power circuit (DC/AC) to communication RS485 port/USB (RI)	DC 4808	6772	N/A	P
Supplementary information: 1. test conducted after single fault and abnormal test. 2. 500V system voltage for model SUN2000-125KTL-M0 was considered for determination of temporary overvoltage, the r.m.s. value of the rated voltage between phases.				

8.4&8.5	**TABLE: Protection against mechanical hazards, Mechanical strength**	P
Part under test	Test (impact, drop, force, handle, rough handling, mobile)	Remarks
Mounting brackets, handle loading	Weight: 93kg×4 for 70s	No damage
Supplementary information: 1.Equipment weight: 93kg 2.Dielectric strength – Pass, see Table 7.5 Safety related electrical (dielectric) tests.		

14	**TABLE: list of critical components**				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Enclosure	Various	5052	Aluminum, type 5052, min 2.0mm thick, painted	EN 62109-1: 2010 EN 62109-2:	Test with unit

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
			coating type RAL9006, 1075*550*300mm	2011	
Heat-sink (the rear side of enclosure)	Various	AL-1060	Aluminum, type AL-1060, min 1.2mm thick, 440*225*87mm	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Plastic window	COVESTRO DEUTSCHLAND AG [PC RESINS]	6557+(z)(f1)	3,0mm thick, 115°C, V-0	UL 94	UL(E41613)
Wall Bracket	Various	Steel	3.0mm, 685,8*397,9*93,5mm	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Barrier	COVESTRO DEUTSCHLAND AG [PC RESINS]	6555+(z)(f1)	2mm thick, V-2	UL 94	UL(E41613)
AC output cable gland	Shanghai Found Automatic Equipment	FCS-K series	V-0, IP68, -40°C…100°C, UV resistant	UL 514	UL(E325535)
PV input connector	Staubli	PV-ADSP4-S2/6-UR, PV-ADBP4-S2/6-UR	1500Vdc, 30A, 90°C	IEC 62852:2014 UL 6703	TUVRh (R60110077) UL(E343181)
	AMPHENOL	HH4CFB4TMS HH4CMB4TMS HH4CFD4TMS HH4CMD4TMS	1100V, 30A, 90°C	IEC 62852:2014 EN 62852:2015	TUVRh (R50388083)
AC Output Terminal Block	PHOENIX CONTACT GmbH & Co. KG	RBO 8-WD	600V,192A, 125°C	UL 1059	UL(E60425)
	Weidmüller Interface GmbH & Co. KG	WFF 70	800V, 175A, 120°C	UL 1059	UL(E60693)
	Weidmüller Interface GmbH & Co. KG	WFF 120	1100V, 310A, 120°C	UL 1059	UL(E60693)
	PHOENIX CONTACT GmbH & Co. KG	RBO 10-WD	1000V, 309A, 105°C	UL 1059	UL(E60425)
DC switch	Shanghai Liangxin Electrical Co.,	NDG3V-50H/6/1/02/M/8/F	1500Vdc,6P, 20A,85℃	EN 60947-3:2009	TÜV SÜD (B08354740316)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
	Ltd. (Nader)				
	Shanghai Liangxin Electrical Co., Ltd. (Nader)	NDG3V-50/8/1/02/M/15/F	1200Vdc,8P, 20A,85℃	EN 60947-3:2009	TÜV SÜD (B08354740316)
	Santon Switchgear Ltd	XBHP+3610/4	1100Vdc, 6P, 20A, 90°C	IEC 60947-3:2009	DEKRA (71-107727)
	Santon Switchgear Ltd	XBHP+3810/4	1200Vdc, 8P, 20A, 90°C	IEC 60947-3:2009	DEKRA (71-107727)
	Shanghai Liangxin Electrical Co., Ltd. (Nader)	NDG3-32/20/6/1/02/M/1000V/1100	1100Vdc, 6P, 20A, 90°C	EN 60947-3:2009	TÜV SÜD (B170583574250)
	Shanghai Liangxin Electrical Co., Ltd. (Nader)	NDG3-32/20/8/1/02/M/1000/1100	1100Vdc, 8P, 20A, 90°C	EN 60947-3:2009	TÜV SÜD (B170583574250)
Internal Cooling Fan 1	ASIA VITAL COMPONENTS CO., LTD.	DBPK1238B2MP001	12Vdc, 30W	EN 60950:2006 UL 507	TÜV SÜD (E8A18012730820) UL(E158191)
	Delta Electronics, Inc	THD1212ME-00EZS		EN 60950:2006	TUVRh (R50156481)
	NMB	12038VA-12R-BU-01		EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	NIDEC	V12E12BS7C5-07Z04		EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Internal Cooling Fan 2	AVC	DBTB1225B2HP062	12Vdc, 6W	EN 60950-1: 2006	TÜV SÜD (B170583574250)
	DELTA	THB1212B-AD1D		EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	NIDEC	U12T12BS2A7-07Z04		UL 507	UL(E89936)
	NMB	11925SG12PBWE1		EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
External fan	AVC	DBPK0938B8MY001	48Vdc, 36W	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	DELTA	TFD0948HE-	48Vdc, 36W	EN 62109-1:	Test with unit

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
		00ESA		2010 EN 62109-2: 2011	
	NIDEC	V92E48BS1P7-24Z04	48Vdc, 36W	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Electromagnetic Relay (K5, K6, K7, K8, K9, K10)	Xiamen Hongfa Electroacoustic Co., Ltd	HF167F-200/12-H3F	800VAC, 200A, 85°C	UL 508	UL (E133481)
Connecting wires	Various	10269	1000V, 8-22AWG	UL 758	UL
	Various	10267	2000V, 10-22AWG	UL 758	UL
	Various	1015	600V, 4-10AWG	UL 758	UL
PCB material	Various	Various	130°C, V-0	UL 94	UL
PCB coatings	LACKWERKE PETERS GMBH CO KG	1301ECO	V-0	UL 746E UL 94	UL
Boost inductor	EAGLERISE ELECTRIC&ELECTRONIC(CHINA) Co., Ltd	BP070003	620uH, 20A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	ShenZhen Highlight Electronic Co., Ltd.	LB69U13898R	620uH, 20A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	SHENZHEN JINGQUANHUA ELECTRONICS CO.,LTD	DQG-UU69-6314A	620uH, 20A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Invert inductor	EAGLERISE ELECTRIC&ELECTRONIC(CHINA) Co., Ltd	BP100011, BP100012	220uH, 240A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	ShenZhen Highlight Electronic Co., Ltd.	LB101U14636R, LB101U14637R	220uH, 240A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	SHENZHEN JINGQUANHUA ELECTRONICS CO., LTD	DQG-UU100-6700A, DQG-UU100-6701A	220uH, 240A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
IGBT module (BST)	Vincotech GmbH	10-PJ12B2A050SH06-LJ89L48T	1200V, 50A	UL 1557	UL(E192116)
	ON Semiconductor Corporation	SNXH100B120H2Q0PG-S, SNXH100B120H2Q0PG-N	1200V, 50A	UL 1557	UL(E468801)
IGBT module	Vincotech	30-	650V, 450A	UL 1557	UL(E192116)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
(INV)	GmbH	PT07NHA400 S5-LA67F58Y			
	ON Semiconductor Corporation	SNXH100M65 L4Q2F2P2G	650V, 450A	UL 1557	UL(E468801)
Film Capacitor (C298, C299, C300, C301, C302, C303, C304, C305)	EPCOS (China) Investment Ltd.	B32776G5506 KZ1, B32776G5506 K 5Z 1	600V, 50uF, 105°C	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	XIAMEN FARATRONIC CO., LTD.	C3D1U506KF AAC00 C3D1U506KF AA382	600V, 50uF, 105°C	UL 810	UL (E256238)
Aluminum Electrolytic Capacitors (C1, C12, C13, C15, C16, C2, C27, C28, C29, C3, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C4, C44, C45, C46, C47, C48, C5, C6)	NANTONG JIANGHAI Capacitor Co. LTD.	ECSW2BB431 MLB350060E	550V, 430uF, 105°C	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	NCC	ELXS5C1VSN 431MA60S	550V, 430uF, 105°C	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	EPCOS (China) Investment Ltd.	B43545S7437 M001X01	550V, 430uF, 105°C	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
AC X capacitor (C377, C378, C380, C501, C502, C503)	XIAMEN FARATRONIC CO., LTD.	C46U3105MF 3C450	1uF, 660Vac. 110°C	UL 60384-14	UL (E186600)
Power Arrester (F1, F10, F11, F12, F2, F3, F4, F5, F6, F7, F8, F9)	SHENZHEN HAIPENGXIN ELECTRONICS CO.,LTD.	PV20K510-MH	Minimum 510Vac/670Vdc, 20kA	UL 1449	UL (E321856)
	Sichuan Zhongguang Lightning Protection Technologies Co., Ltd.	PV20K510-ZG-01	Minimum 510Vac/670Vdc, 20kA	UL 1449	UL (E339436)
	Xiamen SET Electronics Co., Ltd.	TFMOV10M510	Minimum 510Vac/670Vdc, 20kA	EN 50539-11:2013+A1	TUVRh (R50438698)
Power Arrester (F13, F14)	SHENZHEN HAIPENGXIN ELECTRONICS CO.,LTD.	PV20K385-MH	Minimum 385Vac/500Vdc, 20kA	UL 1449	UL (E321856)
	Sichuan Zhongguang Lightning Protection Technologies	PV20K385-ZG:	Minimum 385Vac/500Vdc, 20kA	UL 1449	UL (E339436)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
	Co., Ltd.				
	Xiamen SET Electronics Co., Ltd.	TFMOV10M385	Minimum 385Vac/500Vdc, 20kA	EN 50539-11:2013+A1	TUVRh (R50438698)
Film Capacitor (C352, C406, C407-ENE5FLTF)	XIAMEN FARATRONIC CO., LTD.	C43Q1333M62C000	0,033uF, 300Vac, 110°C	UL 60384-14	UL(E186600)
	EPCOS	B32032A4333M501	0,033uF, 300Vac., 110°C	UL 60384-14	UL(E97863)
Ceramic Capacitor (C1, C2, C3, C4)	WALSIN TECHNOLOGY CORP	YP1AH471K070DAMD0W, YP5AH471K070DAMD0W	0,00047uF, 400Vac, 1500Vdc, 125°C	UL 60384-14	UL(E146544)
Y Capacitor (C13,C14,C15,C31,C32,C33,C7,C8,C9)	WALSIN TECHNOLOGY CORP	YV5AC103M140DAMD0W	0,001uF, 400Vac, 1500Vdc, 125°C	UL 60384-14	UL(E146544)
Y Capacitor (C132, C134, C135, C137, C14, C140, C15, C16, C17, C18, C181, C19, C20, C21, C214, C22, C23, C29, C34, C36, C38, C43, C54, C55, C56, C57, C142, C145, C206, C207, C210, C211, C371, C372, C373, C440, C441, C442, C4216, C4217,C4218, C4219)	WALSIN TECHNOLOGY CORP	YP1AH471K070DAMD0W, YP5AH471K070DAMD0W	0,00047uF, 400Vac/ 1500Vdc, 125°C	UL 60384-14	UL(E146544)
	MURATA	DE1B3RA471KN4AQ01F	0.00047uF, 400Vac, 125°C	UL 60384-14	UL(E37921)
	TDK	CD45-B2GA471KMVKA	0.00047uF, 400Vac, 125°C	UL60384-14	UL(E37861)
	Guangdong Fenghua Advanced Technology Holding CO.,LTD	CT7-Y6Y5P0E471KTE	0,00047uF, 400Vac, 125°C	UL60384-14	UL(E219015)
Ceramic Capacitor (C439,C440,C441,C442,C443,C444)	WALSIN TECHNOLOGY CORP	LN202102K110NAFDMW	0,001uF, 2000Vdc, 125°C	UL 60384-14	UL(E146544)
	TDK XIAMEN CO.,LTD	CK45-R3DD102KAVRA	0,001uF, 2000Vdc, 125°C	UL 60384-14	UL(E146544)
Y Capacitor (C172, C173, C175, C221, C256, C258, C295, C307, C331, C44, C47, C49, C50, C51, C52, C53, C944, C945, C946,	WALSIN TECHNOLOGY CORP	YU1AH472M130DAMD0W, YU5AH472M130DAMD0W	0,0047uF, 500Vac/1500Vdc, 125°C	UL 60384-14	UL(E146544)
	TDK	CD45-E2GA472MMVKA	0,0047uF, 400Vac, 125°C	UL 60384-14	UL(E37861)
	MURATA	DE1E3RA472MN4AQ89F	0,0047uF, 400Vac, 125°C	UL 60384-14	UL(E37921)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
C947, C445, C213, C214, C233, C410, C411, C412, C443, C444, C4220, C4221, C4222,C4223)	Guangdong Fenghua Advanced Technology Holding CO.,LTD	CT7-Y13Y5U0E472MTE	0,0047uF, 400Vac, 125°C	UL 60384-14	UL(E219015)
VDR (RV6, RV7, RV8)	EPCOS (China) Investment Ltd.	B72220U3381K505V87	620Vdc/385Vac,10kA	UL 1449	UL(E321126)
	THINKING	TVR20621KW225M	620Vdc/385Vac,10kA	UL 1449	UL(E314979)
	Xiamen SET Electronics Co., Ltd.	SFV20D621KT	620Vdc/385Vac,10kA	UL 1449	UL(E322662)
VDR (RV1, RV4, RV5)	EPCOS (China) Investment Ltd.	B72220U3511K504V87	820Vdc/510Vac,10kA	UL 1449	UL(E321126)
	THINKING	TVR20821KW219M	820Vdc/510Vac,10kA	UL 1449	UL(E314979)
	Xiamen SET Electronics Co., Ltd.	SFV20D821KT	820Vdc/510Vac,10kA	UL 1449	UL(E322662)
Fuse (F1-ENE8PDBA)	SINOFUSE	RS308-PV	1500V,20A,85°C	UL 248-19	UL (E493628)
	COOPER BUSSMANN	PV-20A10F85L	1500V,20A,85°C	UL 248-19	UL (E335324)
	LITTELFUSE	SPXV020.L	1500V,20A,85°C	UL 248-19	UL(E339112)
Fuse (F19, F20, F38 –ENE5FLTF)	LITTELFUSE	0218015.MXEP&1	250V, 15A, 125°C	IEC 60127-2: 2014	VDE (40016604)
	VICFUSE	UTE-A015	250V, 15A, 125°C	EN 60127-1: 2006 EN 60127-2: 2014	TUVR (50176628)
Fuse (F1, F2,F3 –ENE5FLTL)	SICHUAN ZHONGGUANG LIGHTNING PROTECTION TECHNOLOGIES CO LTD	PV20K385-ZG	20KA-1500V, 385VAC	UL 1449	UL(E339436)
	SHENZHEN HAIPENGXIN ELECTRONICS CO LTD	PV20K385-MH	20KA-1500V, 385VAC	UL 1449	UL(E321856)
	XIAMEN SET ELECTRONICS CO LTD	TFMOV10M385	20KA-1500V, 385VAC	UL 1449	UL(E322662)
Fuse (F4–ENE5FLTL)	SICHUAN ZHONGGUANG LIGHTNING PROTECTION TECHNOLOGIES CO LTD	PV20K510-ZG	20KA-1800V 510V	UL 1449	UL(E339436)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
	SHENZHEN HAIPENGXIN ELECTRONICS CO LTD	PV20K510-MH	20KA-1800V 510V	UL 1449	UL(E321856)
	XIAMEN SET ELECTRONICS CO LTD	TFMOV10M510	20KA-1800V 510V	UL 1449	UL(E322662)
EMI Differential-mode Inductor (L6)	ShenZhen Highlight Electronic Co., LTD	HGP3316F-100M	6uH, 170A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	COILCRAFT	DO3316P-103MLD&2	6uH, 170A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	PULSE	PG0051.103NLT	6uH, 170A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
EMI Com-mode Inductor (T12)	SHENZHEN JINGQUANHUA ELECTRONICS CO.,LTD	DQG-UU133-6375A	520uH, 170A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	ShenZhen Highlight Electronic Co., LTD	LB133H14088R	520uH, 170A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
	EAGLERISE ELECTRIC&ELECTRONIC(CHINA) Co., Ltd	TN140001	520uH, 170A, Class H	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Current sensor (U34)	LEM Electronics (China) Co. Ltd	CTSR 1-TP/SP18	1,7A, 105°C	UL508	UL (E189713)
	LEM Electronics (China) Co. Ltd	CTSR 3-TP/SP19	3A, 105°C	UL 508	UL (E189713)
	VAC	T60404-N4647-P985	3A, 105°C	IEC 61800-5-1:2007	Test with unit
	BYD	BST3-3IGV1M	3A, 105°C	UL 508	Test with unit
	NINGBO CRRC TIMES TRANSDUCER TECHNOLOGY CO.,LTD.	NACGL.3-P6/SP5VN	3A, 105°C	UL 508	Test with unit
Current sensor (U46, U47, U48, 49, U50, U51, U52, U53, U54, U55)	LEM Electronics (China) Co. Ltd	HLSR 20-P	IPN: 50A, VC: 5V, 105°C	EN 62109-1: 2010 EN 62109-2: 2011	Test with unit
Current sensor (U86, U85, U84)	VACUUMSCHMELZE Spol sro	T60404-N4647-X264	IPN: 450A, VC: 11.4-12.6V, 85°C	IEC/EN 62109-1	Test with unit
	LEM	LZSR 150-	IPN: 450A, VC:	IEC/EN 62109-	Test with unit

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
		P/SP1	4.75-5.25V, 85°C	1	
	NINGBO CRRC TIMES TRANSDUCER TECHNOLOGY CO.,LTD.	NACL.150P-S6/SP3VN	IPN: 450A, VC: 4.75-5.25V, 85°C	IEC/EN 62109-1	Test with unit
Optocoupler (U1201, U1202,U55,U56)	RENESAS ELECTRONIC Corporation	PS8902-Y-V-F3-AX	cl.=cr.=14,5mm, di.=0,4mm, hi-pot:7500Vr.m.s., 110°C	UL 1577	UL(E72422)
	Xiamen Hualian Electronics Corp., Ltd.	HPL6W157-HW	cl.=cr.=14,5mm, di.=0,4mm, hi-pot:7500Vr.m.s., 110°C	UL 1577	UL(E178703)
	AVAGO	ACNT-H61L-500ME	cl.=cr.=14,5mm, di.=0,4mm, hi-pot:7500Vr.m.s., 110°C	UL 1577	UL(E55361)
AC auxiliary transformer Transformer(T2)	Shenzhen Jingquanhua Electronic Co., LTD	TTBD40-150	Class F	UL 1446	UL(E344299)
	ShenZhen Highlight Electronic Co., LTD	KB40C10502R	Class F	UL 1446	UL(E344299)
DC auxiliary transformer (T1)	Shenzhen Jingquanhua Electronic Co., LTD	TTBD40-151	Class F	UL 1446	UL(E344299)
	ShenZhen Highlight Electronic Co., Ltd.	KB40C10962R	Class F	UL 1446	UL(E344299)
Potting material cover optocoupler	Dow Corning	SE9186	23kV/mm, -45°C…200°C	EN 62109-1: 2010 IEC 60664-3: 2016	Test with unit
Potting material cover Boost inductors & Invert inductors	DONGGUAN CITY JIA DI NEW MATERIALS CO LTD	JD505	0,7W/(m*K), V-0, 150°C	UL 94	UL(E485392)
Relay (K1 K2 - ENE8PDBA)	HONGFA	HF167F-G/12-HF	800Vac, 120A	EN 61810-1: 2015	TUV R (50374273)
	PANASONIC	HE1aN-W-DC12V-Y7G		UL 508 IEC 61810-1: 2015	VDE (40006681) UL(E43028)
Relay (K3 - ENE8PDBA)	OMRON	G2RL-14-E-CF DC12	250VAC, 16A	UL 60947-1 IEC 61810-1: 2015	UL(E41643) VDE(119650)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
	TE	1649328-4		UL 60947-1 IEC 61810-1: 2015	UL(E214025) VDE(40007571)
		6-1393238-2		UL 60947-1 IEC 61810-1: 2015	UL(E214025) VDE(40007571)
Transformer (T1,T10,T2,T3,T4,T5,T6,T7,T8,T9 - 03026TNK-002) Optional for model SUN2000-100KTL-M1	PULSE	PG2008NL	Class F	UL 1446	UL(E119132)
	ChengDu JinChuan Electronic Co., LTD	BD26-157	Class F	UL 1446	UL(E344299)
	ShenZhen Highlight Electronic Co., LTD	GL22E592R	Class F	UL 1446	UL(E344299)
Transformer (T1-ENE3AUPA) Optional for model SUN2000-100KTL-M1	PULSE	PG3026NL	Class F	UL 1446	UL(E119132)
	ChengDu JinChuan Electronic Co., LTD	TPQ20-161	Class F	UL 1446	UL(E344299)
	ShenZhen Highlight Electronic Co., LTD	KB20Q10183R	Class F	UL 1446	UL(E344299)
Transformer (T2 - ENE3AUPA) Optional for model SUN2000-100KTL-M1	ChengDu JinChuan Electronic Co., LTD	BDK29-6	Class F	UL 1446	UL(E344299)
	ShenZhen Highlight Electronic Co., LTD	KB29D8231R	Class F	UL 1446	UL(E344299)
Transformer (T3,T4,T5 - ENE3AUPA) Optional for model SUN2000-100KTL-M1	ChengDu JinChuan Electronic Co., LTD	BD16-83	Class F	UL 1446	UL(E344299)
	ShenZhen Highlight Electronic Co., LTD	KB16E9399R	Class F	UL 1446	UL(E344299)
Optocoupler (U16, U20 - ENE3AUPA) Optional for model SUN2000-100KTL-M1	EVERLIGHT	EL1018(TA)(HW)-VG	VISO:5000Vr.m.s., 110°C	UL 1577 IEC 60747-5-5: 2013	UL(E214129) VDE(40028391)
	RENESAS	PS2381-1Y-V-F3-AX	VISO:5000Vr.m.s., 115°C	UL 1577	UL(E72422)
Relay (K1,K2,K3,K4 - ENE3AUPA) Optional for model SUN2000-	FUJITSU	FTR-C2CA003G	250VAC, 2A	UL 508	UL(E63615)

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
100KTL-M1					
Film Capacitor (C63, C75 - ENE3AUPA) Optional for model SUN2000-100KTL-M1	XIAMEN FARATRONIC CO., LTD.	C43Q1333M60C000	0,033uF, 300Vac/1500Vdc, 110°C	UL 60384-14	UL(E186600)
Ceramic Capacitor (C158,C155-ENE3AUPA) Optional for model SUN2000-100KTL-M1	TDK	CD45-E2GA472MMVKA	0,0047uF, 400Vac/1500Vdc, 125°C	UL 60384-14	UL(E37861)
	WALSIN	YU1AH472M130DAMD0W	0,0047uF, 400Vac/2000Vdc, 125°C	UL 60384-14	UL(E146544)
	MURATA	DE1E3RA472MN4AQ89F	0,0047uF, 500Vac/1500Vdc, 125°C	UL 60384-14	UL(E37921)
[1]) an asterisk indicates a mark which assures the agreed level of surveillance					

Photo documentation

The representative model: SUN2000-100KTL-M1

Photo-1: Front view

Photo-2: Top and side view

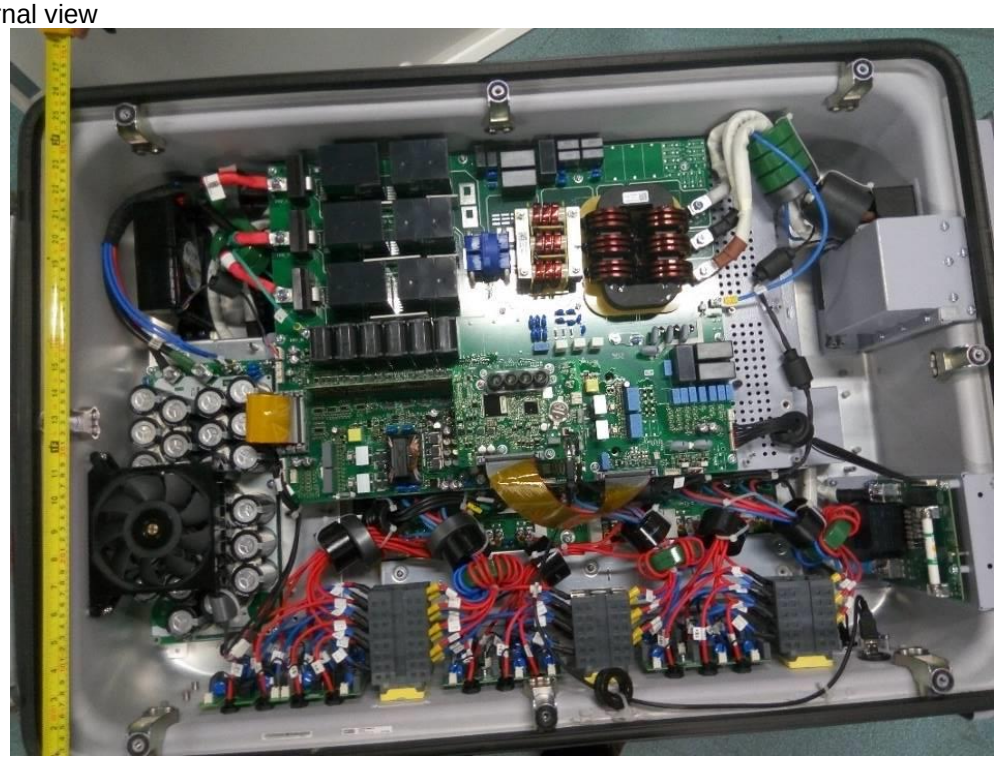
Photo-3: Bottom view

(optional DC switch)

Photo-4: Side view

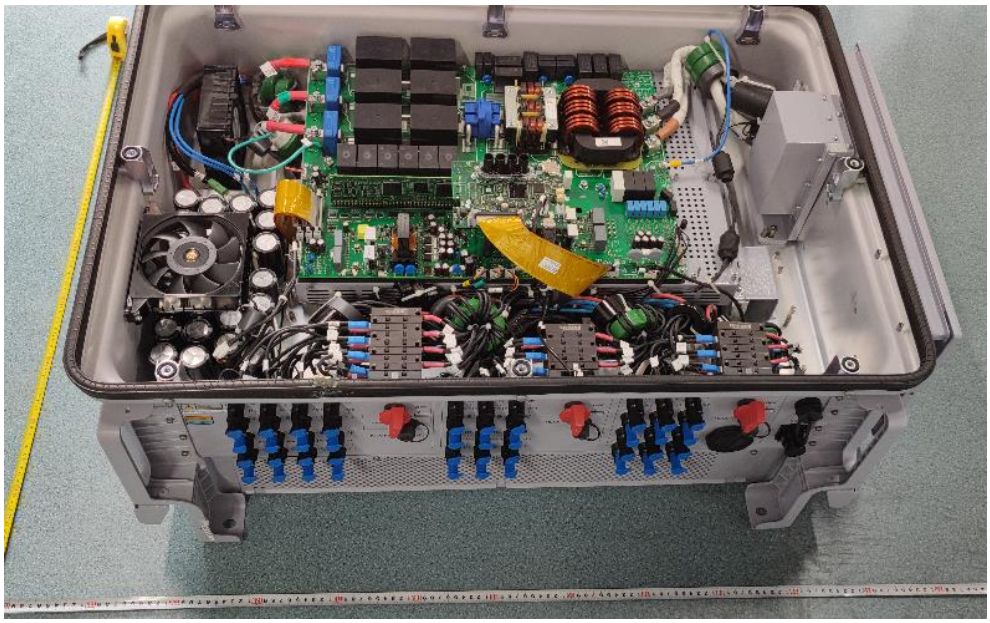
Photo-5: Back view

Photo-6: Internal view



(without PID PCBA)

(with PID PCBA)



(optional DC switch)

Photo-7: Internal view

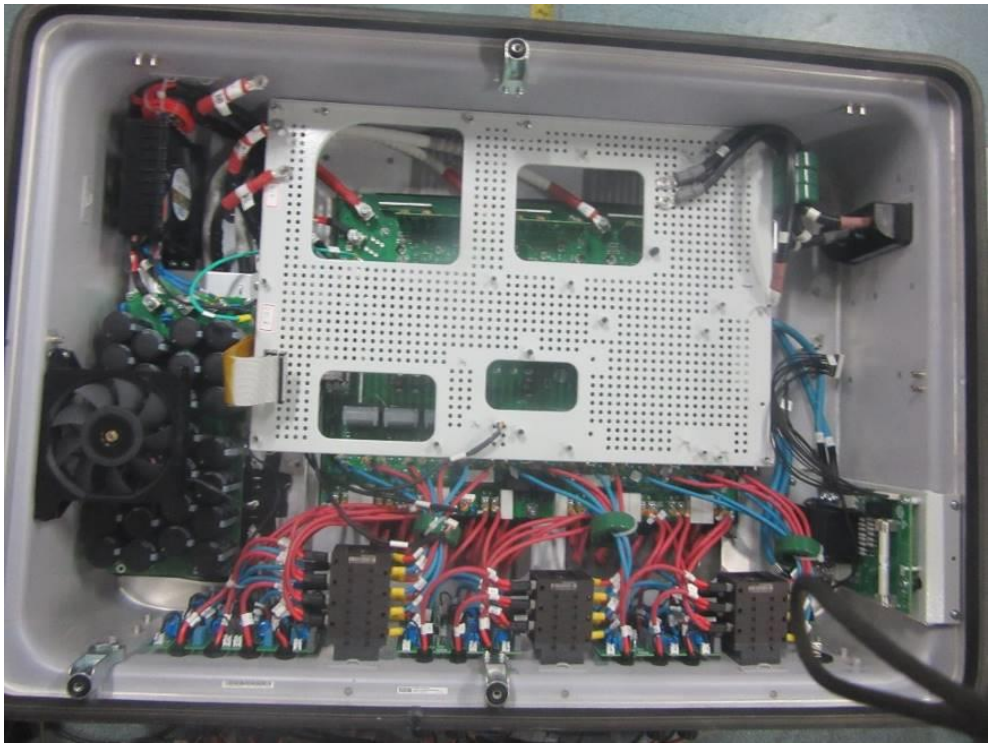


Photo-8: Internal view

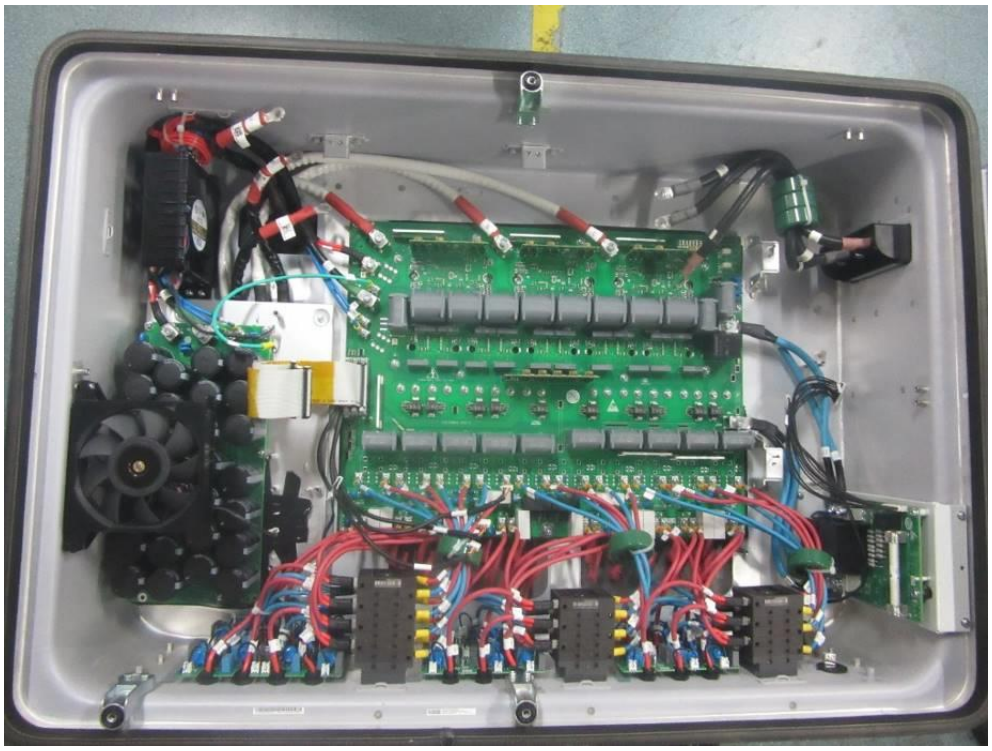


Photo-9: Internal view

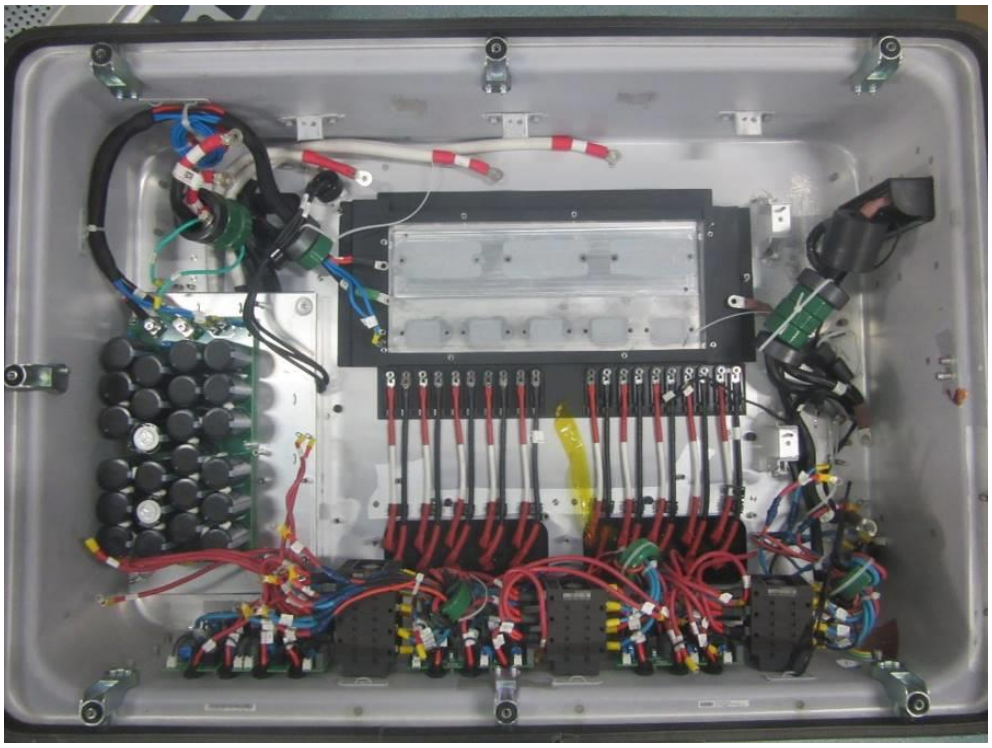


Photo-10: PCB ENE5FLTF

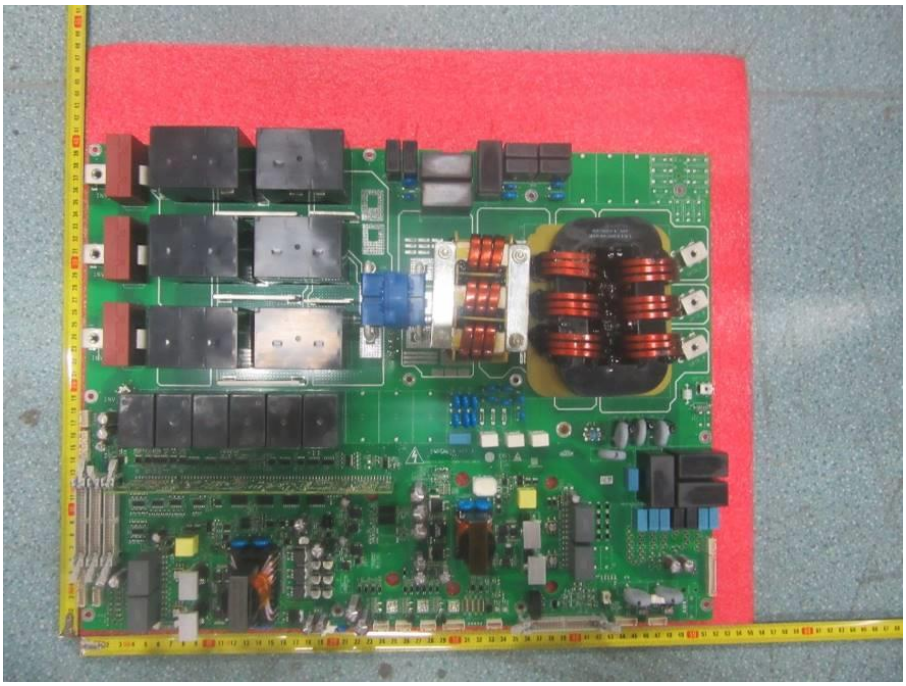


Photo-11: PCB ENE5FLTF

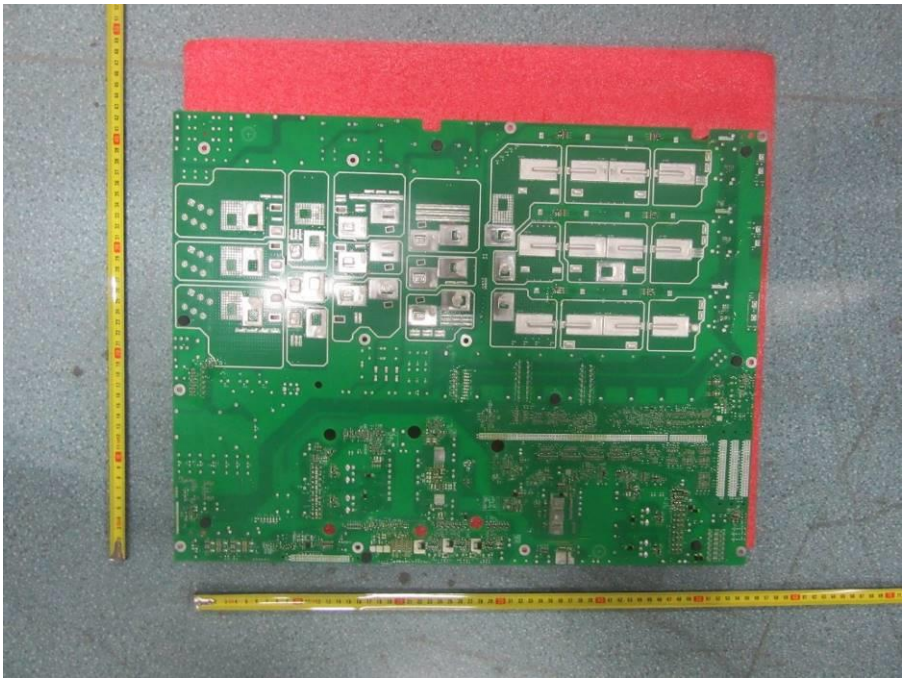
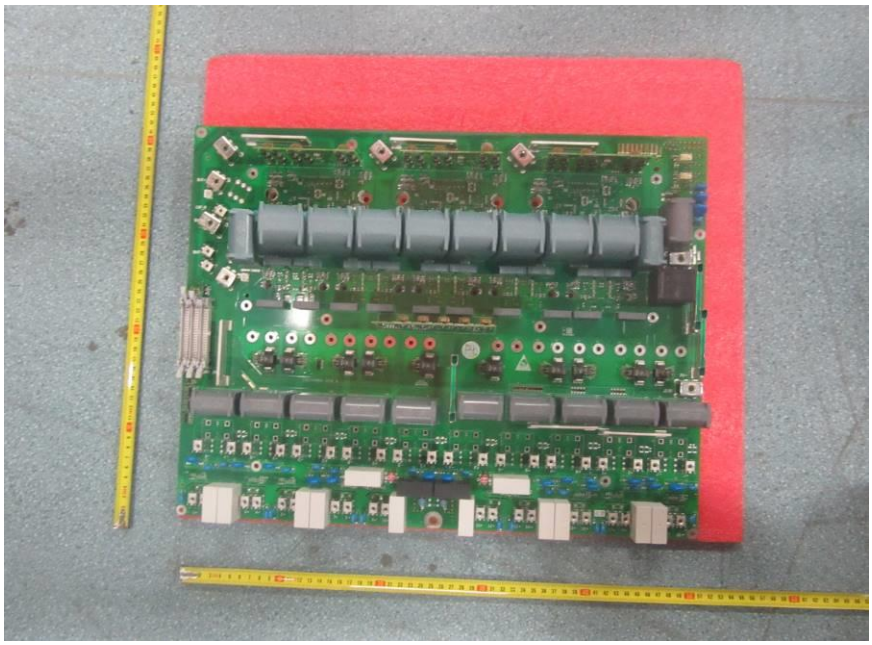
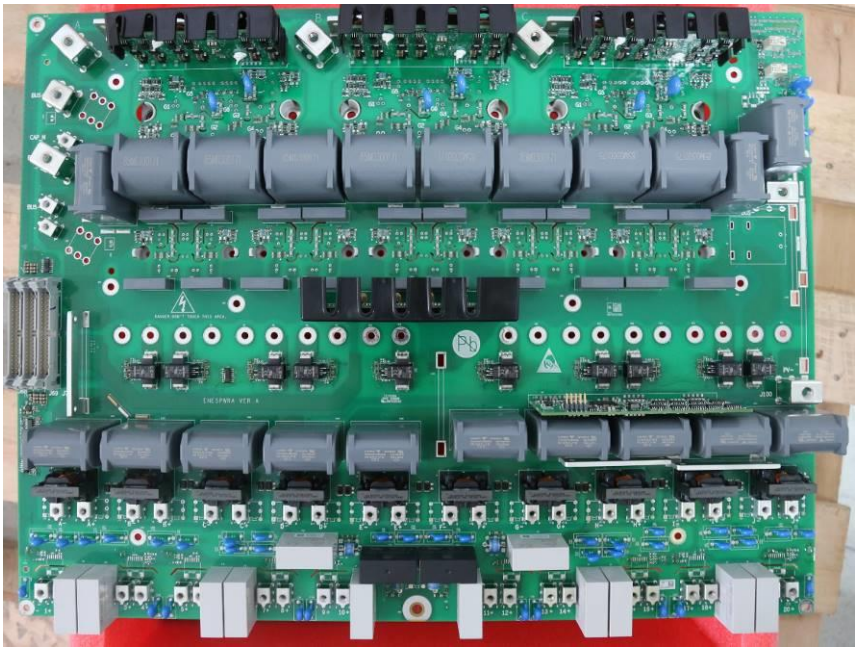


Photo-12: PCB ENE5PWRC





(with AFCI PCBA)

Photo-13: PCB ENE5PWRC

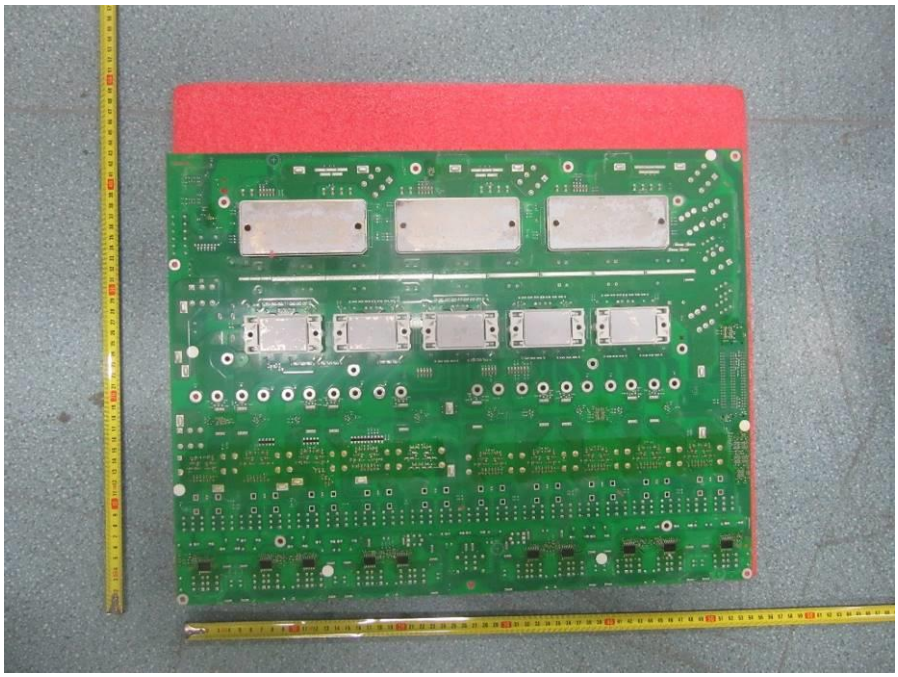


Photo-14: PCB ENE8COMA-01

Photo-15: PCB ENE8COMA-01

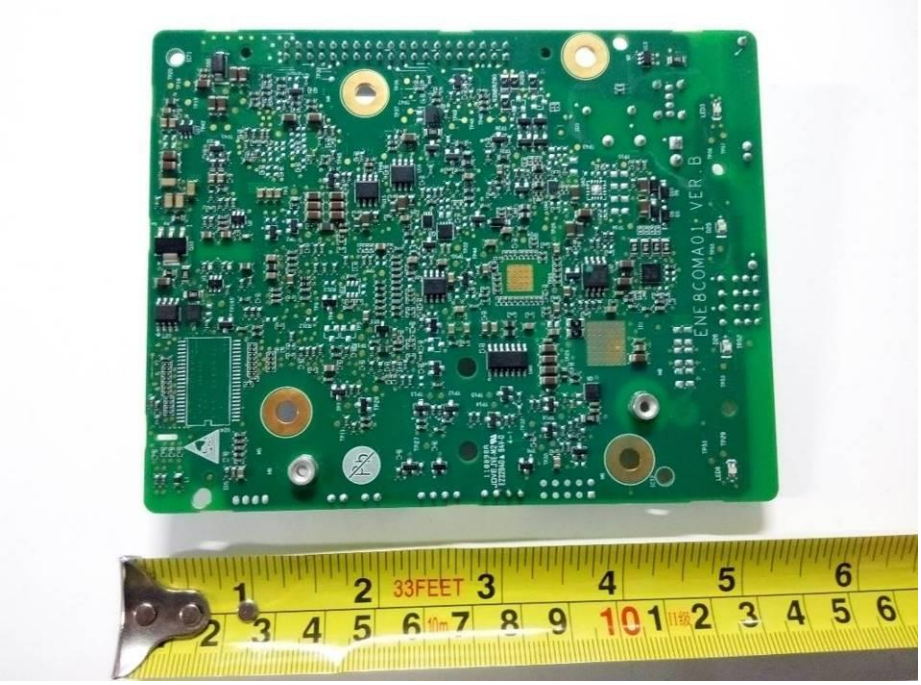


Photo-16: ENE3AUPA (PID board, optional)

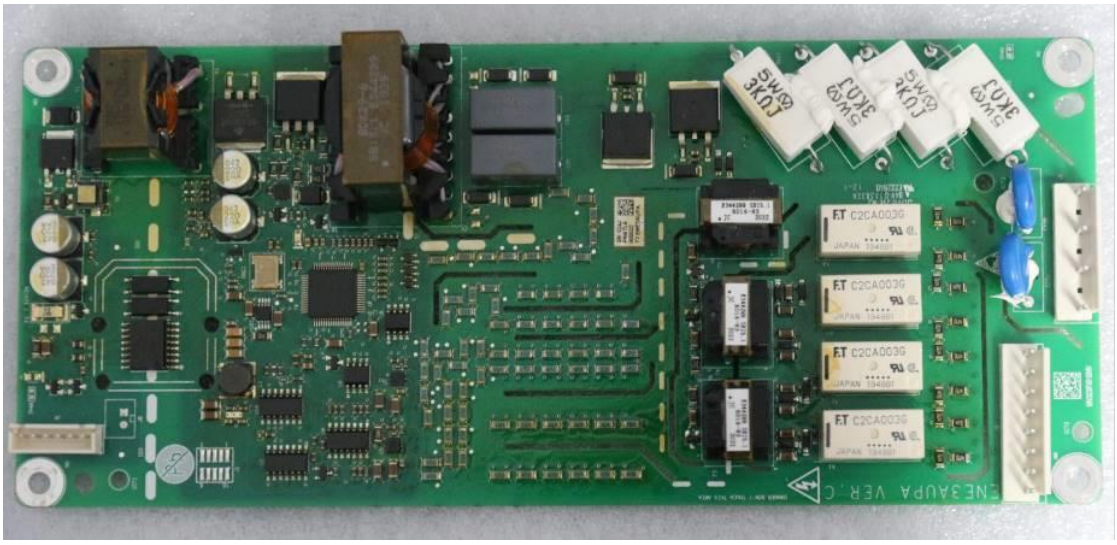


Photo-17: ENE3AUPA (PID board, optional)

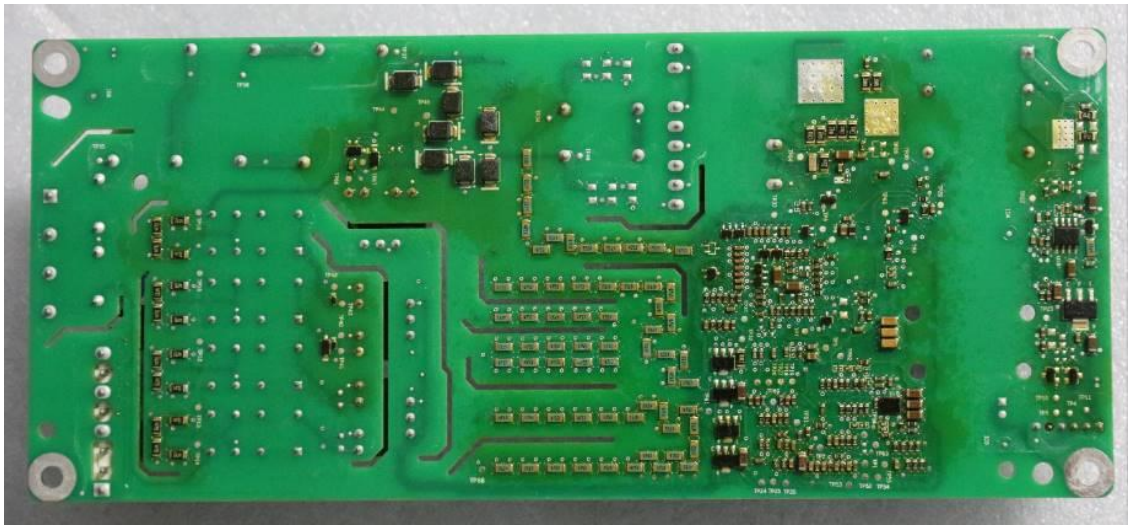


Photo-18: ENE5CTLB (AFCI board, optional)

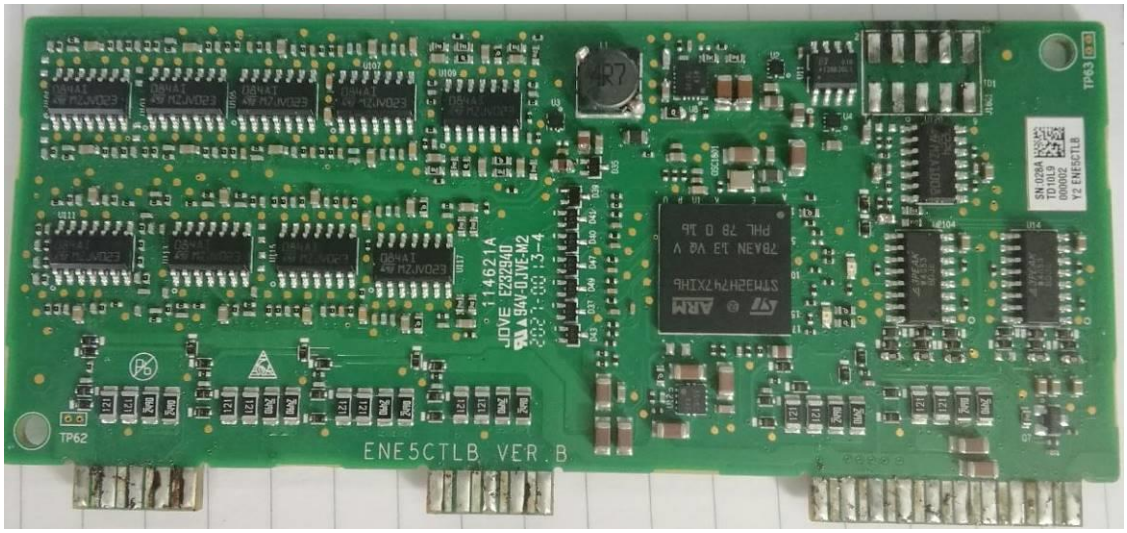


Photo-19: ENE5CTLB (AFCI board, optional)

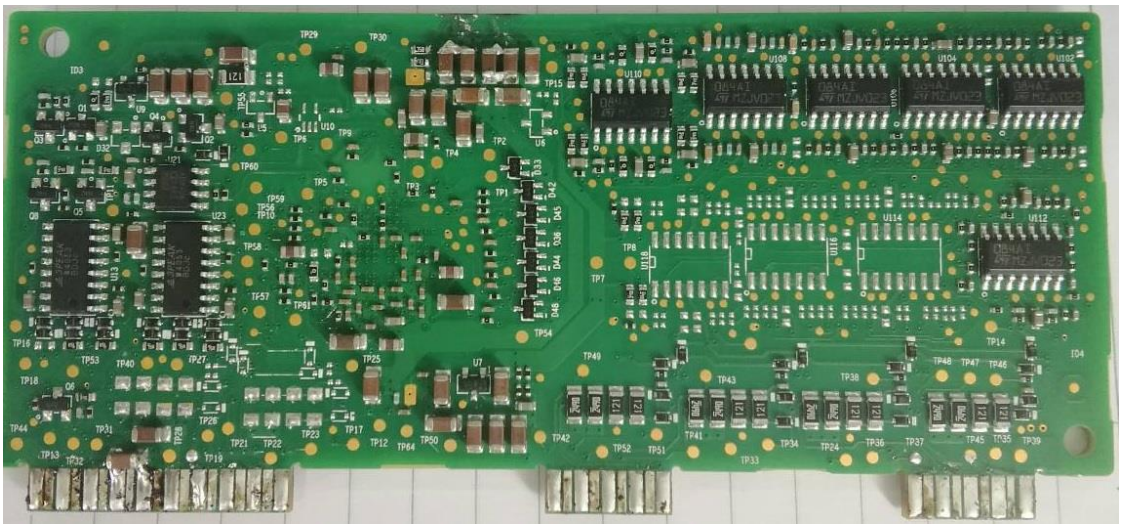


Photo-20: AC connection compartment

……**End of test report**……