Test Report issued under the responsibility of:

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

Report Number. ..... :	220201177SHA-001
Date of issue ..... :	2022-08-03
Total number of pages ..... :	114 Pages
Name of Testing Laboratory preparing the Report ..... :	Intertek Testing Services Shanghai Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Applicant's name ..... :	Shenzhen Hopewind Technology Co., Ltd.
Address ..... :	A1 Area of Building 6, Jinhaoyuan, No.1 of Yanshan Avenue, Yanchuan Community, Songgang Sub-district, Baoan District, Shenzhen, Guangdong Province China
Test specification:	
Standard ..... :	IEC/EN 62109-1:2010
Test procedure ..... :	Type test
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

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Test item description .....:	Grid-connected PV inverter
Trade Mark .....:	Hopewind
Manufacturer.....:	Same as applicant
Model/Type reference .....:	hopeSun xxKTL-L (xx= 10, 12, 15, 17, 24 and 30) hopeSun xxKTL (xx= 5, 6, 8, 10, 12, 15, 17, 20, 22, 25, 30 and 33)
Ratings .....:	See below Specifications table

Specifications table					
Model or Type designation	hopeSun 8KTL	hopeSun 10KTL	hopeSun 12KTL	hopeSun 15KTL	hopeSun 17KTL
PV Input Parameters					
V_{max} PV [V d.c.]	1100				
MPPT Voltage Range [V d.c.]	200-1000				
Max. PV Input Current [A d.c.]	20/20	20/20	20/20	26/20	26/20
Isc PV (absolute Max.) [Ad.c.]	30/30	30/30	30/30	39/30	39/30
AC Grid Output Parameters					
Rated Output Voltage [V a.c.]	400/230; 3P+N+PE				
Rated Output Frequency [Hz]	50/60				
Rated Output Power [kW]	8.0	10.0	12.0	15.0	17.0
Max. cont.. Apparent Power [kVA]	8.8	11	13.2	16.5	18.7
Max. cont. Output Current [A a.c.]	12.7	16.0	19.1	23.9	27.0
Power Factor cosφ [λ]	0.8 (lagging)- 0.8 (leading)				
Others					
Protective Class	Class I				
Inverter Topology	Non-isolated				
Operation Temperature Range	-40°C~60°C (>40°C, power-derating)				
Ingress Protection	IP65				
Size [W*H*D mm]	380mm*450mm*245mm				
Weight [kg]	22				
Overvoltage Category	OVC III (AC Main), OVC II (PV)				

Specifications table					
Model or Type designation	hopeSun 20KTL	hopeSun 22KTL	hopeSun 25KTL	hopeSun 30KTL	hopeSun 33KTL
PV Input Parameters					
V_{max} PV [V d.c.]	1100				
MPPT Voltage Range [V d.c.]	200-1000				
Max. PV Input Current [A d.c.]	30/30	30/30	30/30	30/30	30/30
Isc PV (absolute Max.) [Ad.c.]	45/45	45/45	45/45	45/45	45/45
AC Grid Output Parameters					
Rated Output Voltage [V a.c.]	400/230; 3P+N+PE				
Rated Output Frequency [Hz]	50/60				
Rated Output Power [kW]	20.0	22.0	25.0	30.0	33.0
Max. cont.. Apparent Power [kVA]	22.0	24.2	27.5	33.0	36.3
Max. cont. Output Current [A a.c.]	31.8	35.0	39.7	47.8	52.4
Power Factor cosφ [λ]	0.8 (lagging)- 0.8 (leading)				
Others					
Protective Class	Class I				
Inverter Topology	Non-isolated				
Operation Temperature Range	-40°C~60°C (>40°C, power-derating)				
Ingress Protection	IP65				
Size [W*H*D mm]	380mm*450mm*245mm				
Weight [kg]	25		30	35	
Overvoltage Category	OVC III (AC Main), OVC II (PV)				

Specifications table			
Model or Type designation	hopeSun 5KTL	hopeSun 6KTL	hopeSun 30KTL-L
PV Input Parameters			
V_{max} PV [V d.c.]	1100		
MPPT Voltage Range [V d.c.]	200-1000		
Max. PV Input Current [A d.c.]	20		60/60
Isc PV (absolute Max.) [Ad.c.]	30		90/90
AC Grid Output Parameters			
Rated Output Voltage [V a.c.]	400/230; 3P+N+PE		220/127; 3P+N+PE
Rated Output Frequency [Hz]	50/60		
Rated Output Power [kW]	5	6	30
Max. cont.. Apparent Power [kVA]	5.5	6.6	30
Max. cont. Output Current [A a.c.]	7.9	9.5	78.7
Power Factor cosφ [λ]	0.8 (lagging)- 0.8 (leading)		
Others			
Protective Class	Class I		
Inverter Topology	Non-isolated		
Operation Temperature Range	-40°C~60°C (>40°C, power-derating)		
Ingress Protection	IP65		
Size [W*H*D mm]	380mm*450mm*245mm		
Weight [kg]	22		35
Overvoltage Category	OVC III (AC Main), OVC II (PV)		

Specifications table					
Model or Type designation	hopeSun 10KTL-L	hopeSun 12KTL-L	hopeSun 15KTL-L	hopeSun 17KTL-L	hopeSun 24KTL-L
PV Input Parameters					
V_{max} PV [V d.c.]	1100				
MPPT Voltage Range [V d.c.]	200-1000				
Max. PV Input Current [A d.c.]	26/20	26/20	26/20	26/20	26/20
Isc PV (absolute Max.) [Ad.c.]	39/30	39/30	39/30	39/30	39/30
AC Grid Output Parameters					
Rated Output Voltage [V a.c.]	220/127; 3P+N+PE				
Rated Output Frequency [Hz]	50/60				
Rated Output Power [kW]	10	12	15	17	24
Max. cont. Output Current [A a.c.]	26.2	31.5	39.4	44.6	63
Power Factor cosφ [λ]	0.8 (lagging)- 0.8 (leading)				
Others					
Protective Class	Class I				
Inverter Topology	Non-isolated				
Operation Temperature Range	-40°C~60°C (>40°C, power-derating)				
Ingress Protection	IP65				
Size [W*H*D mm]	380mm*450mm*245mm				
Weight [kg]	22				30
Overvoltage Category	OVC III (AC Main), OVC II (PV)				

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ **Testing Laboratory:**	Intertek Testing Services Shanghai.	
Testing location/ address .....:	Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China	
☐ **Associated Testing Laboratory:**		
Testing location/ address .....:		
Tested by (name, function, signature) .....:	Billy Chen (Engineer)	
Approved by (name, function, signature) .....:	Robin Xu (Mandated Reviewer)	
☐ **Testing procedure: CTF Stage 1:**		
Testing location/ address .....:		
Tested by (name, function, signature) .....:		
Approved by (name, function, signature) .....:		
☐ **Testing procedure: CTF Stage 2:**		
Testing location/ address .....:		
Tested by (name + signature) .....:		
Witnessed by (name, function, signature) .....:		
Approved by (name, function, signature) .....:		
☐ **Testing procedure: CTF Stage 3:**		

☐ **Testing procedure: CTF Stage 4:**		
Testing location/ address ..... :		
Tested by (name, function, signature) ..... :		
Witnessed by (name, function, signature) ..... :		
Approved by (name, function, signature) ..... :		
Supervised by (name, function, signature) ..... :		
List of Attachments (including a total number of pages in each attachment): Appendix 1: Photos of product (total pages, 6)		

Summary of testing:

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

Tests performed (name of test and test clause):

☒4.3	Thermal Test
☒4.4	Testing in single fault condition
☐4.6	Backfeed voltage protection test
☒4.7	Electrical ratings tests
☒5	Marking test
☒6.3	IP test according IEC60529
☐7.3.6.3.3	Rating of protective bonding
☐7.3.7	Insulation including clearance and creepage distances
☒7.5.1	Impulse voltage test (type test)
☒7.5.2	Voltage test (dielectric strength test)
☒7.5.4	Touch current measurement
☐8.3	Stability
☒8.4	Provisions for lifting and carrying
☒8.5	Wall mounting
☐13.3.2.5	Cord anchorages and strain relief
☐13.6.2.1	Stress relief test
☒13.7	Mechanical resistance to deflection, impact, or drop

Testing location:

Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China

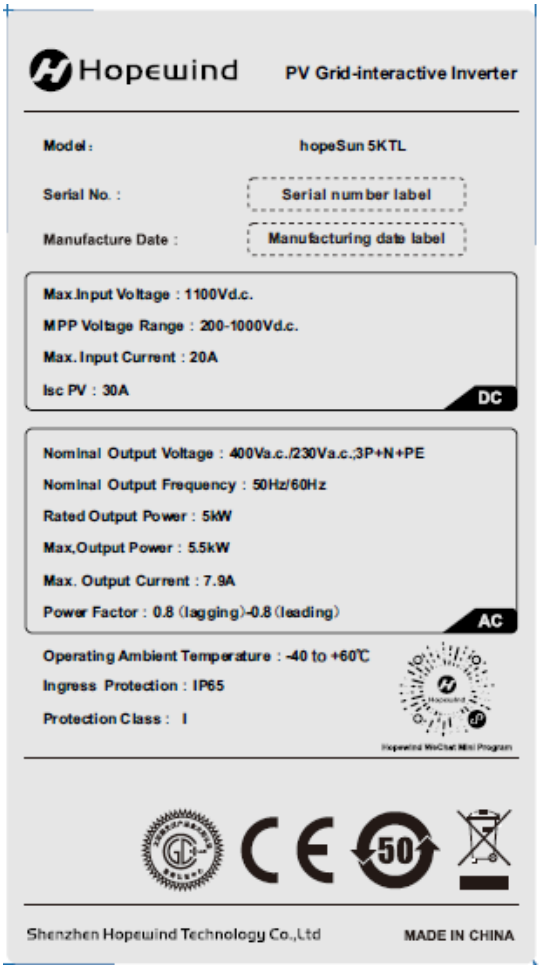
Summary of compliance with National Differences (List of countries addressed):

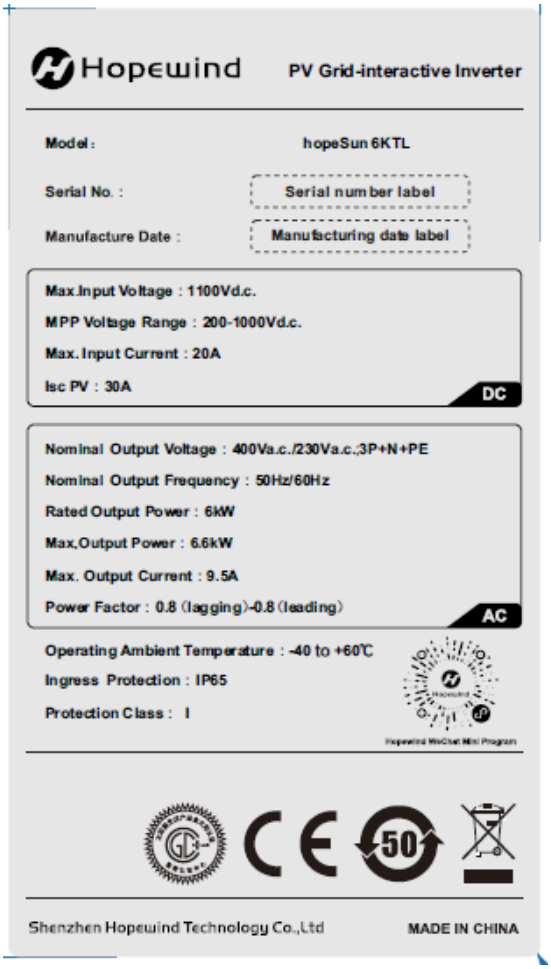
N/A

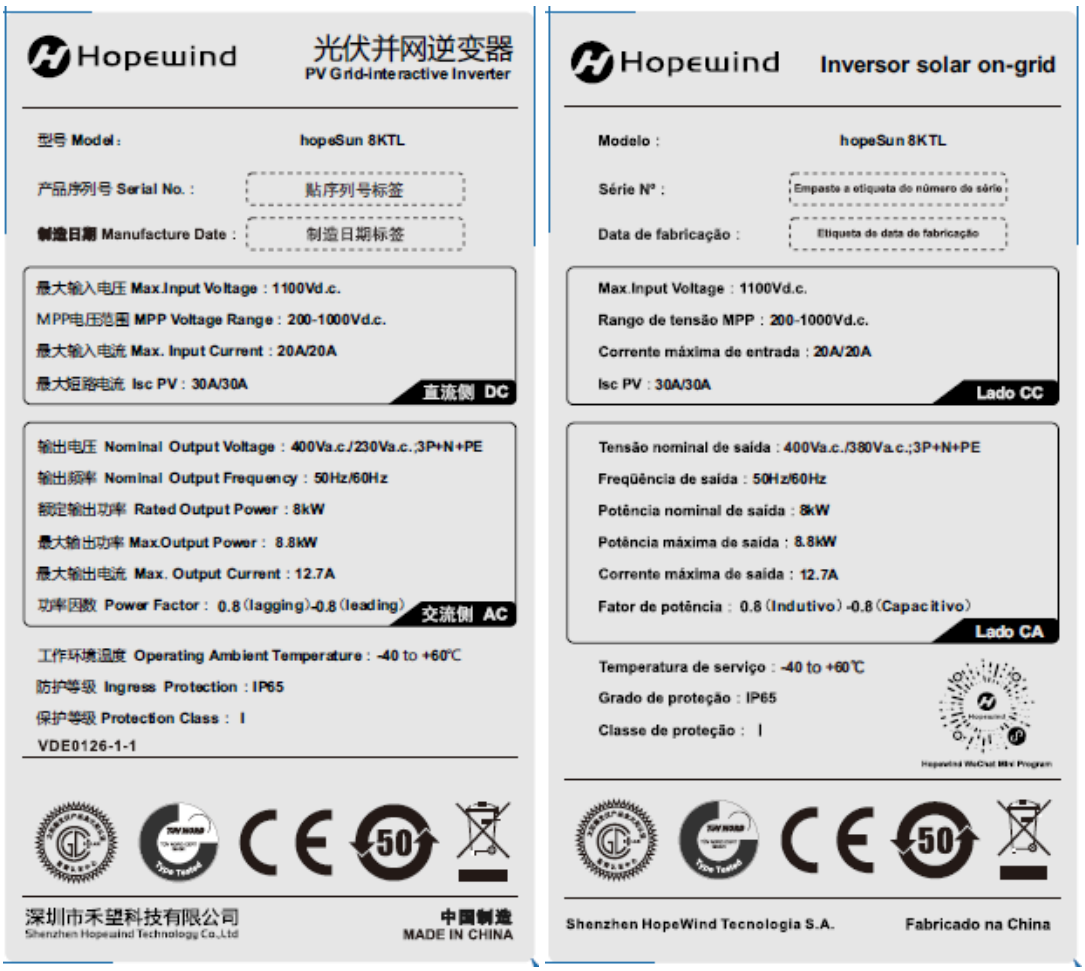
☒ **The product fulfils the requirements of** IEC/EN 62109-1:2010 (First Edition)

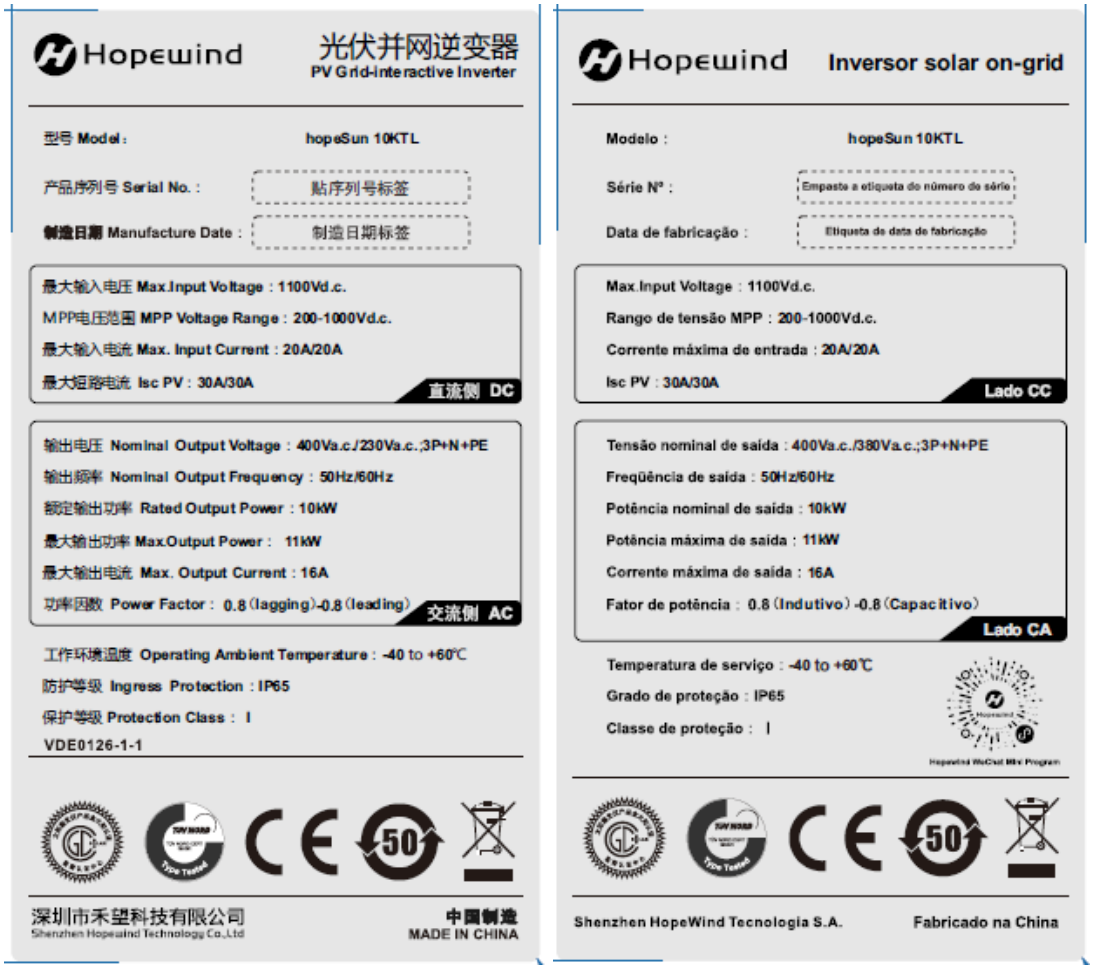
Copy of marking plate:

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.






Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model: hopeSun 8KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 20A/20A
最大短路电流 Isc PV : 30A/30A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 8kW
最大输出功率 Max.Output Power : 8.8kW
最大输出电流 Max. Output Current : 12.7A
功率因数 Power Factor : 0.8(lagging)-0.8(leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
保护等级 Protection Class : I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo : hopeSun 8KTL
Série Nº : Empaste a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 20A/20A
Isc PV : 30A/30A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 8kW
Potência máxima de saída : 8.8kW
Corrente máxima de saída : 12.7A
Fator de potência : 0.8(Indutivo)-0.8(Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China


Hopewind
光伏并网逆变器
PV Grid-Interactive Inverter
型号 Model: hopeSun 10KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 20A/20A
最大短路电流 Isc PV : 30A/30A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 10kW
最大输出功率 Max.Output Power : 11kW
最大输出电流 Max. Output Current : 16A
功率因数 Power Factor : 0.8 (lagging)-0.8 (leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
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Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 20A/20A
Isc PV : 30A/30A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 10kW
Potência máxima de saída : 11kW
Corrente máxima de saída : 16A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
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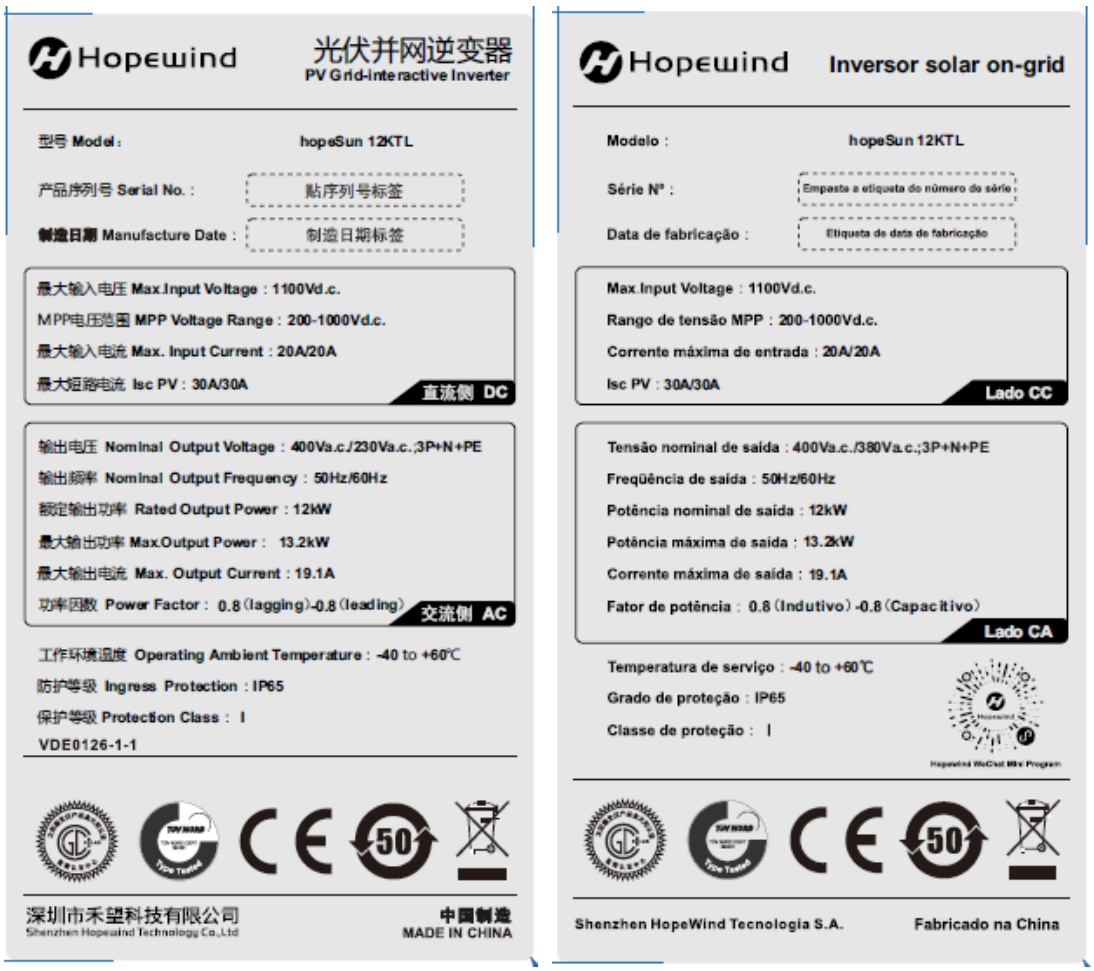
Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model：
hopeSun 12KTL
产品序列号 Serial No.：
贴序列号标签
制造日期 Manufacture Date：
制造日期标签
最大输入电压 Max.Input Voltage：1100Vd.c.
MPP电压范围 MPP Voltage Range：200-1000Vd.c.
最大输入电流 Max. Input Current：20A/20A
最大短路电流 Isc PV：30A/30A
直流侧 DC
输出电压 Nominal Output Voltage：400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency：50Hz/60Hz
额定输出功率 Rated Output Power：12kW
最大输出功率 Max.Output Power：13.2kW
最大输出电流 Max. Output Current：19.1A
功率因数 Power Factor：0.8(lagging)-0.8(leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature：-40 to +60℃
防护等级 Ingress Protection：IP65
保护等级 Protection Class：I
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MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo：
hopeSun 12KTL
Série Nº：
Empasta e etiqueta do número de série
Data de fabricação：
Etiqueta de data de fabricação
Max.Input Voltage：1100Vd.c.
Rango de tensão MPP：200-1000Vd.c.
Corrente máxima de entrada：20A/20A
Isc PV：30A/30A
Lado CC
Tensão nominal de saída：400Va.c./380Va.c.;3P+N+PE
Freqüência de saída：50Hz/60Hz
Potência nominal de saída：12kW
Potência máxima de saída：13.2kW
Corrente máxima de saída：19.1A
Fator de potência：0.8(Indutivo)-0.8(Capacitivo)
Lado CA
Temperatura de serviço：-40 to +60℃
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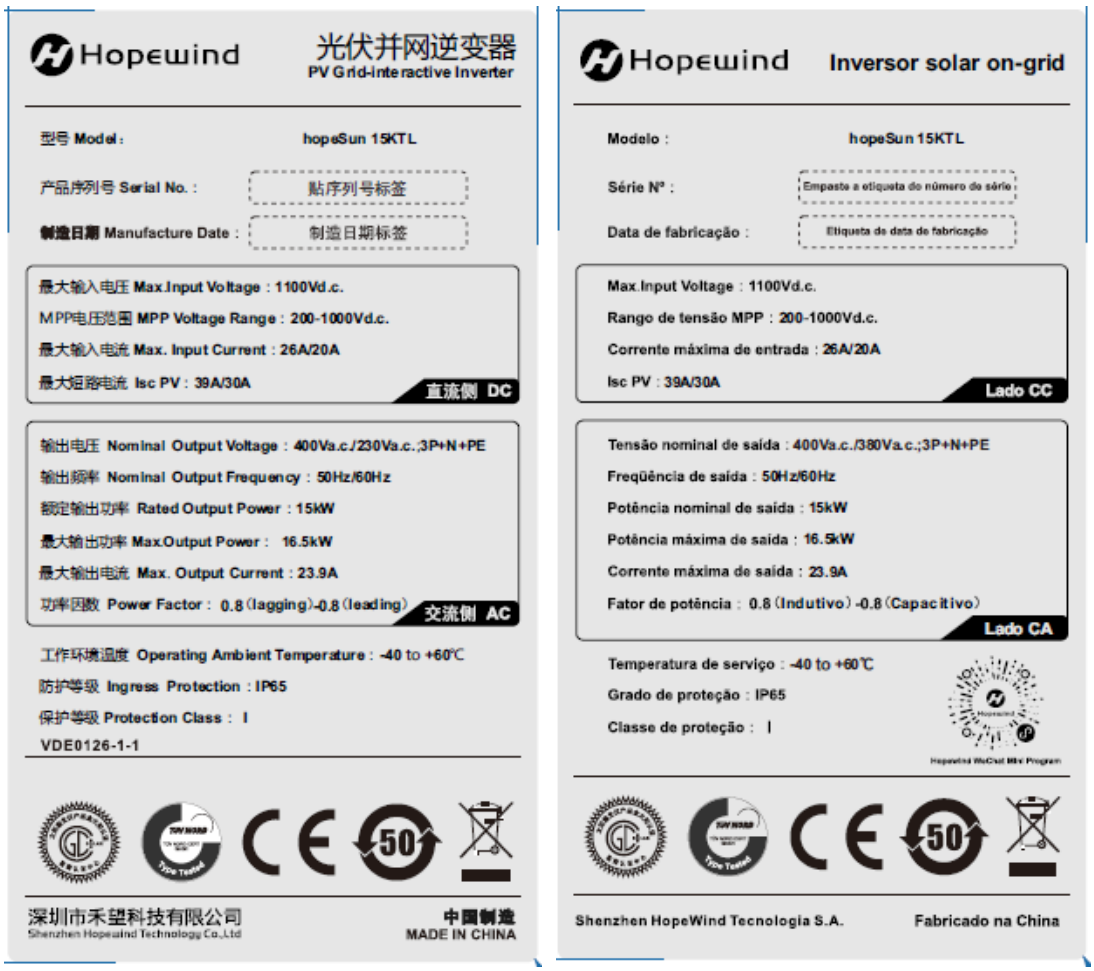
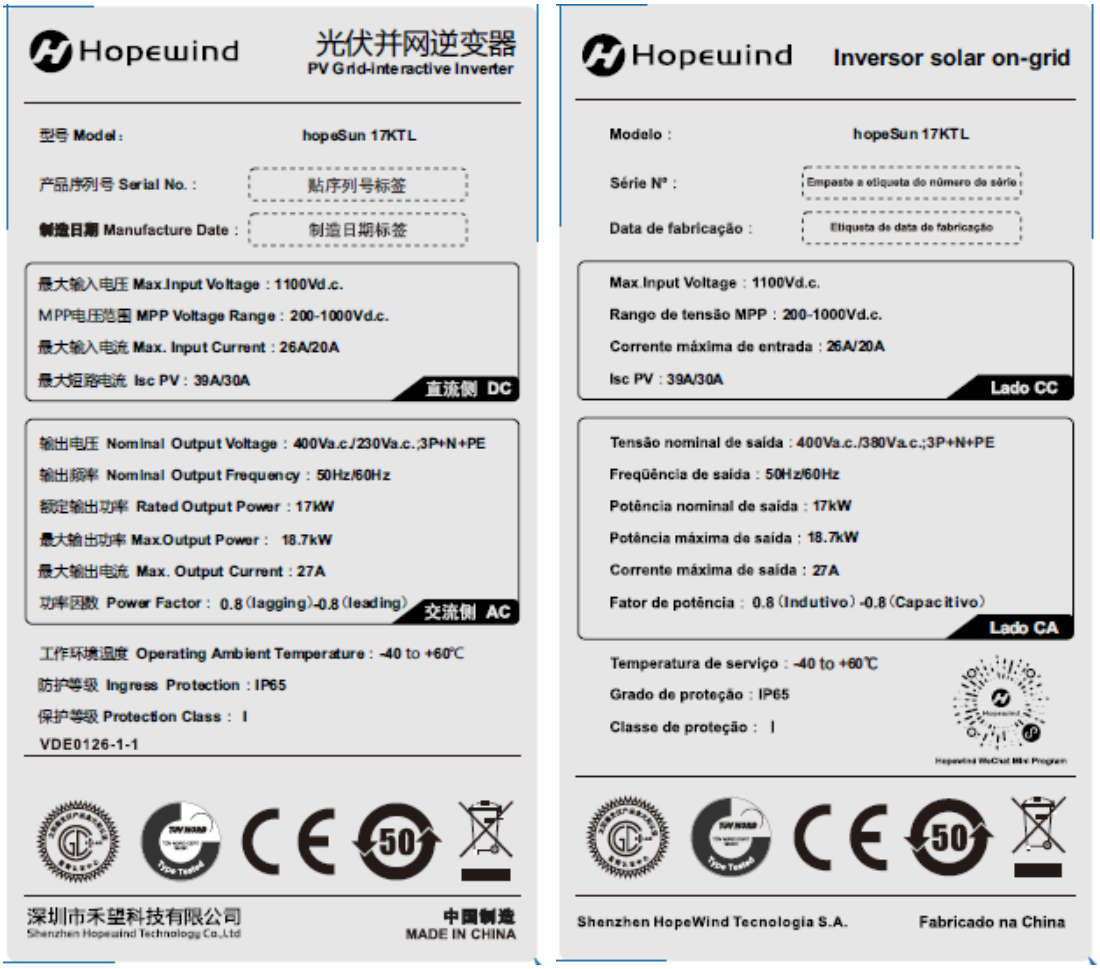
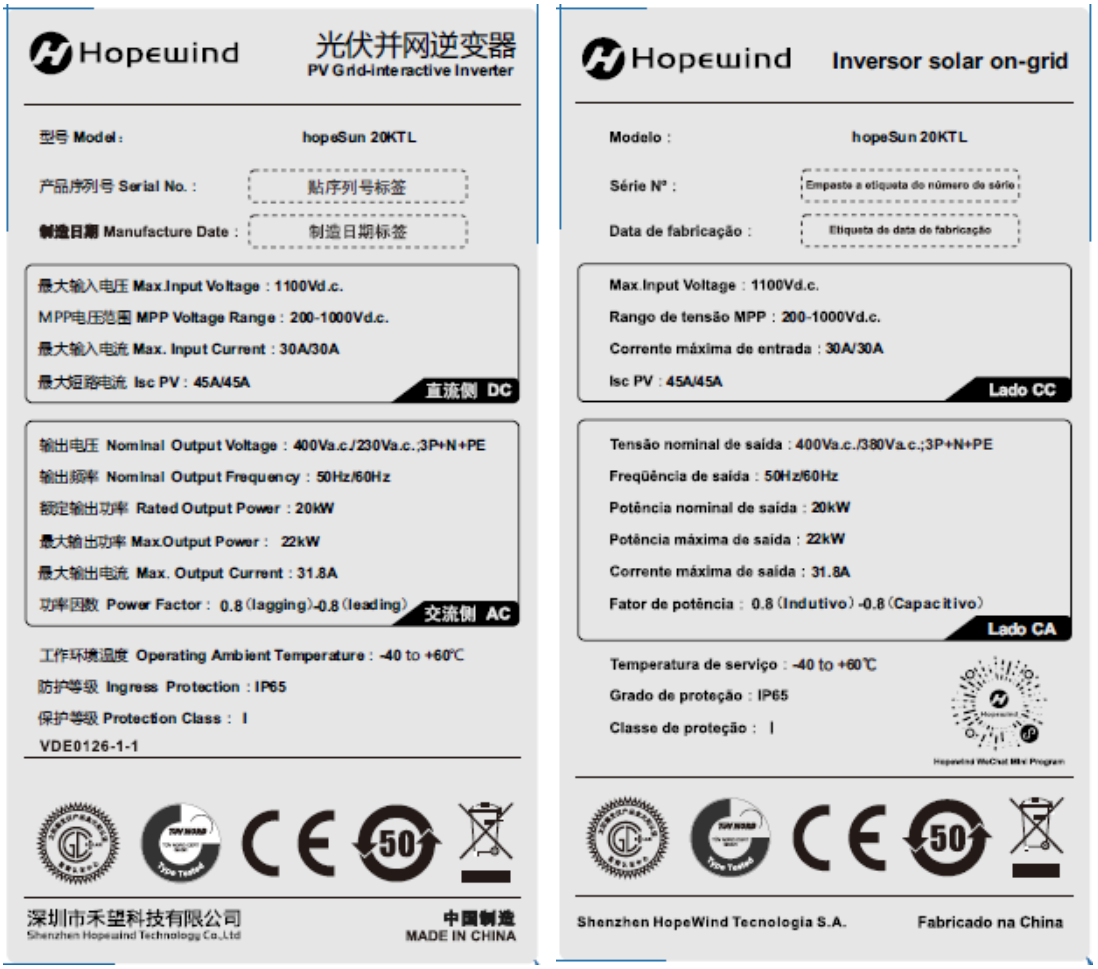
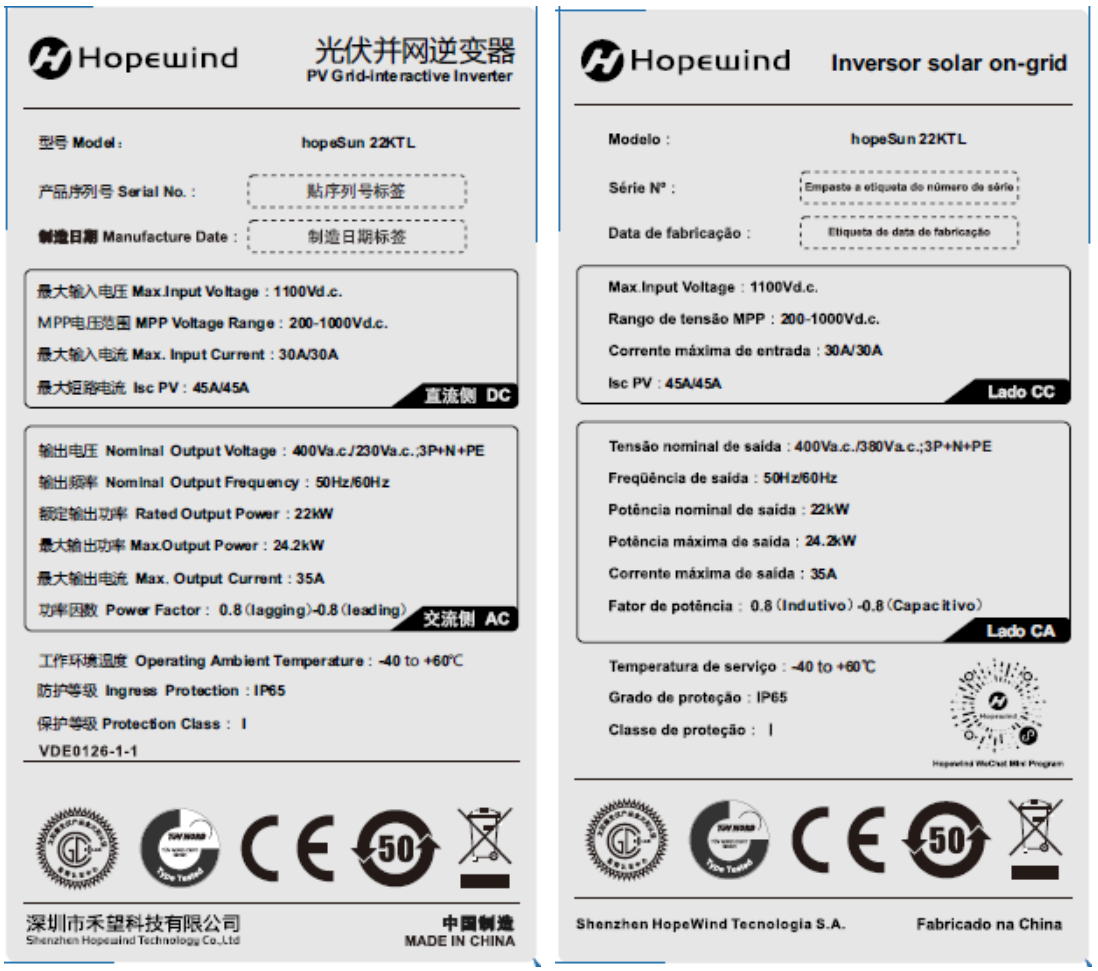
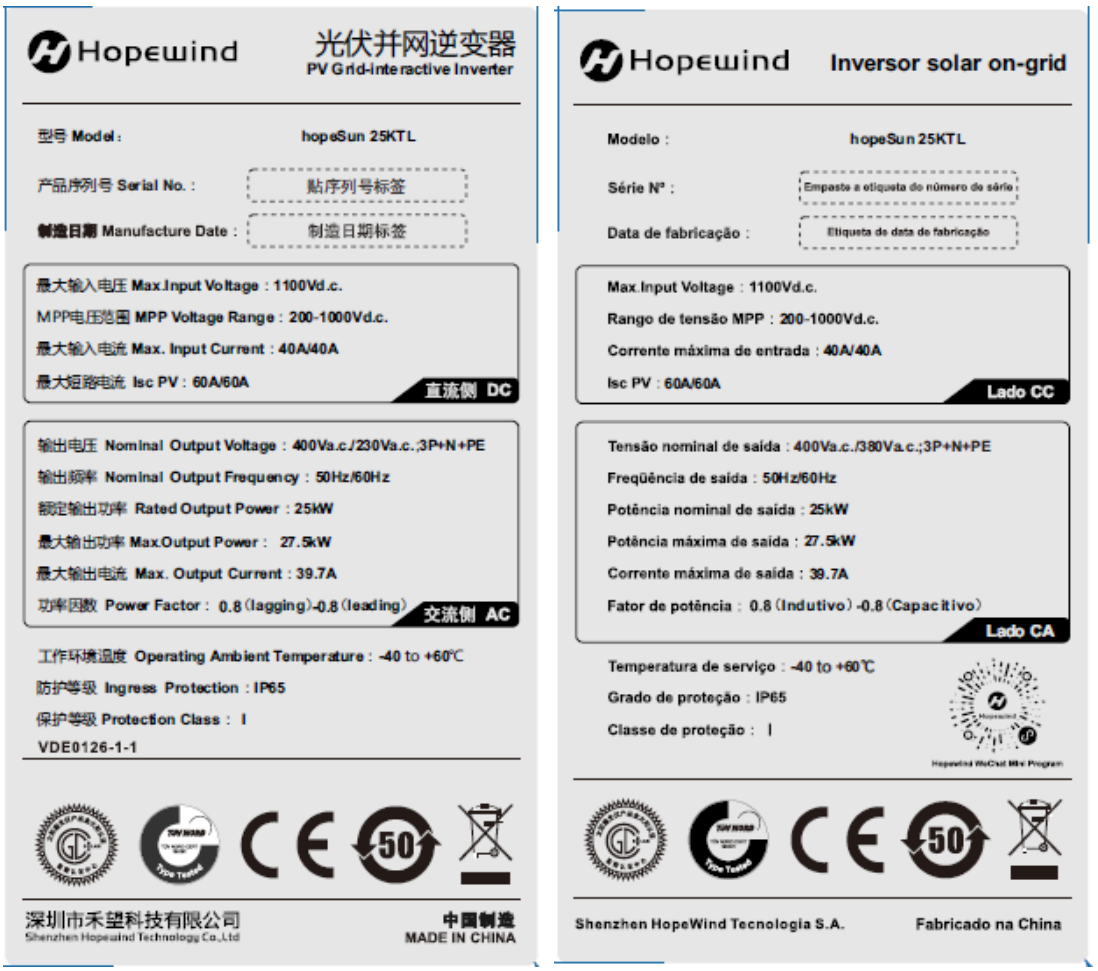
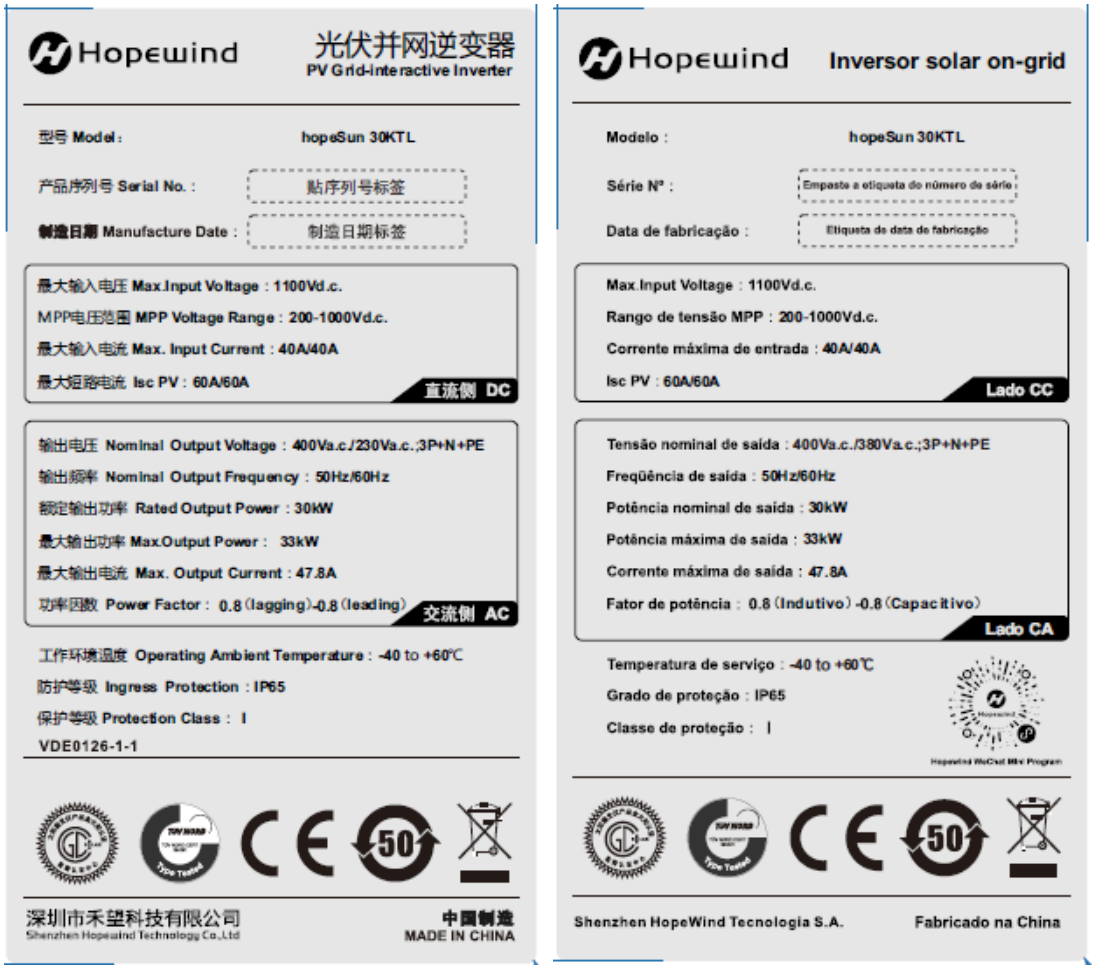

Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model: hopeSun 15KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 26A/20A
最大短路电流 Isc PV : 39A/30A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 15kW
最大输出功率 Max.Output Power : 16.5kW
最大输出电流 Max. Output Current : 23.9A
功率因数 Power Factor : 0.8 (lagging)-0.8 (leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
保护等级 Protection Class : I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo : hopeSun 15KTL
Série Nº : Empaste a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 26A/20A
Isc PV : 39A/30A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 15kW
Potência máxima de saída : 16.5kW
Corrente máxima de saída : 23.9A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

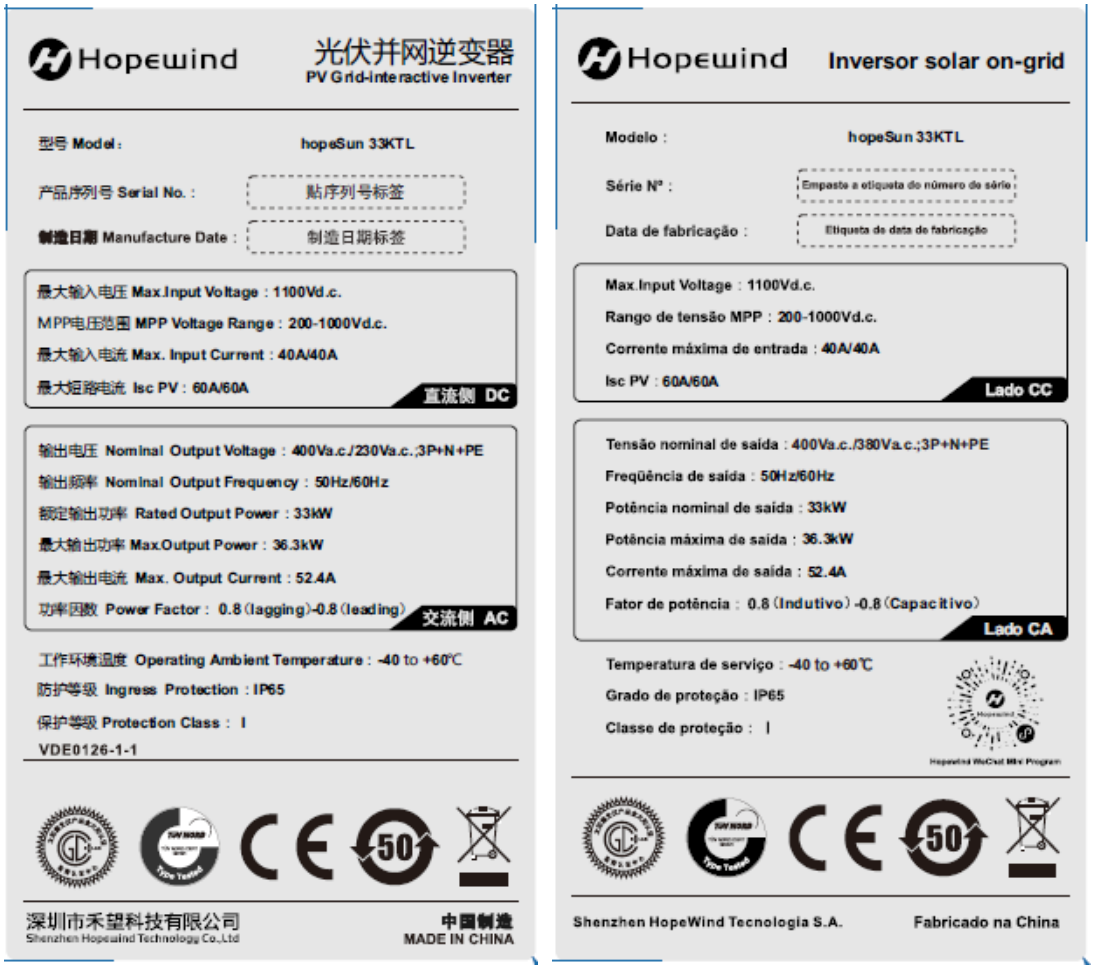

Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model：
hopeSun 17KTL
产品序列号 Serial No.：
贴序列号标签
制造日期 Manufacture Date：
制造日期标签
最大输入电压 Max.Input Voltage：1100Vd.c.
MPP电压范围 MPP Voltage Range：200-1000Vd.c.
最大输入电流 Max. Input Current：26A/20A
最大短路电流 Isc PV：39A/30A
直流侧 DC
输出电压 Nominal Output Voltage：400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency：50Hz/60Hz
额定输出功率 Rated Output Power：17kW
最大输出功率 Max.Output Power：18.7kW
最大输出电流 Max. Output Current：27A
功率因数 Power Factor：0.8(lagging)-0.8(leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature：-40 to +60℃
防护等级 Ingress Protection：IP65
保护等级 Protection Class：I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo：
hopeSun 17KTL
Série Nº：
Empreste a etiqueta do número de série
Data de fabricação：
Etiqueta de data de fabricação
Max.Input Voltage：1100Vd.c.
Rango de tensão MPP：200-1000Vd.c.
Corrente máxima de entrada：26A/20A
Isc PV：39A/30A
Lado CC
Tensão nominal de saída：400Va.c./380Va.c.;3P+N+PE
Freqüência de saída：50Hz/60Hz
Potência nominal de saída：17kW
Potência máxima de saída：18.7kW
Corrente máxima de saída：27A
Fator de potência：0.8(Indutivo)-0.8(Capacitivo)
Lado CA
Temperatura de serviço：-40 to +60℃
Grado de proteção：IP65
Classe de proteção：I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

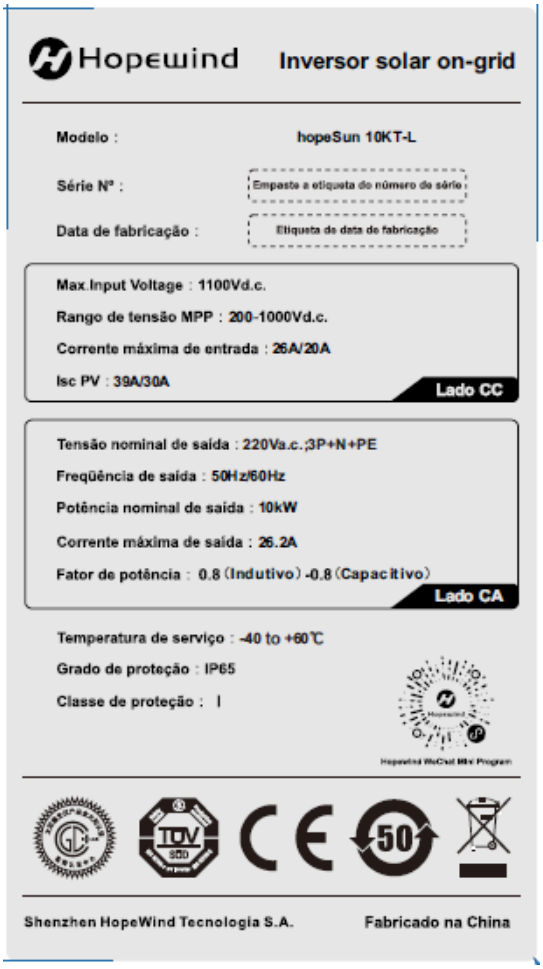

Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model: hopeSun 20KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 30A/30A
最大短路电流 Isc PV : 45A/45A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 20kW
最大输出功率 Max.Output Power : 22kW
最大输出电流 Max. Output Current : 31.8A
功率因数 Power Factor : 0.8 (lagging)-0.8 (leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
保护等级 Protection Class : I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo : hopeSun 20KTL
Série Nº : Empaste a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 30A/30A
Isc PV : 45A/45A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 20kW
Potência máxima de saída : 22kW
Corrente máxima de saída : 31.8A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

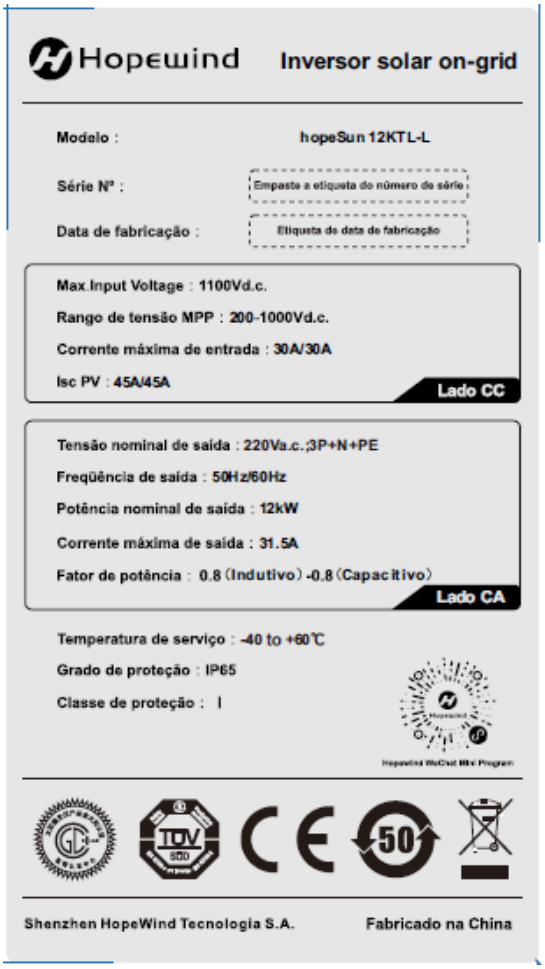

Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model: hopeSun 22KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 30A/30A
最大短路电流 Isc PV : 45A/45A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 22kW
最大输出功率 Max.Output Power : 24.2kW
最大输出电流 Max. Output Current : 35A
功率因数 Power Factor : 0.8 (lagging)-0.8 (leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
保护等级 Protection Class : I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo : hopeSun 22KTL
Série Nº : Empasta a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 30A/30A
Isc PV : 45A/45A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 22kW
Potência máxima de saída : 24.2kW
Corrente máxima de saída : 35A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China


Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model：
hopeSun 25KTL
产品序列号 Serial No.：
贴序列号标签
制造日期 Manufacture Date：
制造日期标签
最大输入电压 Max.Input Voltage：1100Vd.c.
MPP电压范围 MPP Voltage Range：200-1000Vd.c.
最大输入电流 Max. Input Current：40A/40A
最大短路电流 Isc PV：60A/60A
直流侧 DC
输出电压 Nominal Output Voltage：400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency：50Hz/60Hz
额定输出功率 Rated Output Power：25kW
最大输出功率 Max.Output Power：27.5kW
最大输出电流 Max. Output Current：39.7A
功率因数 Power Factor：0.8（lagging）-0.8（leading）
交流侧 AC
工作环境温度 Operating Ambient Temperature：-40 to +60℃
防护等级 Ingress Protection：IP65
保护等级 Protection Class：I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo：
hopeSun 25KTL
Série Nº：
Empasta a etiqueta do número de série
Data de fabricação：
Etiqueta de data de fabricação
Max.Input Voltage：1100Vd.c.
Rango de tensão MPP：200-1000Vd.c.
Corrente máxima de entrada：40A/40A
Isc PV：60A/60A
Lado CC
Tensão nominal de saída：400Va.c./380Va.c.;3P+N+PE
Freqüência de saída：50Hz/60Hz
Potência nominal de saída：25kW
Potência máxima de saída：27.5kW
Corrente máxima de saída：39.7A
Fator de potência：0.8（Indutivo）-0.8（Capacitivo）
Lado CA
Temperatura de serviço：-40 to +60℃
Grado de proteção：IP65
Classe de proteção：I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

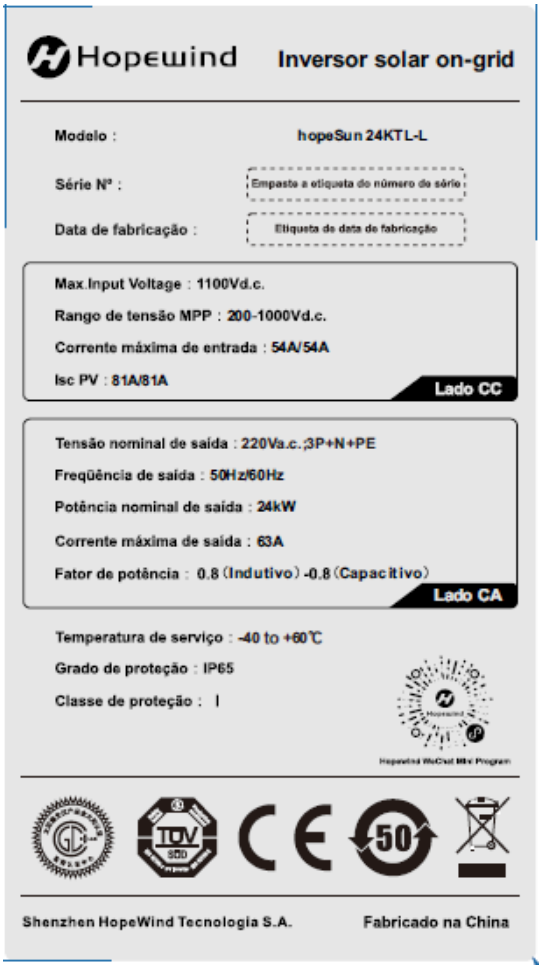

Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model: hopeSun 30KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 40A/40A
最大短路电流 Isc PV : 60A/60A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 30kW
最大输出功率 Max.Output Power : 33kW
最大输出电流 Max. Output Current : 47.8A
功率因数 Power Factor : 0.8 (lagging)-0.8 (leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
保护等级 Protection Class : I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo : hopeSun 30KTL
Série Nº : Empreste a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 40A/40A
Isc PV : 60A/60A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 30kW
Potência máxima de saída : 33kW
Corrente máxima de saída : 47.8A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

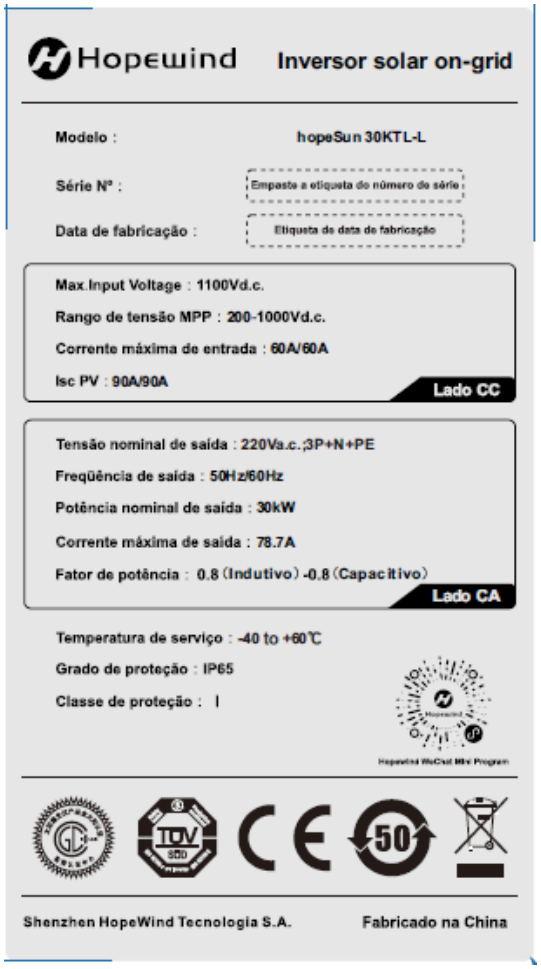

Hopewind
光伏并网逆变器
PV Grid-interactive Inverter
型号 Model: hopeSun 33KTL
产品序列号 Serial No.: 贴序列号标签
制造日期 Manufacture Date: 制造日期标签
最大输入电压 Max.Input Voltage : 1100Vd.c.
MPP电压范围 MPP Voltage Range : 200-1000Vd.c.
最大输入电流 Max. Input Current : 40A/40A
最大短路电流 Isc PV : 60A/60A
直流侧 DC
输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE
输出频率 Nominal Output Frequency : 50Hz/60Hz
额定输出功率 Rated Output Power : 33kW
最大输出功率 Max.Output Power : 36.3kW
最大输出电流 Max. Output Current : 52.4A
功率因数 Power Factor : 0.8 (lagging)-0.8 (leading)
交流侧 AC
工作环境温度 Operating Ambient Temperature : -40 to +60℃
防护等级 Ingress Protection : IP65
保护等级 Protection Class : I
VDE0126-1-1
深圳市禾望科技有限公司
Shenzhen Hopewind Technology Co.,Ltd
中国制造
MADE IN CHINA
Hopewind
Inversor solar on-grid
Modelo : hopeSun 33KTL
Série Nº : Empreste a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 40A/40A
Isc PV : 60A/60A
Lado CC
Tensão nominal de saída : 400Va.c./380Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 33kW
Potência máxima de saída : 36.3kW
Corrente máxima de saída : 52.4A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China


Hopewind
Inversor solar on-grid
Modelo : hopeSun 10KT-L
Série Nº :
Empaste a etiqueta do número de série
Data de fabricação :
Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 26A/20A
Isc PV : 39A/30A
Lado CC
Tensão nominal de saída : 220Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 10kW
Corrente máxima de saída : 26.2A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

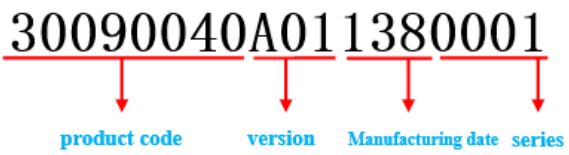

Hopewind
Inversor solar on-grid
Modelo : hopeSun 12KTL-L
Série Nº :
Empaste a etiqueta do número de série
Data de fabricação :
Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 30A/30A
Isc PV : 45A/45A
Lado CC
Tensão nominal de saída : 220Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 12kW
Corrente máxima de saída : 31.5A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China


Hopewind
Inversor solar on-grid
Modelo : hopeSun 15KTL-L
Série Nº : Empasta a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 40A/40A
Isc PV : 60A/60A
Lado CC
Tensão nominal de saída : 220Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 15kW
Corrente máxima de saída : 39.4A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China
Hopewind
Inversor solar on-grid
Modelo : hopeSun 17KTL-L
Série Nº : Empasta a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 40A/40A
Isc PV : 60A/60A
Lado CC
Tensão nominal de saída : 220Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 17kW
Corrente máxima de saída : 44.6A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China


Hopewind
Inversor solar on-grid
Modelo : hopeSun 24KTL-L
Série Nº : Empasta a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 54A/54A
Isc PV : 81A/81A
Lado CC
Tensão nominal de saída : 220Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 24kW
Corrente máxima de saída : 63A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China


Hopewind
Inversor solar on-grid
Modelo : hopeSun 30KTL-L
Série Nº : Empasta a etiqueta do número de série
Data de fabricação : Etiqueta de data de fabricação
Max.Input Voltage : 1100Vd.c.
Rango de tensão MPP : 200-1000Vd.c.
Corrente máxima de entrada : 60A/60A
Isc PV : 90A/90A
Lado CC
Tensão nominal de saída : 220Va.c.;3P+N+PE
Freqüência de saída : 50Hz/60Hz
Potência nominal de saída : 30kW
Corrente máxima de saída : 78.7A
Fator de potência : 0.8 (Indutivo) -0.8 (Capacitivo)
Lado CA
Temperatura de serviço : -40 to +60℃
Grado de proteção : IP65
Classe de proteção : I
Shenzhen HopeWind Tecnologia S.A.
Fabricado na China

Series No.



Remark:

Printed symbols shall be at least 2.75 mm high. Printed text characters shall be at least 1.5 mm high, whether upper case or lower case, and shall contrast in colour with the background

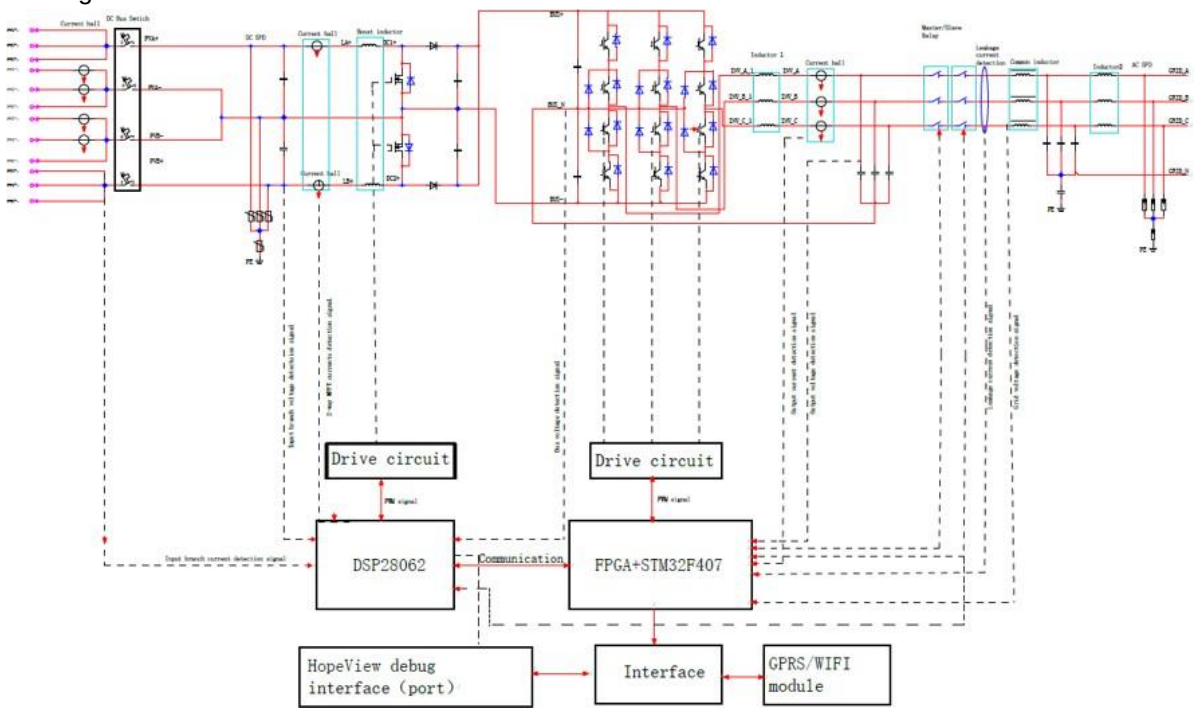
Warning marking`

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 (%) ..... :	-90 / +110 %
Tested for power systems ..... :	TN
IT testing, phase-phase voltage (V) ..... :	--
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg) ..... :	Max.35, see specification
Pollution degree ..... :	PD3 (PD2 internal)
IP protection class ..... :	IP65
..... :	
Possible test case verdicts:	
- test case does not apply to the test object ..... :	N/A
- test object does meet the requirement ..... :	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 ..... :	2021-12-13
Date (s) of performance of tests ..... :	2022-02-16 to 2022-07-07

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.** Standard IEC/EN 62109-2:2011 is to be used in conjunction with IEC/EN 62109-1:2010. The test results presented in this report relate only to the item tested. The results indicate that the specimen complies with standard" IEC/EN 62109-1:2010 and IEC/EN 62109-2:2011". Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.	
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) ..... :	Suzhou Hopewind Electric Co., Ltd. 555 Songjia Road, wusongjiang science and Technology Industrial Park, wuzhong Economic Development Zone, Suzhou. Jiangsu Province, China.

General product information:

The testing unit is a Class I grid-connected PV inverter for outdoor installation (IP65).
The unit is providing EMC filtering at the output toward mains.
The unit does not provide galvanic separation from input to output (transformer-less).
The output is switched off redundant by the high-power switching bridge and two relays on each line. This assures that the opening of the output circuit will also operate in case of one is error.
Block diagram:



The maximum ambient temperature permitted by the manufacturer's specification is 60°C, all tests performed at hopeSun33KTL unless otherwise stated.

Hardware Version: hopesunMD→A;
hopesunWM→A;
Software Version: DSP →
V569B000D000;
FPGA→
V106B000D000; M4
→ V106B000D000;
Bootloader → V102B000D000.

Model difference:

The model hopeSun 5KTL, hopeSun 6KTL, hopeSun 8KTL and hopeSun 10KTL are identical to hopeSun 12KTL, except the power de-rating by software.

hopeSun 15KTL and hopeSun 17KTL are identical to model hopeSun 10KTL-L except the power rating, AC output voltage and current.

hopeSun 20KTL and hopeSun 22KTL are identical to model hopeSun 12KTL-L except the power rating, AC output voltage and current.

hopeSun 25KTL and are identical to model hopeSun 15KTL-L except the power rating, AC output voltage and current.

hopeSun 30KTL, hopeSun 33KTL, hopeSun 17KTL-L, hopeSun 24KTL-L and are identical to model hopeSun 30KTL-L except the power rating, AC output voltage and current.

hopeSun 12KTL, hopeSun 10KTL-L, hopeSun 12KTL-L and hopeSun 15KTL-L are identical to hopeSun 30KTL-L except the power de-rating by software and components (see below table).

No.	Component \ Model	Usage amount				
		hopeSun 5KTL, hopeSun 6KTL, hopeSun 8KTL, hopeSun 10KTL, hopeSun 12KTL.	hopeSun 15KTL, hopeSun 17KTL, hopeSun 10KTL-L.	hopeSun 20KTL, hopeSun 22KTL, hopeSun 12KTL-L.	hopeSun 25KTL, hopeSun 15KTL-L.	hopeSun 30KTL, hopeSun 33KTL, hopeSun 17KTL-L, hopeSun 24KTL-L, hopeSun 30KTL-L.
1	Boost IGBT	4PCS	4PCS	6PCS	6PCS	6PCS
2	Bus capacitor	6PCS	8PCS	6PCS	8PCS	8PCS
3	specification of L12, L13, L14	3PCS (HWL0368)	3PCS (HWL0368)	3PCS (HWL0346)	3PCS (HWL0346)	3PCS (HWL0347)
4	specification of L15	1PCS (HWL0369)	1PCS (HWL0369)	1PCS (HWL0345)	1PCS (HWL0345)	1PCS (HWL0344)

IEC/EN 62109-1			
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		P
4.2.2.4	Accessories		P
4.2.2.5	Covers and removable parts		P
4.2.2.6	Mains supply a) Voltage: b) Frequency: c) Polarity: d) Earthing: e) Over-current Protection:	 3ϕ/N/PE, 400Vac; 50Hz; Earthed; over-voltage 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 battery	N/A
4.2.2.8	Conditions of loading for output ports		P
4.2.2.9	Earthing terminals	Protective conductor terminal was connected to earth. No functional earth terminal.	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
4.3.2.2	Touch temperatures		P
4.3.2.3	Temperature limits for mounting surfaces	see appended table 4.3	P
4.4	Testing in single fault condition	see appended table 4.4	P

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Clause	Requirement + Test	Result - Remark	Verdict
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		P
4.4.4.3	Motors	No motors	N/A
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 devices used	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		N/A
4.5	Humidity preconditioning		P
4.5.1	General		P
4.5.2	Conditions	93% RH, 40 °C, 48 h	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
4.6.3	Compliance with backfeed tests		P

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Clause	Requirement + Test	Result - Remark	Verdict
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	Label is attached	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.		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		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	see marking plate	P
	b) model number, name or other means to identify the equipment	see 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.	see marking plate	P
5.1.4	Equipment ratings		P
	Unless otherwise specified in another part of IEC 62109, the following ratings, as applicable shall be marked on the equipment:		P
	– input voltage, type of voltage (a.c. or d.c.), frequency, and max. continuous current for each input	see marking plate	P
	– output voltage, type of voltage (a.c. or d.c.), frequency, max. continuous current, and for a.c. outputs, either the power or power factor for each output	see marking plate	P

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Clause	Requirement + Test	Result - Remark	Verdict
	– the ingress protection (IP) rating as in 6.3 below	see marking plate (IP65)	P
5.1.5	Fuse identification	No fuse	N/A
	Marking shall be located adjacent to each fuse or fuseholder, or on the fuseholder, or in another location provided that it is obvious to which fuse the marking applies, giving the fuse current rating and where fuses of different voltage rating value could be fitted, the fuse voltage rating.		N/A
	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.		N/A
5.1.6	Terminals, Connections, and Controls		P
	If necessary for safety, an indication shall be given of the purpose of Terminals, connectors, controls, and indicators, and their various positions, including any connections for coolant fluids such as water and drainage. The symbols in Annex C may be used, and where there is insufficient space, symbol 9 of Annex C may be used.	Ground terminals are marked with relevant explanation. PV port with PV special connector AC port with special Terminals	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.	No such components	N/A
	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.	The PCE is not intended to connect to multiple-voltage and there is no voltage setting device	N/A
	A unit with d.c. terminals shall be plainly marked indicating the polarity of the connections, with:	PV port with PV special connector and with + -	P
	– the sign “+” for positive and “-” for negative; or		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		P
	The means of connection for the protective earthing conductor shall be marked with:		P
	– symbol 7 of Annex C; or		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– the letters “PE“; or		N/A
	– the colour coding green-yellow.		P
5.1.7	Switches and circuit-breakers		P
	The on and off-positions of switches and circuits breakers shall be clearly marked. If a push-button switch is used as the power switch, symbols 10 and 16 of Annex C may be used to indicate the on-position, or symbols 11 and 17 to indicate the off-position, with the pair of symbols (10 and 16, or 11 and 17) close together.	Marked with on and off	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		N/A
	Where required by note 1 of Table 2 as a result of high temperatures of terminals or parts in the wiring compartment, there shall be a marking, visible beside the terminal before connection, of either:		N/A
	a) the minimum temperature Rating and size of the cable to be connected to the TERMINALS; or		N/A
	b) a marking to warn the installer to consult the installation instruction. Symbol 9 of Table D-1 is an acceptable marking		N/A
5.2	Warning markings		P
5.2.1	Visibility and legibility requirements for warning markings	Warning marking marked on enclosure.	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
5.2.2	Content for warning markings		P
5.2.2.1	Ungrounded heat sinks and similar parts	No ungrounded heat sink	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.		P
5.2.2.3	Coolant	No coolant used	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.		P
5.2.2.5	Motor guarding	No motor	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).		N/A
5.2.3	Sonic hazard markings and instructions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	A PCE with connections for multiple energy sources shall be marked with symbol 13 of Annex C and the manual shall contain the information required in 5.3.4.	PV array, AC MAINS	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.		P
5.2.5	Excessive touch current		N/A
	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.	the touch current measured in accordance with 7.5.4 does not exceed 3,5 mA a.c. or 10 mA d.c.	N/A
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		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:		P
	– ENVIRONMENTAL CATEGORY as per 6.1	For outdoor use	P
	– WET LOCATIONS classification fort he intended external environment as per 6.1	Wet Locations	P

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Clause	Requirement + Test	Result - Remark	Verdict
	– POLLUTION DEGREE classification for the intended external environment as per 6.2	PD3(external), PD2(internal)	P
	– INGRESS PROTECTION rating as per 6.3	IP65	P
	– Ambient temperature and relative humidity ratings	-40°C to 60°C 0-100 % condensing	P
	– MAXIMUM altitude rating	Up to 2000m	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		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		P
	In general, the documentation must be provided in printed form and is to be delivered with the equipment.	Printed form provided	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		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:	As specified in user manual, refer to information related to installation	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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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;		N/A
	g) instructions and information relating to sound pressure level if required by 10.2.1;		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 battery	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;	Not exceed the Max. rated current	N/A
	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;	Should be comply with local national code	N/A
	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.“	Should be comply with local national code	N/A
	o) for PCE intended to charge batteries, the battery nominal voltage rating, size, and type		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.		N/A
5.3.3	Information related to operation	As specified in user manual, refer to information related to operation	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	Maintenance instructions shall include the following:	Maintenance made only by authorized service personal	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	No 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
	– Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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	Outdoor	P
	– Suitability for WET LOCATIONS or not	Yes	P
	– POLLUTION DEGREE rating in 6.2 below	PD3	P
	– INGRESS PROTECTION (IP) rating, as in 6.3 below	IP65	P
	– Ultraviolet (UV) exposure rating, as in 6.4 below	Metal enclosure	P
	– Ambient temperature and relative humidity ratings, as in 6.5 below	-40°C~+60°C, 0-100%, condensing	P
6.1	Environmental categories and minimum environmental conditions		P
6.1.1	Outdoor		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.1.2	Indoor, unconditioned		N/A
6.1.3	Indoor, conditioned		N/A
6.2	Pollution degree	PD3	P
6.3	Ingress Protection	IP65	P
6.4	UV exposure	For LED panel	P
6.5	Temperature and humidity	-40°C~+60°C, 0-100%, condensing	P
7	**PROTECTION AGAINST ELECTRIC SHOCK AND ENERGY HAZARDS**		P
7.1	General		P
7.2	Fault conditions		P
7.3	Protection against electric shock		P
7.3.1	General	Earthed metal enclosure protects against direct contact	P
7.3.2	Decisive voltage classification		P
7.3.2.1	Use of decisive voltage class (DVC)		P
7.3.2.2	Limits of DVC (according table 6)	DVC-C output circuit,	P
7.3.2.3	Short-terms limits of accessible voltages under fault conditions	No accessible voltage exceeds DVC A during fault condition.	P
7.3.2.4	Requirements for protection (according table 7)		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)		P
7.3.2.6.3	DC working voltage (see Figure 3)		P
7.3.2.6.4	Pulsating working voltage (see Figure 4)		P
7.3.3	Protective separation		P
	Protective separation shall be achieved by:		P
	▪ double or reinforced insulation, or	Reinforced insulation between DC input & AC output to communication circuit	P

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Clause	Requirement + Test	Result - Remark	Verdict
	▪ 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	Live part to enclosure	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	Well earthed metal enclosure used.	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 measures given in 7.3.4.2 (enclosures and barriers) and 7.3.4.3 (insulation).	Enclosure provided	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.	No such components	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		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.	IP 65 enclosure provided to prevent access to inside live parts	P
7.3.4.2.1	General		P
	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		N/A
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:	IP 65 enclosure	P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) decisive voltage classification A, (DVC A) - the probe may touch the live parts		P
	b) decisive voltage classification B, (DVC B) - the probe must not touch bare live parts		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,		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 Annex E, 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.		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
	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.	Without openings	N/A
	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.		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.3.4.2.4	Service access areas	Not energized at service	N/A
7.3.4.3	Protection by means of insulation of live parts		P
	Where the requirements of 7.3.4.2 are not met, live parts shall be provided with insulation if:	See 7.3.7 Table: Clearance and creepage distance	P
	– their working voltage is greater than the maximum limit of decisive voltage class A, or		P
	– for a DVC A or B circuit, protective separation from adjacent circuit of DVC C is not provided (see note 2 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.		N/A
	Conformity is checked by visual inspection and trial insertion.		N/A
7.3.5.2	Protection using decisive voltage class A	Communication interface circuit	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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)	Class I (basic insulation plus protective earthing) class II part (Communication circuit of SELV): reinforced insulation	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	The earthed metal enclosure meets this requirement	P
	That part of a PCE meets the requirements of 7.3.6.4 is defined as protective class II.		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.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	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 provided through approved AC installation terminals, and an external second protective earthing conductor is bonded to metal case	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;		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.	No coating	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.	No such part	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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:		N/A
	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.	Protective bonding wire size is same as output cable	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:		P
	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;		P
	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.		P
	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.		P
7.3.6.3.3.1	Test current, duration, and acceptance criteria		P
	The test current, duration of the test and acceptance criteria are as follows:	see appended table 7.3.6.3.3	P
	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.		P
	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.		P
	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.		P
	The test current is derived from an a.c or d.c supply source, the output of which is not earthed.		P

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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)		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		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.		P
	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:		P
	▪ 2,5 mm² if mechanical protection is provided;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	▪ 4 mm² if mechanical protection is not provided.		N/A
	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.		N/A
7.3.6.3.6	Means of connection for the external protective earthing conductor		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	Near terminal	P
	• the colour coding green-yellow		P
	Marking shall not be done on easily changeable parts such as screws.		P
7.3.6.3.7	Touch current in case of failure of the protective earthing conductor	A second protective earthing conductor used on enclosure	N/A
	The requirements of this sub-clause shall be satisfied to maintain safety in case of damage to or disconnection of the protective earthing conductor.		N/A
	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.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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.		N/A
	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		N/A
	• 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	First PE at AC connect and Secondary at external 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.		N/A
	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)		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	class II part (Communication circuit of SELV): reinforced insulation	P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	• 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.		N/A
7.3.7	Insulation Including Clearance and Creepage Distance	See 7.3.7 Table: Clearance and creepage distance	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	PD3 for outside of enclosure PD2 for internal	P
	• overvoltage category	OVC II for PV input circuit, OCV III for mains circuit	P
	• supply earthing system		P
	• insulation voltage		P
	• location of insulation		P

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Clause	Requirement + Test	Result - Remark	Verdict
	• type of insulation		P
	Compliance of insulation, creepage distances, and clearance distances, shall be verified by measurement or visual inspection, and the tests of 7.5.		P
7.3.7.1.3	Supply earthing systems	TN system with neutral earthed, except corner earthed system	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;		N/A
	• 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.		N/A
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		P
7.3.7.2.2	Circuits connected directly to the mains	AC Output circuit connected to mains	P
7.3.7.2.3	Circuits other than mains circuits	PV input	P
7.3.7.2.4	Insulation between circuits		P
7.3.7.3	Functional insulating		P
7.3.7.4	Clearance distances	See appended table 7.3.7	P
7.3.7.4.1	Determination		P
7.3.7.4.2	Electric field homogeneity		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

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Clause	Requirement + Test	Result - Remark	Verdict
7.3.7.5.1	General		P
7.3.7.5.2	Voltage		P
7.3.7.5.3	Materials		P
7.3.7.6	Coating		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	UL 94, V-0	P
7.3.7.8.4.1	General		P
7.3.7.8.4.2	Use of coating materials	No coating material	N/A
7.3.7.8.5	Wound components		N/A
7.3.7.8.6	Potting materials		N/A
7.3.7.9	Insulation requirements above 30 kHz		N/A
7.3.8	Residual Current-operated protective (RCD) or monitoring (RCM) device compatibility	Should be comply with local national code	N/A
	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.		N/A
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.	Approved installation coupler use. Accessible communication interface is DVC A (< 30VDC)	P
7.3.9.2	Service access areas		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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.	Warning symbol 21 of Annex C is marked on PCE.	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.	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
	Equipment shall be so designed that there is no risk of energy hazard in operator access areas from accessible circuits.	No energy exists in operator access areas	P
7.4.3	Services Access Areas		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	RH 93%, 40°C, 48 hours	P
7.5.2.4	Performing the voltage test	Output circuit to input circuit and enclosure	P
7.5.2.5	Duration of the a.c. or d.c. voltage test	60s	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)	See appended table 7.5.4	N/A
	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.	See 7.3.6.3.7	N/A
	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.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.5.5	Equipment with multiple sources of supply	Hazards do not present under normal or single fault conditions	P
8	**PROTECTION AGAINST MECHANICAL HAZARDS**		P
8.1	General		P
	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.		P
	Conformity is checked as specified in 8.2 to 8.6.		P
8.2	Moving parts	No 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.		N/A
8.2.1	Protection of service persons		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	Max 35 kg	N/A
	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.	No such parts	N/A
	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.		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.6	Expelled parts		N/A
	Equipment shall contain or limit the energy of parts that could cause a HAZARD if expelled in the event of a fault.		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.	Components are witnessed at normal condition and abnormal tests are verified	P
9.1.1	Reducing the risk of ignition and spread of flame		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.	Method 1	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		N/A
	– insulated wiring, except as permitted in 9.1.2.2.		N/A
9.1.2.2	Parts not requiring a fire enclosure	Fire enclosure used	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.	Metal enclosure	P
9.1.3.2	Materials for fire enclosures	Metal enclosure	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		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.		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	No such part	N/A
9.1.4	Openings in fire enclosures	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		N/A
9.1.4.6	Additional requirements for openings in transportable equipment		N/A
9.2	LIMITED POWER SOURCES		N/A
9.2.1	General		N/A
9.2.2	Limited power source tests	See appended table 9.2	N/A
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 overcurrent 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

IEC/EN 62109-1			
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**		N/A
10.1	General		N/A
	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.	No sonic pressure hazards	N/A
10.2	Sonic pressure and Sound level		N/A
10.2.1	Hazardous Noise Levels		N/A
11	**PROTECTION AGAINST LIQUID HAZARDS**		N/A
11.1	Liquid Containment, Pressure and Leakage	No 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		N/A
12	**CHEMICAL HAZARDS**		N/A
12.1	General		N/A
13	**PHYSICAL REQUIREMENTS**		P
13.1	Handles and manual controls		P

IEC/EN 62109-1			
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	P
13.1.1	Adjustable controls	Without adjustable controls	N/A
13.2	Securing of parts	All screws locked with starwasher	P
13.3	Provisions for external connections		P
13.3.1	General	Certified PV connectors are used. Installation manuals provide information for the disconnection means.	P
13.3.2	Connection to an a.c. Mains supply	Approved AC terminals	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	Approved AC terminals	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		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	Approved AC terminals	N/A
13.3.3.1	Wiring terminals		N/A
13.3.3.2	Screw terminals		N/A
13.3.3.3	Wiring terminal sizes		N/A
13.3.3.4	Wiring terminal design		N/A
13.3.3.5	Grouping of wiring terminals		N/A
13.3.3.6	Stranded wire		N/A
13.3.4	Supply wiring space		N/A
13.3.5	Wire bending space for wires 10 mm² and greater		N/A
13.3.6	Disconnection from supply sources	Disconnect the unit from the MAINS and PV supply by the external customer installed disconnecting devices.	P
13.3.7	Connectors, plugs and sockets	Approved PV connectors AND AC terminals used	P
13.3.8	Direct plug-in equipment		N/A
13.4	Internal wiring and connections		P
13.4.1	General		P
13.4.2	Routing	Internal wire is routed to avoid sharp edge and overheat	P
13.4.3	Colour coding	Conductor having green-and-yellow insulation is used only for protective 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	Without 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	Approved PV and AC terminals	P
13.6.1.1	Thermal index or capability		P
13.6.2	Polymers serving as enclosures or barriers preventing access to hazards		P

IEC/EN 62109-1			
Clause	Requirement + Test	Result - Remark	Verdict
13.6.2.1	Stress relief test		P
13.6.3	Polymers serving as solid insulation	Approved PV connectors AND AC terminals used	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	Impact test applied on the display screen 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		N/A
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
	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

IEC/EN 62109-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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		N/A
14.4	Fuse holders		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.		N/A
14.7	Circuits or components used as transient overvoltage limiting devices		N/A
	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.		N/A
14.8	Batteries		N/A

IEC/EN 62109-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	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

IEC/EN 62109-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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	All software or firmware limits or controls were disabled during single-fault test, annex B, B.1.1 A) was considered	P

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV Input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
hopeSun33KTL	650.6	52.63	34224	230.0	L1: 48.31 L2: 48.37 L3: 48.09	33010
	650.4	53.40	34698	207.2	L1: 52.05 L2: 51.85 L3: 52.11	32356
	650.7	52.56	34187	253.1	L1: 44.09 L2: 44.16 L3: 43.87	33082
	850.5	40.25	34219	253.1	L1: 43.99 L2: 44.00 L3: 43.75	32997
	850.5	40.45	34399	230.5	L1: 48.27 L2: 48.35 L3: 48.13	33006
	850.4	40.72	34613	207.5	L1: 51.70 L2: 51.23 L3: 51.88	32185
	424.8	80.24	34053	258.7	L1: 43.08 L2: 42.87 L3: 43.06	32971
	425.4	78.09	33188	237.7	L1: 45.72 L2: 45.68 L3: 45.70	32181
	425.7	78.03	33215	208.4	L1: 51.46 L2: 51.29 L3: 51.67	32145

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
hopeSun30KTL	650.7	47.68	31025	253.2	L1: 40.20 L2: 40.17 L3: 39.91	30130
	650.7	47.67	31020	230.2	L1: 43.91 L2: 44.04 L3: 43.71	30011
	650.8	47.72	31059	207.7	L1: 47.64 L2: 47.72 L3: 47.22	29689
	850.5	36.49	31031	207.2	L1: 47.62 L2: 47.27 L3: 47.38	29564
	850.5	36.75	31254	230.4	L1: 44.01 L2: 44.12 L3: 43.84	30056
	850.5	36.51	31055	253.1	L1: 40.05 L2: 40.00 L3: 39.76	30000
	424.6	70.79	30058	207.9	L1: 46.62 L2: 46.38 L3: 46.51	29005
	424.6	74.89	31771	231.0	L1: 44.34 L2: 44.19 L3: 44.37	30717
	424.6	75.11	31855	253.3	L1: 40.22 L2: 40.55 L3: 40.13	30855

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun25KTL	850.5	30.30	25771	253.0	L1: 33.43 L2: 33.27 L3: 33.03	24925
	850.4	30.51	25948	230.0	L1: 36.70 L2: 36.76 L3: 36.39	24992
	850.4	30.77	26168	207.8	L1: 39.55 L2: 39.43 L3: 39.51	24598
	649.7	39.90	25921	208.2	L1: 39.46 L2: 39.38 L3: 39.19	24615
	649.7	39.99	25985	230.1	L1: 36.99 L2: 36.99 L3: 36.68	25180
	649.7	39.64	25757	253.4	L1: 33.46 L2: 33.52 L3: 33.29	25041
	425.6	60.92	25928	253.2	L1: 33.85 L2: 33.77 L3: 33.61	25095
	425.6	60.91	25920	230.2	L1: 36.97 L2: 36.95 L3: 36.75	25021
	425.6	60.60	25789	207.3	L1: 39.47 L2: 39.62 L3: 39.29	24551

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun22KTL	425.6	51.25	21809	207.5	L1: 33.95 L2: 33.95 L3: 33.81	21046
	425.6	53.70	22858	230.5	L1: 32.67 L2: 32.69 L3: 32.58	22088
	425.6	53.25	22664	253.2	L1: 29.68 L2: 29.69 L3: 29.52	21957
	649.8	34.78	22596	253.0	L1: 29.54 L2: 29.45 L3: 29.27	21985
	649.8	34.81	22617	230.0	L1: 32.31 L2: 32.32 L3: 32.05	21946
	649.8	34.19	22215	207.9	L1: 34.00 L2: 34.03 L3: 34.78	21438
	850.5	25.83	21967	208.1	L1: 33.92 L2: 33.97 L3: 33.64	21176
	850.5	26.88	22864	230.3	L1: 32.41 L2: 32.31 L3: 32.09	22028
	850.5	26.71	22719	253.0	L1: 29.51 L2: 29.40 L3: 29.14	21971

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun20KTL	850.5	24.49	20827	253.2	L1: 27.07 L2: 27.02 L3: 26.72	20141
	850.5	24.51	20850	230.2	L1: 29.60 L2: 29.60 L3: 29.26	20088
	850.5	23.37	19868	207.3	L1: 27.07 L2: 27.02 L3: 26.72	19173
	649.5	30.56	19852	207.4	L1: 30.68 L2: 30.63 L3: 30.38	19057
	649.8	31.69	20591	229.9	L1: 29.51 L2: 29.44 L3: 29.25	19977
	649.7	31.68	20587	253.3	L1: 26.94 L2: 26.87 L3: 26.73	20035
	425.7	48.32	20568	253.2	L1: 26.96 L2: 26.99 L3: 26.77	19945
	425.6	48.79	20768	230.5	L1: 29.71 L2: 29.79 L3: 29.61	20092
	425.6	46.60	19834	206.8	L1: 30.66 L2: 30.68 L3: 30.36	19021

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun17KTL	450.8	36.84	16605	207.6	L1: 25.73 L2: 25.75 L3: 25.68	16024
	450.8	38.89	17529	230.2	L1: 25.20 L2: 25.26 L3: 25.00	16985
	450.8	38.93	17547	252.9	L1: 23.14 L2: 23.12 L3: 22.88	17037
	649.7	26.97	17521	253.3	L1: 23.05 L2: 22.92 L3: 22.75	17054
	649.7	27.01	17552	230.6	L1: 25.13 L2: 25.21 L3: 25.01	17040
	649.7	25.92	16839	208.3	L1: 25.93 L2: 25.87 L3: 26.15	16166
	850.4	19.78	16821	207.4	L1: 26.09 L2: 25.98 L3: 26.20	16233
	850.5	20.84	17727	230.0	L1: 25.23 L2: 25.24 L3: 25.01	17073
	850.5	20.69	17594	253.3	L1: 22.94 L2: 22.91 L3: 22.68	17005

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun15KTL	850.5	18.30	15568	253.2	L1: 20.40 L2: 20.29 L3: 20.11	15036
	850.5	18.29	15552	230.2	L1: 22.23 L2: 22.21 L3: 21.93	14971
	850.5	17.36	14765	207.5	L1: 22.88 L2: 22.89 L3: 23.01	14249
	649.8	22.81	14821	207.9	L1: 23.09 L2: 22.98 L3: 22.88	14332
	649.8	23.94	15558	230.4	L1: 22.40 L2: 22.35 L3: 22.22	15100
	649.7	23.75	15433	253.3	L1: 20.30 L2: 20.37 L3: 20.10	15018
	449.8	34.52	15531	253.0	L1: 20.60 L2: 20.52 L3: 20.29	15077
	449.8	34.52	15529	230.3	L1: 22.42 L2: 22.42 L3: 22.22	15052
	449.8	33.05	14861	208.1	L1: 23.06 L2: 23.02 L3: 22.86	14371

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun12KTL	370.5	35.58	12069	208.6	L1: 18.65 L2: 18.69 L3: 18.52	11671
	370.5	33.61	12454	229.9	L1: 18.25 L2: 18.17 L3: 17.94	12048
	370.5	33.63	12462	253.2	L1: 16.69 L2: 16.71 L3: 16.52	12074
	649.7	18.98	12330	253.2	L1: 16.37 L2: 16.40 L3: 16.17	11991
	649.7	19.00	12346	230.1	L1: 17.92 L2: 17.89 L3: 17.70	11977
	649.7	18.73	12170	207.8	L1: 18.91 L2: 18.84 L3: 18.75	11744
	850.4	14.20	12071	207.3	L1: 18.56 L2: 18.77 L3: 18.73	11673
	850.4	14.74	12537	230.4	L1: 17.98 L2: 17.99 L3: 17.81	12046
	850.4	14.59	12409	252.9	L1: 16.41 L2: 16.35 L3: 16.07	11958

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun10KTL	850.5	12.24	10408	253.2	L1: 13.90 L2: 13.79 L3: 13.60	10002
	850.4	12.27	10432	230.2	L1: 15.13 L2: 15.09 L3: 14.85	9996
	850.4	12.04	10232	208.1	L1: 15.89 L2: 15.85 L3: 15.74	9895
	649.8	15.54	10097	208.5	L1: 15.66 L2: 15.61 L3: 15.42	9764
	649.8	16.04	10423	230.1	L1: 15.24 L2: 15.25 L3: 14.97	10100
	649.7	15.88	10315	253.1	L1: 13.88 L2: 13.78 L3: 13.63	10019
	370.6	28.07	10402	253.2	L1: 14.12 L2: 14.08 L3: 13.87	10066
	370.6	28.05	10395	230.0	L1: 15.36 L2: 15.32 L3: 15.09	10049
	370.6	27.48	10180	207.7	L1: 15.80 L2: 15.79 L3: 15.86	9844

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun8KTL	370.6	21.76	8063	207.6	L1: 12.52 L2: 12.55 L3: 12.51	7797
	370.5	22.45	8319	229.9	L1: 12.47 L2: 12.39 L3: 12.25	8025
	370.6	22.44	8315	253.0	L1: 11.50 L2: 11.48 L3: 11.19	8030
	649.7	12.77	8297	253.5	L1: 11.27 L2: 11.28 L3: 11.10	8038
	649.7	12.77	8294	230.1	L1: 12.30 L2: 12.26 L3: 12.05	8018
	649.7	12.44	8076	208.1	L1: 12.51 L2: 12.42 L3: 12.54	7809
	850.5	9.55	8116	207.8	L1: 12.59 L2: 12.60 L3: 12.53	7848
	850.5	9.88	8403	230.5	L1: 12.35 L2: 12.25 L3: 12.12	8019
	850.5	9.91	8424	252.9	L1: 11.45 L2: 11.35 L3: 11.09	8062

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun6KTL	370.5	16.46	6099	207.1	L1: 9.51 L2: 9.48 L3: 9.45	5849
	370.1	16.45	6087	230.1	L1: 8.65 L2: 8.71 L3: 8.60	5935
	370.4	16.43	6086	253.4	L1: 7.79 L2: 7.68 L3: 7.75	5910
	650.3	9.35	6079	207.5	L1: 9.47 L2: 9.46 L3: 9.40	5885
	650.8	9.36	6089	231.4	L1: 8.55 L2: 8.68 L3: 8.49	5906
	649.5	9.38	6092	253.6	L1: 7.85 L2: 7.77 L3: 7.83	5928
	851.2	7.16	6094	207.9	L1: 9.39 L2: 9.48 L3: 9.40	5909
	851.5	7.14	6079	231.3	L1: 8.49 L2: 8.51 L3: 8.38	5897
	850.3	7.15	6082	253.8	L1: 7.81 L2: 7.74 L3: 7.68	5936

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun5KTL	371.4	13.53	5026	207.6	L1: 9.51 L2: 9.48 L3: 9.45	4875
	370.6	13.67	5065	230.5	L1: 8.65 L2: 8.71 L3: 8.60	4938
	371.8	13.56	5043	253.2	L1: 7.79 L2: 7.68 L3: 7.75	4897
	650.8	7.74	5035	207.4	L1: 9.47 L2: 9.46 L3: 9.40	4904
	651.9	7.78	5074	230.8	L1: 8.55 L2: 8.68 L3: 8.49	4922
	649.5	7.80	5065	253.1	L1: 7.85 L2: 7.77 L3: 7.83	4928
	850.6	5.89	5011	207.4	L1: 9.39 L2: 9.48 L3: 9.40	4896
	850.4	5.93	5039	230.6	L1: 8.49 L2: 8.51 L3: 8.38	4888
	851.3	5.93	5045	253.2	L1: 7.81 L2: 7.74 L3: 7.68	4924

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
hopeSun30KTL-L	425.4	72.94	31028	198.3	L1: 50.64 L2: 51.26 L3: 50.89	30128
	425.6	73.04	31085	198.5	L1: 50.32 L2: 50.45 L3: 50.28	29966
	426.8	72.81	31076	199.1	L1: 50.36 L2: 50.86 L3: 51.11	30082
	651.3	47.70	31066	220.8	L1: 45.54 L2: 46.64 L3: 45.81	30165
	652.5	47.63	31077	221.3	L1: 45.45 L2: 46.51 L3: 46.09	30176
	650.8	47.80	31109	220.7	L1: 45.72 L2: 44.79 L3: 46.09	30269
	850.1	36.53	31053	242.3	L1: 41.61 L2: 41.53 L3: 40.98	30246
	852.3	36.42	31043	243.1	L1: 41.25 L2: 41.34 L3: 41.76	30081
	851.4	36.55	31116	242.5	L1: 41.83 L2: 41.38 L3: 42.05	30431

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun24KTL-L	425.1	58.00	24655	198.5	L1: 40.20 L2: 40.08 L3: 41.03	23940
	426.1	58.11	24762	198.4	L1: 40.11 L2: 40.15 L3: 40.22	23871
	425.5	58.04	24695	199.1	L1: 40.02 L2: 39.88 L3: 41.06	23905
	650.5	37.93	24673	220.5	L1: 36.22 L2: 37.05 L3: 37.11	23957
	651.8	37.82	24654	220.3	L1: 36.22 L2: 37.23 L3: 37.16	23939
	651.1	37.69	24543	220.7	L1: 37.05 L2: 36.07 L3: 37.13	23880
	852.3	28.73	24485	242.1	L1: 33.23 L2: 32.84 L3: 31.95	23848
	851.6	29.18	24852	242.1	L1: 33.16 L2: 32.86 L3: 33.46	24082
	850.8	28.78	24485	242	L1: 32.98 L2: 33.45 L3: 33.95	23946

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun17KTL-L	451.2	36.91	16653	198.5	L1: 26.93 L2: 26.85 L3: 26.99	16037
	450.6	36.67	16522	198.4	L1: 26.65 L2: 26.73 L3: 26.68	15861
	452.3	36.56	16536	199.1	L1: 26.60 L2: 26.75 L3: 26.43	15891
	651.2	26.94	17543	220.5	L1: 25.75 L2: 26.05 L3: 25.88	17034
	650.5	27.00	17563	220.3	L1: 25.80 L2: 25.95 L3: 26.07	17054
	651.3	26.01	16939	220.7	L1: 24.89 L2: 24.75 L3: 25.06	16482
	850.2	19.81	16844	242.1	L1: 22.59 L2: 23.00 L3: 22.65	16406
	850.9	20.84	17736	242.1	L1: 23.66 L2: 24.35 L3: 23.68	17186
	851.1	20.71	17626	242.0	L1: 23.74 L2: 23.85 L3: 23.69	17238

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun15KTL-L	449.8	18.30	14068	198.3	L1: 22.77 L2: 22.95 L3: 22.85	13547
	450.2	18.29	14077	198.2	L1: 22.73 L2: 22.68 L3: 22.75	13514
	450.3	17.36	14065	198.4	L1: 22.71 L2: 22.43 L3: 22.94	13516
	651.3	22.81	15356	221.3	L1: 22.46 L2: 22.52 L3: 22.76	14911
	650.3	23.94	15288	220.5	L1: 22.44 L2: 22.65 L3: 22.48	14845
	649.8	23.75	15346	220.6	L1: 22.56 L2: 22.69 L3: 22.70	14932
	851.3	34.52	15385	242.5	L1: 20.60 L2: 21.23 L3: 20.85	14985
	851.5	34.52	15374	243.0	L1: 20.44 L2: 21.30 L3: 20.74	14897
	850.8	33.05	15266	242.6	L1: 20.51 L2: 20.46 L3: 20.38	14930

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)	P

Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun12KTL-L	370.5	18.30	11155	198.2	L1: 18.07 L2: 18.45 L3: 18..11	10742
	371.4	18.29	11086	198.5	L1: 17.87 L2: 18.05 L3: 17.99	10643
	371.2	17.36	11136	198.4	L1: 17.98 L2: 17.65 L3: 17.77	10702
	650.8	22.81	12341	220.5	L1: 18.12 L2: 18.05 L3: 18.65	11983
	651.2	23.94	12352	220.6	L1: 18.12 L2: 18.35 L3: 18.22	11994
	649.5	23.75	12285	221.3	L1: 18.00 L2: 18.13 L3: 18.23	11953
	850.3	34.52	12276	242.6	L1: 16.43 L2: 16.55 L3: 16.38	11957
	850.6	34.52	12295	242.7	L1: 16.36 L2: 16.44 L3: 16.50	11914
	850.1	33.05	12261	242.2	L1: 16.50 L2: 16.26 L3: 16.38	11991

4.2.2.6/4.7	TABLE: electrical data (in normal conditions)					P
Model	PV input			AC Grid output		
	U (V) DC	I (A) DC	P (W) DC	U (V) AC	I (A) AC	P (W) AC
HopeSun10KTL-L	372.1	18.30	9856	198.5	L1: 15.94 L2: 15.85 L3: 15.69	9485
	370.5	18.29	9750	198.6	L1: 15.71 L2: 15.85 L3: 15.78	9360
	371.3	17.36	9762	199.2	L1: 15.70 L2: 15.65 L3: 15.91	9381
	651.2	22.81	11115	220.6	L1: 16.31 L2: 16.45 L3: 16.55	10793
	650.4	23.94	10265	220.8	L1: 15.05 L2: 16.08 L3: 15.35	9967
	650.3	23.75	10285	221.6	L1: 15.05 L2: 15.43 L3: 15.22	10007
	851.3	34.52	10243	242.1	L1: 13.74 L2: 13.85 L3: 13.65	9977
	850.7	34.52	10225	242.6	L1: 13.61 L2: 13.73 L3: 13.87	9908
	850.6	33.05	10210	243.4	L1: 13.67 L2: 14.22 L3: 13.88	9985

4.3	TABLE: heating temperature rise measurements		P
	test voltage (V) ..... :	See below	—
	Ambient temperature t1 (°C) ..... :	See below	—
	Ambient temperature t2 (°C) ..... :	See below	—

temperature rise dT of part/at:	T (°C)				allowed T_{max} (°C)
Supplied Voltage(V):	PV 425 Grid 207	PV 425 Grid 253	PV 850 Grid 207	PV 850 Grid 253	--
Model: hopeSun33KTL					
DC input terminal(outside)	50.0	46.7	43.5	41.6	85
DC wire(internal)	56.9	53.3	55.3	50.8	80
DC switch (outside)	67.9	62.6	60.6	56.2	75
AC output terminal(outside)	69.1	63.8	62.7	52.9	85
AC output wire(internal)	49.0	46.0	45.4	42.9	80
Enclosure Front(outside)*	56.5	53.1	58.1	50.3	90
Enclosure back(outside)*	59.1	54.2	59.5	55.1	90
Enclosure left(outside)*	55.2	51.8	53.5	49.3	90
Enclosure right(outside)*	58.9	55.1	56.8	52.5	90
Enclosure top(outside)*	57.0	56.3	62.6	57.5	90
Enclosure bottom(outside)*	55.5	51.8	54.1	49.9	90
Display (LED)	63.5	58.9	60.8	56.3	95
mounting port	58.5	54.4	58.0	53.2	85
Bus cap C306	67.3	63.0	62.1	57.8	110
Y cap (DC) C258	56.9	53.4	54.2	50.7	105
Varistor RV1	65.4	61.0	61.1	56.8	85
Bobbin of SPS Transformer T7	65.7	61.1	62.9	58.4	110
Wire of SPS Transformer T7	70.3	64.4	70.1	64.3	110
Optocoupler U14	65.8	61.2	63.1	58.5	100
DC Hall SH1	68.6	63.5	68.5	62.9	105
Y cap C263	67.5	62.8	64.4	60.0	105

Metal film CAP C252	71.0	65.1	72.5	66.2	110
Inductot T1	66.1	61.1	60.9	56.5	110
Relay K1	69.5	64.8	64.6	59.5	85
Output inductor L12	72.6	65.3	71.8	63.9	85
Output inductor L15	64.7	59.5	62.1	57.2	85
Varistor RV7	77.7	68.8	75.0	68.1	85
X CAP C253	75.5	68.9	73.9	67.4	100
X CAP C250	62.8	57.9	60.1	55.6	100
Hall SH4	78.9	72.0	77.0	70.7	85
Relay K1(AC_R)	64.4	59.3	62.1	57.0	85
Relay K2(AC_R)	76.3	69.5	74.1	68.1	85
Relay K3(AC_S)	64.6	59.4	62.3	57.2	85
Relay K4(AC_S)	77.3	70.6	75.0	69.1	85
Relay K5(AC_T)	64.4	59.5	61.9	57.0	85
Relay K6(AC_T)	75.9	69.8	73.9	68.1	85
Metal film CAP C241	64.6	59.9	62.1	57.3	110
Hall SH2	73.7	67.7	71.3	65.7	85
Y cap (AC) C232	83.2	79.5	83.2	78.5	105
Optocoupler U38	64.1	59.5	62.7	57.2	100
Bobbin of SPS Transformer T3	64.1	59.5	62.2	57.3	110
Wire of SPS Transformer T3	79.9	76.1	79.8	75.2	110
Optocoupler U2	76.2	72.2	74.8	70.2	100
Bobbin of SPS Transformer T2	67.2	62.8	59.6	55.4	110
Wire of SPS Transformer T2	69.0	65.7	65.7	60.9	110
Master CPU U2	66.1	61.8	65.1	59.6	125
Slave CPU U3	65.0	60.5	63.0	58.3	85
Inverter inductor Coil	67.2	62.6	65.2	60.3	110
Boost inductor Coil	96.7	85.7	100.3	94.5	110
Ambient	43.5	41.0	40.7	40.8	--

Supplied Voltage(V):	**PV 650 Grid 230**	**PV 650 Grid 230**	**--**	**--**	**--**
DC input terminal(outside)	44.3	63.2	--	--	85
DC wire(internal)	54.4	65.4	--	--	80
DC switch (outside)	60.8	69.2	--	--	75
AC output terminal(outside)	62.2	68.1	--	--	85
AC output wire(internal)	46.0	62.9	--	--	80
Enclosure Front(outside)*	57.0	67.1	--	--	90
Enclosure back(outside)*	57.2	69.1	--	--	90
Enclosure left(outside)*	52.8	64.3	--	--	90
Enclosure right(outside)*	55.8	66.1	--	--	90
Enclosure top(outside)*	61.3	66.9	--	--	90
Enclosure bottom(outside)*	53.5	65.0	--	--	90
Display (LED)	60.0	69.2	--	--	95
mounting port	56.5	65.8	--	--	85
Bus cap C306	71.3	70.3	--	--	110
Y cap (DC) C258	53.8	66.0	--	--	105
Varistor RV1	60.2	69.7	--	--	85
Bobbin of SPS Transformer T7	71.1	70.8	--	--	110
Wire of SPS Transformer T7	75.8	72.4	--	--	110
Optocoupler U14	72.2	70.8	--	--	100
DC Hall SH1	65.6	73.0	--	--	105
Y cap C263	63.7	72.0	--	--	105
Metal film CAP C252	68.2	73.2	--	--	110
Inductot T1	71.5	69.1	--	--	110
Relay K1	76.2	67.3	--	--	85
Output inductor L12	76.7	71.4	--	--	85
Output inductor L15	76.8	70.1	--	--	85
Varistor RV7	75.2	73.6	--	--	85
X CAP C253	74.1	76.7	--	--	100

X CAP C250	59.6	69.2	--	--	100
Hall SH4	77.3	78.5	--	--	85
Relay K1(AC_R)	71.5	69.5	--	--	85
Relay K2(AC_R)	79.7	76.3	--	--	85
Relay K3(AC_S)	71.7	69.6	--	--	85
Relay K4(AC_S)	80.6	77.3	--	--	85
Relay K5(AC_T)	71.2	69.2	--	--	85
Relay K6(AC_T)	79.1	75.7	--	--	85
Metal film CAP C241	71.2	69.8	--	--	110
Hall SH2	81.7	74.4	--	--	85
Y cap (AC) C232	90.5	88.7	--	--	105
Optocoupler U38	71.2	68.8	--	--	100
Bobbin of SPS Transformer T3	89.0	84.7	--	--	110
Wire of SPS Transformer T3	70.9	69.2	--	--	110
Optocoupler U2	84.6	83.1	--	--	100
Bobbin of SPS Transformer T2	73.9	69.3	--	--	110
Wire of SPS Transformer T2	79.3	73.2	--	--	110
Master CPU U2	73.1	69.3	--	--	125
Slave CPU U3	72.0	70.5	--	--	85
Inverter inductor Coil	79.3	72.6	--	--	110
Boost inductor Coil	104.7	90.0	--	--	110
Ambient	40.0	61.4	--	--	--

Supplied Voltage(V):	PV 425 Grid 198	PV 425 Grid 242	PV 850 Grid 198	PV 850 Grid 242	--
Model: hopeSun30KTL-L					
DC input terminal(outside)	48.8	45.5	44.8	47.3	85
DC wire(internal)	55.5	52.0	53.9	49.5	80
DC switch (outside)	66.2	61.0	59.1	54.8	75
AC output terminal(outside)	67.4	62.2	61.1	51.6	85
AC output wire(internal)	47.8	44.9	44.3	41.8	80
Enclosure Front(outside)*	55.1	51.8	56.6	49.0	90
Enclosure back(outside)*	57.6	52.8	58.0	53.7	90
Enclosure left(outside)*	53.8	50.5	52.2	48.1	90
Enclosure right(outside)*	57.4	53.7	55.4	51.2	90
Enclosure top(outside)*	55.6	54.9	61.0	56.1	90
Enclosure bottom(outside)*	54.1	50.5	52.7	48.7	90
Display (LED)	61.9	57.4	59.3	54.9	95
mounting port	57.0	53.0	56.6	51.9	85
Bus cap C306	65.6	61.4	60.5	56.4	110
Y cap (DC) C258	55.5	52.1	52.8	49.4	105
Varistor RV1	63.8	59.5	59.6	55.4	85
Bobbin of SPS Transformer T7	64.1	59.6	61.3	56.9	110
Wire of SPS Transformer T7	68.5	62.8	68.3	62.7	110
Optocoupler U14	64.2	59.7	61.5	57.0	100
DC Hall SH1	66.9	61.9	66.8	61.3	105
Y cap C263	65.8	61.2	62.8	58.5	105
Metal film CAP C252	69.2	63.5	70.7	64.5	110
Inductot T1	64.4	59.6	59.4	55.1	110
Relay K1	67.8	63.2	63.0	58.0	85
Output inductor L12	70.8	63.7	70.0	62.3	85
Output inductor L15	63.1	58.0	60.5	55.8	85

Varistor RV7	75.8	67.1	73.1	66.4	85
X CAP C253	73.6	67.2	72.1	65.7	100
X CAP C250	61.2	56.5	58.6	54.2	100
Hall SH4	76.9	70.2	75.1	68.9	85
Relay K1(AC_R)	62.8	57.8	60.5	55.6	85
Relay K2(AC_R)	74.4	67.8	72.2	66.4	85
Relay K3(AC_S)	63.0	57.9	60.7	55.8	85
Relay K4(AC_S)	75.4	68.8	73.1	67.4	85
Relay K5(AC_T)	62.8	58.0	60.4	55.6	85
Relay K6(AC_T)	74.0	68.1	72.1	66.4	85
Metal film CAP C241	63.0	58.4	60.5	55.9	110
Hall SH2	71.9	66.0	69.5	64.1	85
Y cap (AC) C232	81.1	77.5	81.1	76.5	105
Optocoupler U38	62.5	58.0	61.1	55.8	100
Bobbin of SPS Transformer T3	62.5	58.0	60.6	55.9	110
Wire of SPS Transformer T3	77.9	74.2	77.8	73.3	110
Optocoupler U2	74.3	70.4	72.9	68.4	100
Bobbin of SPS Transformer T2	65.5	61.2	58.1	54.0	110
Wire of SPS Transformer T2	67.3	64.1	64.1	59.4	110
Master CPU U2	64.4	60.3	63.5	58.1	125
Slave CPU U3	63.4	59.0	61.4	56.8	85
Inverter inductor Coil	65.5	61.0	63.6	58.8	110
Boost inductor Coil	94.3	83.6	97.8	92.1	110
Ambient	41.5	40.5	40.2	41.1	--
Supplied Voltage(V):	PV 650 Grid 230	PV 650 Grid 230	--	--	--
DC input terminal(outside)	47.7	61.6	--	--	85
DC wire(internal)	57.5	63.8	--	--	80
DC switch (outside)	63.8	67.5	--	--	75
AC output terminal(outside)	65.1	66.4	--	--	85

AC output wire(internal)	49.4	61.3	--	--	80
Enclosure Front(outside)*	60.1	65.4	--	--	90
Enclosure back(outside)*	60.3	67.4	--	--	90
Enclosure left(outside)*	56	62.7	--	--	90
Enclosure right(outside)*	58.9	64.4	--	--	90
Enclosure top(outside)*	64.3	65.2	--	--	90
Enclosure bottom(outside)*	56.7	63.4	--	--	90
Display (LED)	63.0	67.5	--	--	95
mounting port	59.6	64.2	--	--	85
Bus cap C306	74.0	68.5	--	--	110
Y cap (DC) C258	57.0	64.4	--	--	105
Varistor RV1	63.2	68.0	--	--	85
Bobbin of SPS Transformer T7	73.8	69.0	--	--	110
Wire of SPS Transformer T7	78.4	70.6	--	--	110
Optocoupler U14	74.9	69.0	--	--	100
DC Hall SH1	68.5	71.2	--	--	105
Y cap C263	66.6	70.2	--	--	105
Metal film CAP C252	71	71.4	--	--	110
Inductot T1	74.2	67.4	--	--	110
Relay K1	78.8	65.6	--	--	85
Output inductor L12	79.3	69.6	--	--	85
Output inductor L15	79.4	68.3	--	--	85
Varistor RV7	77.8	71.8	--	--	85
X CAP C253	76.7	74.8	--	--	100
X CAP C250	62.6	67.5	--	--	100
Hall SH4	79.9	76.5	--	--	85
Relay K1(AC_R)	73.7	67.3	--	--	85
Relay K2(AC_R)	81.6	73.9	--	--	85
Relay K3(AC_S)	73.9	67.4	--	--	85

Relay K4(AC_S)	82.5	74.8	--	--	85
Relay K5(AC_T)	73.4	67.0	--	--	85
Relay K6(AC_T)	81.1	73.3	--	--	85
Metal film CAP C241	73.4	67.6	--	--	110
Hall SH2	83.6	72.0	--	--	85
Y cap (AC) C232	92.1	85.9	--	--	105
Optocoupler U38	73.4	66.6	--	--	100
Bobbin of SPS Transformer T3	90.7	82.0	--	--	110
Wire of SPS Transformer T3	73.1	67.0	--	--	110
Optocoupler U2	86.4	80.4	--	--	100
Bobbin of SPS Transformer T2	76	67.1	--	--	110
Wire of SPS Transformer T2	81.3	70.9	--	--	110
Master CPU U2	75.3	67.1	--	--	125
Slave CPU U3	74.2	68.2	--	--	85
Inverter inductor Coil	81.3	70.3	--	--	110
Boost inductor Coil	105.8	87.1	--	--	110
Ambient	40.5	60.9	--	--	--

	Winding temperature rise measurements		--
	Ambient temperature t1 (°C) ..... :	--	—
	Ambient temperature t2 (°C) ..... :	--	—

temperature rise dT of winding:	R_1 (Ω)	R_2 (Ω)	T (°C)	allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--

Note(s):
With a specified max. ambient temperature of 60°C, full load operating temperature is 40°C.

4.4	TABLE: fault condition tests		P
	test voltage (V) ..... :	See below	—
	Ambient temperature (°C) ..... :	25°C, if not stated otherwise	

No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	Result
1.	DC input	s-c	650	10 min	/	/	The unit indicates a fault and shut down. DC fuses open. No hazard.
2.	DC input	Reversed	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
3.	AC output	o-l 120%	650	10 min	/	/	Overload step by step, the unit can loaded 110% and reach equilibrium state, when load further more, the The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
4.	AC output	s-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
5.	AC output	Phase mis-wiring grid connection (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
6.	Relay (AC) k1	s-c (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
7.	Relay (AC) k2	s-c (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
8.	Relay (AC) k3	s-c (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
9.	Relay (AC) k4	s-c (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
10.	Relay (AC) k5	s-c (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage. No hazard.
11.	Relay (AC) k6	s-c (before start up)	650	10 min	/	/	The unit indicates a fault and unable to connect with grid. Can resettable. No damage.

							No hazard.
12.	Cooling system failure	Fan locked	650	10 min	/	/	The unit keep running with rated power at the beginning. After 40 minutes, the unit shut down. Can resettable. No damage. No hazard.
13.	SPS transformer T2 Pin 6 to Pin 7	s-c	650	10 min	/	/	The unit indicate a fault and shut down. Can resettable. No damage. No hazard.
14.	SPS transformer T2 Pin 9 to Pin 10	s-c	650	10 min	/	/	The unit indicate a fault and shut down. Can resettable. No damage. No hazard.
15.	SPS transformer T3 Pin 6 to Pin 7	s-c	650	10 min	/	/	The unit indicate a fault and shut down. Can resettable. No damage. No hazard.
16.	SPS transformer T3 Pin 9 to Pin 10	s-c	650	10 min	/	/	The unit indicate a fault and shut down. Can resettable. No damage. No hazard.
17.	Drive Optocoupler U7 (IGBT) Pin1	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
18.	Drive Optocoupler U7 (IGBT) Pin 5-8	s-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
19.	Q18 (MOS FET) Pin 1 to Pin 2	s-c	650	10 min	/	/	The unit indicates a fault and shut down. Cannot resettable. No hazard, Q15, Q16 damaged.
20.	Q18 (MOS FET) Pin 2 to Pin 3	s-c	650	10 min	/	/	The unit indicate a fault and shut down. Cannot resettable. No hazard, D27, D18, D19 damaged.
21.	Q18 (MOS FET) Pin 1 to Pin 3	s-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
22.	Insulate Optocoupler U2	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.

23.	ISO detection circuit R713	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
24.	ISO detection circuit R713	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
25.	AC voltage sampling circuit R267	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
26.	AC voltage sampling circuit R267	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
28.	AC voltage sampling circuit R263	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
29.	AC voltage sampling circuit R263	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
30.	AV current sampling circuit R700	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
31.	AV current sampling circuit R700	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
32.	DC voltage sampling circuit R220	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
33.	DC voltage sampling circuit R220	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.
34.	DC voltage sampling circuit R222	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
35.	DC voltage	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No

	sampling circuit R222						damage. No hazard.
36.	Bus voltage sampling circuit R253	s-c	650	10 min	/	/	The unit normal operation, No damage. No hazard.
37.	Bus voltage samplin g circuit R253	o-c	650	10 min	/	/	The unit indicates a fault and shut down. Can resettable. No damage. No hazard.

Legend			
FID	Fault Indication	MT	Max. Temperature
SD	PCE Shut Down:	DG	Disconnection To Grid
RO	Recovered to Operate after removing the single fault setting	NCD	No Comp. or parts Damaged
NH	No Hazards occurred	PEST	Pass the Electric Strength Test
BI	Basic insulation	SI	Supplementary insulation
DI	Double insulation	RI	Reinforced insulation
FI	Functional insulation	O.V.C	Overvoltage category
S.C	short-circuited	O.C	open-circuited
o-l	Over-load.		

Note(s):

The electric strength test performed after fault condition test and see appended table 7.5.2 for detailed test conditions.

7.3.6.3.3	TABLE: protective equipotential bonding;			N/A
Measured between:	Test current (A)	Voltage drop (V)	Resistance (mΩ)	result
--				
supplementary information: The alternative of 7.3.6.3.5 was considered.				

7.3.6.3.7	TABLE: touch current measurement			P
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
At metal enclosure	AC 1.58	AC 3.5 / DC 10	PE disconnected	
supplementary information:				

7.3.7.4& 7.3.7.5	TABLE: clearance and creepage distance measurements					P
Clearance cl and creepage distance dcr at/of:	System / Impulse voltage (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required dcr (mm)	dcr (mm)
PCE unit (Vmax PV: OVCII 1100Vdc, OVC III 230Vac, 50Hz)						
PV supply circuits to metal chassis: BI	4772	1100Vdc	4.0 *1.29 = 5.2	**See below**	11.0	**See below**
- at DC switch	--	--	--	>20	--	>20
- at BUS Capacitor	--	--	--	6.5	--	>20
- at IGBT	--	--	--	6.5	--	>15
-at PCB board (insulation sheet)	--	--	--	6.5	--	>15
PV supply circuits line to line: FI	4772	1100Vdc	4.0 *1.29 = 5.2	>15	11.0	>15
AC mains circuits L1 to L2 to L3 : FI	4772	1100Vdc	4.0 *1.29 = 5.2	>15	11.0	>15
AC mains circuits/ to metal chassis: BI (components)	4772	1100Vdc	4.0 *1.29 = 5.2	6.5	11.0	>15
AC Output board						
Control circuits to Communication circuits: SI	4772	1100Vdc	4.0 *1.29 = 5.2	**See below**	5.5	**See below**
-at Optocoupler	--	--	--	7.6	--	7.6
-at PCB trace	--	--	--	7.2	-	7.2
AC mains circuits to earth : BI	4772	1100Vdc	4.0 *1.29 = 5.2	**5.8**	5.5	**5.8**
AC mains circuits L1 to L2 to L3 : FI	4772	1100Vdc	4.0 *1.29 = 5.2	**5.6**	5.5	**5.6**
Main power board						
PV supply circuits / AC mains circuits to Control circuits: BI	4772	1100Vdc	4.0 *1.29 = 5.2	**See below**	5.5	**See below**
-at Transformer	--	--	--	9.3	--	9.3
-at PCB trace	--	--	--	7.8	-	7.8
PV supply circuits / AC mains circuits to Control circuits: BI	4772	1100Vdc	4.0 *1.29 = 5.2	**See below**	5.5	**See below**
-at Optocoupler	--	--	--	6.7	--	6.7
PV supply circuits / AC mains circuits to earth : BI	4772	1100Vdc	4.0 *1.29 = 5.2	**5.7**	5.5	**5.7**
Independence components						
Circuits Definition:						

Communication Circuits: DVC-A		PV Circuits: DVC-C	
Control Circuits: DVC-C		AC mains / Grid Circuits: DVC-C	
Protection Separation			
Accessible Parts Earthed to PV Circuits: BI		Accessible Parts Earthed to AC mains /Grid Circuits: BI	
DSP circuits to PV Circuits: BI		Control circuits to AC mains/Grid Circuits: BI	
Communication Circuits to Control circuits: SI			
Legend			
BI	Basic insulation	SI	Supplementary insulation
DI	Double insulation	RI	Reinforced insulation
FI	Functional insulation	O.V.C	Overvoltage category
PD	Pollution degree	MG	Insulating material group
PPI	Protection by Protective Impedance	DVC	Decision Voltage Classification
s-c	Shorted Circuits	o-c	Opened Circuits

Note:
$V_{MAX\ PV}$ (V) = 1100 Vd.c, AC output voltage = 230Va.c
PV supply circuits = O.V.C II, AC mains circuits = O.V.C. III, DC Power Supply Voltage = O.V.C II.
PD = PD2 (IP65), MG = IIIa/b, Altitude = 4000m (1.29 factor)
Communication Circuits in PCE is considered as DVC-A with reinforced insulation from DVC-C circuits.
Communication circuits in PCE are considered as DVC-A which could be accessible.
PV side: SPD were provided between PV circuits and earth.
Grid side: SPD were provided between AC mains circuits and mains to earth as well.
1. Annex I of SPD or varistor for reducing impulse voltage was considered in this test report.
2. Interpolation is permitted in general, except for impulse withstand voltage decision.
3. Functional insulation was shorted circuit tests and consideration. see sub-clause 5.3.4 c).

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)
Transformer tape (BI)	1100 Vdc	6000Vpk	0.2	>0.2
Optical coupler1) (RI)	1100 Vdc	6000Vpk	0.4	>0.4
Triple insulation wire of transformer core	1100 Vdc	6000Vpk	0.2	>0.2
Note 1: Approval three layers Insulation tape Note 2: Approval TRIPLE Insulated WIRE and three layers Insulation tape				

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
PV input to Ground (BI)		2545Vdc	6000V	--	No breakdown
AC output to Ground (BI)		2545Vdc	6000V	--	No breakdown
PV input to communication port (RI)		5090 Vdc	8000V	--	No breakdown
AC outputt to communication port (RI)		5090 Vdc	8000V	--	No breakdown
Legend					
BI	Basic insulation	SI	Supplementary insulation		
DI	Double insulation	RI	Reinforced insulation		
FI	Functional insulation	O.V.C	Overvoltage category		
Note(s):					

7.5.3	TABLE: Touch current in case of failure of the protective earthing conductor	P
Leakage current between	I (mA)	Max. allowed I (mA)
L/N to metal enclosure	1.58	3.5

9.2	TABLE: Limited power sources					N/A
Circuit output tested:						
Note: Measured Uoc (V) with all load circuits disconnected:						
Components	Sample No.	Uoc (V)	I_{sc} (A)		VA	
			Meas.	Limit	Meas.	Limit
supplementary information:						
Sc=Short circuit, Oc=Open circuit						

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Model: hopeSun 5KTL- hopeSun 33KTL, hopeSun 10KTL-L to hopeSun 30KTL-L					
PV connector	DongGuan Vaconn ElectronicTechnology Co., Ltd	VP-D4B-PHSM0/VP-D4B-PHSF0	1000V/30A, -40°C to 85°C	IEC/EN 62852	TUV R 50396796
DC Switch	Shanghai Liangxin Electrical Co., Ltd	NDG3V-50/4/1/02/M/14	1000V/50A, -40°C To 75°C	EN 60947-3	TUV SUD B 083574 0316 Rev.02
-Alternate	Zhejiang Ben Yi electrical Co., Ltd	BYSS.2-50	1000V-40A-800V(50A) -40°C to 85°C	EN 60947-3	TUV R 50386111
-Alternate	Beijing People's Electric PlantCo., Ltd.	GHX5-32P	1100V-50A, -40°C to 85°C	EN 60947-3	TUV R 50439884
Fan outside FAN1-FAN2 for 30- 33kW FAN1 for hopeSun20-25kW	ASIA VITAL COMPONENTS CO LTD	XY09025 Series	12Vdc-8.64W-0.72A,-40°C to 70 °C,4800R.P.M	EN 62368-1	TUV SUD B025730 0876
-Alternate	NMB Technologies Corporation	09225VE-12N- CU-02	12Vdc-8.64W-0.72A -40°C to70 °C 5300R.P.M	DIN EN 60950-1	VDE 40010963
Fan inside	NMB Technologies Corporation	09225VA-12P-AL-00& 09225VA12PAL00-900 09225VA12PAL00	12Vdc-8.16W-0.68A -40°C to70 °C 5600 ± 10% R.P.M.	DIN EN 60950-1	VDE 40010963
-Alternate	DELTA ELECTRONICS INC	QFR0912EJ-00XXX	12Vdc-8.16W-0.68A -40°C to70 °C 5600±10% R.P.M. UL 507 (E132003)	IEC 62109-1	Tested with appliance
Boost inductor& Inverter inductor	Hopewind	HWL0334	150uH@40A/150uH@40A/280uH@36A/280uH@36A/280uH@36A-18KHz-CLASS F	IEC 62109-1	Tested with appliance
hopeSunHVH6board for hopeSun15-22kW, hopeSunHVH7board for hopeSun30-33kW					
DC Fuse for hopeSun30-33kW FU1—FU6	Xi'an sinofuse electric Co., Ltd	RS308-PV-3E20A	Ue=1000V, In=20A 105°C	EN 60269-1 EN 60269-6	TUV R50402583

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Alternate：DC Fuse for hopeSun30-33kW FU1—FU6	Hollyland	HC10gPV (HOLLY)	Ue=1000V, In=20A 105°C	EN 60269-1 EN 60269-6	TUV R50263929
DC Hall for 30-33kW SH1—SH4 DC Hall for hopeSun20-25kW SH1—SH2 DC Hall for hopeSun15-17kW SH1	Sinomags Technology Co., Ltd	STK-CTS/P	50mV/A-±25A-2.5%-5V 105°C, UL508(E507664)	IEC 62109-1	Tested with appliance
hopeSunWM board					
Bus Cap for hopeSun30-33kW C301—C306&C1, C2 Bus Cap for hopeSun8-25kW C301—C306	Xiamen Faratronic Co.,Ltd	C3D	600V-50uF-±10% 110°C	IEC/EN 61071 IEC/EN; 61881-1	TUV R 50266108
-Alternate	WUXI CRE NEW ENERGY TECHNOLOGY CO LTD	DMJ-PS	600V-50uF-±10% 110°C, UL810 (E496566)	IEC 62109-1	Tested with appliance
Inverter IGBT Q1—Q12	Infineon Technologies AG	IKZ75N65ES5	650V-75A 175°C	IEC 62109-1	Tested with appliance
-Alternate	Fuji Electric Co.,Ltd.	FGZ75XS65C	650V-75A 175°C	IEC 62109-1	Tested with appliance
Inverter IGBT Q1—Q12	JiLin Sino-Microelectronics	JT075N065GHED	650V-75A 150°C	IEC 62109-1	Tested with appliance
Inverter IGBT Q1—Q12	Silan Microelectronics Co.,Ltd	SGT75T65SDM1 P4	650V-75A 150°C	IEC 62109-1	Tested with appliance
Diode D1—D6	ONsemiconductor	FFH60UP60S	600V-60A 125°C	IEC 62109-1	Tested with appliance
-Alternate	Mac Microelectronics Co.,Ltd	MM60FU060B	600V-60A125°C	IEC 62109-1	Tested with appliance
Boost Mos Q13-Q18 for 15- 33kW Q14-Q17 for hopeSun8-12kW	Cree, Inc.	C2M0160120D	1200V-17.7A-160mΩ-TO-247-3-150°C	IEC 62109-1	Tested with appliance
- Alternate	ONsemiconductor	NTHL160N120SC 1-D	1200V-17A-160mΩ-TO-247-3-175°C	IEC 62109-1	Tested with appliance

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Diode D17—D20 26010090	Infineon Technologies AG	IDW15G120C 5B	1200V-32A-TO-247-3 175°C	IEC 62109-1	Tested with appliance
-Alternate	ROHM Co., Ltd	SCS220KE2	1200V-20A@155°C247-3L-150°C	IEC 62109-1	Tested with appliance
-Alternate	Cree, Inc	C4D15120D	1200V-24A-T0-247-3-175,150°C	IEC 62109-1	Tested with appliance
Diode D26, D27 26010119	Yangzhou Yangjie Electronic Technology Co., Ltd	60EPS16	1600V-60A-TO-247-2L -150°C	IEC 62109-1	Tested with appliance
- Alternate	JIEJIE MICROELECTRONICS CO., Ltd	GP6016SL	1600V-60A-TO-247-2L-150°C	IEC 62109-1	Tested with appliance
Transformer ,T7	Hopewind	HWT0077	190uH-1.2W-200KHz Class B	IEC 62109-1	Tested with appliance
Bobbin of insulation Transformer	SUMITOMO BAKELITE CO LTD	PM-9820,PM-9825	V-0,150°C, UL94 (E41429)	IEC 62109-1	Tested with appliance
Insulation tape of transformer	JINGJIANG PRESSURE SENSITIVE GLUE FTY	PZ/PF	130°C, UL510A (E165111)	IEC 62109-1	Tested with appliance
Wire of transformer	FURUKAWA ELECTRONIC CO LTD	TEX-E	130°C, 0.2mm, UL60950-1 (E206440)	IEC 62109-1	Tested with appliance
-Alternate	SHANGHAI XIANGXIANG ELECTRON CO LTD	TKW-B	130°C, 0.2mm, UL60950-1(E308908)	IEC 62109-1	Tested with appliance
-Alternate	SHANGHAI LUCKY TRADE CO LTD	TIW-B	130°C, 0.2mm, UL60950-1(E305883)	IEC 62109-1	Tested with appliance
-Alternate	Great Leoflon Industrial Co.,Ltd	TRW(B)	130°C, 0.2mm, UL60950-1(E211989)	IEC 62109-1	Tested with appliance
Metal film Cap for hopeSun8-22kW C1, C2, C3, C4	Xiamen Faratronic Co.,Ltd	C3D	1200V-5uF,105°C, UL810(E256238)	IEC 62109-1	Tested with appliance
-Alternate	WUXI CRE NEW ENERGY TECHNOLOGY CO LTD	DMJ-PS	1200V-5uF-±10% 110°C, UL810(E256238)	IEC 62109-1	Tested with appliance

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Metal film Capfor 25-33kW C1,C2,C3,C4	Xiamen Faratronic Co.,Ltd	C3D	1200V-10uF-±10% 110°C, UL810(E256238)	IEC 62109-1	Tested with appliance
-Alternate	WUXI CRE NEW ENERGY TECHNOLOGY CO LTD	DMJ-PS	1200V-10uF-±10% 110°C	IEC 62109-1	Tested with appliance
Metal film Cap C13-C18	Xiamen Faratronic Co., Ltd	C322J334K 90C0 00	630V-0.33uF-±10%,125°C	IEC 62109-1	Tested with appliance
Transformer T1--T6	Hopewind	HWT0051	680uH-100kHz Class B	IEC 62109-1	Tested with appliance
Bobbin of insulation Transformer	CHANG CHUN PLASTICS CO LTD	T375HF	UL94 V-0,150°C, UL746C(E59481)	IEC 62109-1	Tested with appliance
Insulation tape of transformer	JINGJIANG PRESSURE SENSITIVE GLUE FTY	PZ/CT	130°C, UL510A (E165111)	IEC 62109-1	Tested with appliance
Wire of transformer	SHANGHAI XIANGXIANG ELECTRON CO LTD	TKW-B	130°C,0.3mm, UL60950-1(E308908)	IEC 62109-1	Tested with appliance
-Alternate	COSMOLINK	TIW-M(B)	130°C, 0.3mm, UL60950-1(E213764)	IEC 62109-1	Tested with appliance
-Alternate	FURUKAWA ELECTRONIC CO LTD	TEX-E	130°C, 0.3mm, UL60950-1(E206440)	IEC 62109-1	Tested with appliance
Hall SH1, SH2	Sinomags Technology Co., Ltd	STK-xPL/abc Series	32Arms-Vout 0.8V-±80A-%,105°C	EN 62477-1	VIC no. VIC161031-CZX-1386
-Alternate	LEM SWITZERLAND S A	HLSR 50-P HLSR 32-P	50Arms-10mV/A-±125A-1% - 40°C to 105°C, UL508 (E189713)	IEC 62109-1	Tested with appliance
Varistor RV1, RV2, RV3, RV4	THINKING ELECTRONIC INDUSTRIAL CO LTD	TVA25821KG KG EUX1	510Vac-670Vdc-738Vdc-10kA -40°C to 105°C, UL1449 (E314979)	IEC 62109-1	Tested with appliance
Varistor RV1, RV2, RV3, RV4	CHEN SHUO ELECTRONICS (JIU IANG) CO., LTD	25D821KA	510Vac-670Vdc-738Vdc-10kA, -40°C to 85°C	IEC 61051-2 IEC 61051-2-2 IEC 61051-1	VDE 40049204
Varistor RV1, RV2, RV3, RV4	Guangdong Fenghua Advanced Technology Holding Co., Ltd	FNR25K821B AS N1NN	510Vac-670Vdc-738Vdc-10kA, -40 to 85°C	IEC 61051-2 IEC 61051-2-2 IEC 61051-1	VDE 40008242
Y-CAP C258, C259, C260, C261, C262, C263, C264	TDK CORPORATION	CD16	250V/400VAC-4700pF -25°C to +105°C, UL60484-14(E37861)	IEC 62109-1	Tested with appliance

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
- Alternate	Fenghua Advanced Technology Co., Ltd	CT7	250V/400VAC-4700pF -25°C to +105°C, UL60484-14(E219015)	IEC 62109-1	Tested with appliance
PV input Cap for hopeSun25-33kW C256,C257	Xiamen Faratronic Co.,Ltd	C3D	1200V-10uF 105°C, UL810(E256238)	IEC 62109-1	Tested with appliance
-Alternate	WUXI CRE NEW ENERGY TECHNOLOGY CO LTD	DMJ-PS	1200V-10uF 105°C, UL810(E496566)	IEC 62109-1	Tested with appliance
PV input Cap for hopeSun8-22kW C313, C314	Xiamen Faratronic Co.,Ltd	C3D	1200V-5uF 105°C, UL810(E256238)	IEC 62109-1	Tested with appliance
-Alternate	WUXI CRE NEW ENERGY TECHNOLOGY CO LTD	DMJ-PS	1200V-5uF 105°C, UL810(E496566)	IEC 62109-1	Tested with appliance
hopeSunMDboard					
Hall SH1, SH2, SH3	Sinomags Technology Co., Ltd	STK-HD, STK-P	80Arms-10mV/A-±200A-1% -40 to 105°C, UL508(E507664)	IEC 62109-1	Tested with appliance
-Alternate	LEM SWITZERLAND S A	HLSR 80-P/SP10	80Arms-10mV/A-±200A-1%-40°C to 105°C, UL508(E189713)	IEC 62109-1	Tested with appliance
-Alternate	LEM	HLSR 50-P HLSR 32-P	50Arms-10mV/A-±125A-1% -40°C to 105°C, UL508(E189713)	IEC 62109-1	Tested with appliance
Metal film Cap C240, C241, C242, C2 95, C296, C297	Xiamen Faratronic Co.,Ltd	C6A	350Vac-4.7uF-±10%;110°C, UL810(E256238)	IEC 62109-1	Tested with appliance
-Alternate	WUXI CRE NEW ENERGY TECHNOLOGY CO LTD	DMJ-PS	350Vac-4.7uF-±10%;110°C, UL810(E496566)	IEC 62109-1	Tested with appliance
Y-CAP C232, C254	Fenghua Advanced Technology Co., Ltd	CT7-Y12Y5U0E472MS E	250VAC-4700pF-±20%;-25°C to 125°C;Y1, UL60384-14(E219015)	IEC 62109-1	Tested with appliance
- Alternate	TDK	CD16-E2GA472MY*S	250V/400VAC-4700pF, -25°C to +105°C, UL60384-14 (E37861)	IEC 62109-1	Tested with appliance
Relay K7, K8	Xiamen Hongfa Electroacoustic Co., Ltd.	HF115F	2C/O-250Vac-8A -40°C to 85°C	IEC/EN 61810-1	VDE 116934

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Optocoupler U36-U38	Suzhou Novosense Microelectronics Co., Ltd	NSI8131W1	5000Vrms-150Mbps; -40°C to 125°C, UL1577(E500602)	IEC 62109-1	Tested with appliance
- Alternate	SILICON LABORATORIES INC	SI8631ED-B-IS	5000Vrms-150Mbps;-40°C to 125°C, UL1577(E257455)	IEC 62109-1	Tested with appliance
- Alternate	TEXAS INSTRUMENTS TUCSON CORP	ISO7731QDWRQ 1	5000Vrms-150Mbps;-40°C to 125°C, UL1577(E181974)	IEC 62109-1	Tested with appliance
Varistor RV1-RV4	THINKING ELECTRONIC INDUSTRIAL CO LTD	TVR14820KIY	50Vac-65Vdc-82Vdc-4500A -40°C to 125°C, UL1449(E314979)	IEC 62109-1	Tested with appliance
- Alternate	TDK	S14K82	50Vac-65Vdc-82Vdc-4500A -40°C to 125°C	IEC 61051-2 IEC 61051-2-2; IEC 61051-1; IEC 62368-1 Anhang/Annex G.8.1; IEC 60950-1/Annex Q	VDE 40027582
- Alternate	Guangdong enghua Advanced	FNR14K820BFS N1BN	65Vdc-82Vdc-4500A, -40°Cto 85°C	IEC 61051-2; IEC 61051-2-2; IEC 61051-1	VDE 40008242
Varistor RV5-RV8	THINKING ELECTRONIC INDUSTRIAL CO LTD	TVA25821KGKG EUX1	510Vac-670Vdc-738Vdc-10kA- -40°C to 85°C, UL1449(E314979)	IEC 62109-1	Tested with appliance
- Alternate	LONG KE ELECTRONICS (HUIYANG) CO LTD	25D821KA	510Vac-670Vdc-738Vdc-10kA- -40°C to 85°C, UL1449(E326953)	IEC 62109-1	Tested with appliance
Varistor RV5-RV8	Guangdong Fenghua AdvancedTechnology Holding Co., Ltd	FNR25K821BAS N1NN	510Vac-670Vdc-738Vdc-10kA -40°C to 85°C, UL1449(E325462)	IEC 62109-1	Tested with appliance
Inductor L12, L13, L14 for hopeSun8-25kW	Hopewind	HWL0346	15uH-18kHz-Class F	IEC 62109-1	Tested with appliance
Inductor L12, L13, L14 for hopeSun30-33kW	Hopewind	HWL0347	20uH-18kHz-Class F	IEC 62109-1	Tested with appliance
Inductor L15 for hopeSun8-25kW	Hopewind	HWL0343	400uH-ClassB	IEC 62109-1	Tested with appliance
Inductor for 30-33kW L15 24020269	Hopewind	HWL0344	450uH-ClassB	IEC 62109-1	Tested with appliance

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Metal film CAP C248,C249,C250	Xiamen Faratronic Co.,Ltd	C43Q1333K 61C0 00	300Vac-33nF-Y2 -40°Cto 105°C, UL60384-14(E186600)	IEC 62109-1	Tested with appliance
- Alternate	Sichuan Zhongxing Electronic Co., Ltd	MKP63	300Va.c.;33nF; 105°C; Y2, UL60384-14(E217215)	IEC 62109-1	Tested with appliance
Gas Tube G2,G1	TDK ELECTRONICS (MALAYSIA) SDN BHD	T83-A90X	90V-15kA,-40°C to 85°C, UL60384-14(E163070)	IEC 62109-1	Tested with appliance
- Alternate	THINKING ELECTRONIC INDUSTRIAL CO LTD	GB83R090HB	90V-15kA, -40°C to 85°C, UL60384-14(E245070)	IEC 62109-1	Tested with appliance
Transformer T3	Hopewind	HWT0114	Class B	IEC 62109-1	Tested with appliance
Bobbin of insulation Transformer	SUMITOMO BAKELITE CO LTD	PM-9820,PM-9823,	V-0,150°C, UL94(E41429)	IEC 62109-1	Tested with appliance
- Alternate	CHANG CHUN PLASTICS CO LTD	T375HF	UL94 V-0,150°C, UL94(E59481)	IEC 62109-1	Tested with appliance
Insulation tape of transformer	JINGJIANG PRESSURE SENSITIVE GLUE FTY	PZ/PF	130°C, UL, UL510A (E165111)	IEC 62109-1	Tested with appliance
Wire of transformer	FURUKAWA ELECTRONIC CO LTD	TEX-E	130°C, 0.5mm UL60950-1 (E206440)	IEC 62109-1	Tested with appliance
-Alternate	SHANGHAI XIANGXIANG ELECTRON CO LTD	TKW-B	130°C, 0.5mm, UL60950-1(E308908)	IEC 62109-1	Tested with appliance
-Alternate	SHANGHAI LUCKY TRADE CO LTD	TIW-B	130°C, 0.5mm, UL60950-1(E305883)	IEC 62109-1	Tested with appliance
-Alternate	Great Leoflon Industrial Co.,Ltd	TRW(B)	130°C, 0.5mm, UL60950-1 (E211989)	IEC 62109-1	Tested with appliance
Transformer T2	Hopewind	BCK1601-1731/ EEL16	Class B	IEC 62109-1	Tested with appliance
Bobbin of insulation Transformer	SUMITOMO BAKELITE CO LTD	PM-9820, PM- 9823	V-0,150°C, UL94 (E41429)	IEC 62109-1	Tested with appliance
- Alternate	CHANG CHUN PLASTICS CO LTD	T375HF	V-0,150°C, UL94 (E59481)	IEC 62109-1	Tested with appliance
Insulation tape of transformer	JINGJIANG PRESSURE SENSITIVE GLUE FTY	PZ/PF	130°C, UL510A (E165111)	IEC 62109-1	Tested with appliance

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Magnet wire	TAI-I ELECTRIC WIRE & CABLE CO LTD	MW75-C	130°C,0.3mm, UL1446 (E85640)	IEC 62109-1	Tested with appliance
- Alternate	HENG YA ELECTRIC (DONGGUAN) LTD	MW75-C	130°C,0.3mm, UL1446 (E197768)	IEC 62109-1	Tested with appliance
- Alternate	FENG CHING METAL CORP	MW75-C	130°C, 0.3mm, UL1446 (E172395)	IEC 62109-1	Tested with appliance
Optocoupler U2	VISHAY SEMICONDUCTOR GMBH	TCLT1009	CTR2~4-ton/6uS; -40°C to 100°C, UL1577 (E76222)	IEC 62109-1	Tested with appliance
Relay for 30-33 K1--K6	Dongguan Churod Electronics Co., Ltd	CHS01-V-112HA2	12V-2.25W-277Vac-60A, -40°C to +85°C, UL508 (E341422)	IEC 62109-1	Tested with appliance
- Alternate	XIAMEN HONGFA ELECTROACOUSTIC CO LTD	HF165F-50	12V-2.25W-277Vac-60A, -40°C to +85°C, UL508 (E134517)	IEC 62109-1	Tested with appliance
Relay for 8-25 K1--K6	Dongguan Churod Electronics Co., Ltd	CHS01-V-112HA	277Vac-43A, -40°C to +85°C, UL508 (E341422)	IEC 62109-1	Tested with appliance
- Alternate	TYCO ELECTRONICS (SHENZHEN) CO LTD	T9VV1K15-12S	277Vac-43A, -40°C+85°C, UL508 (E58304)	IEC 62109-1	Tested with appliance
- Alternate	XIAMEN HONGFA ELECTROACOUSTIC CO LTD	HF165F12-HT	12V-2.25W-277Vac-35A; -40°C to 85°C	IEC/EN 61810-1	TUV R50463438
Master CPU U2	Texas instrument	TMS320F28062P ZPS	90MHz-64K-3.3V-HTQFP100；125°C	IEC 62109-1	Tested with appliance
Slave CPU U3	LATTCE Semiconductor	LCMXO2-2000HC-4TG144I	180MHz-1024Kbytes-3.3V-LQFP144; -40°C ~85°C	IEC 62109-1	Tested with appliance
Thermal sensor (NTC)	DONGGUAN GETMORE ELECTRONIC TECHNOLOGY CO., LTD	HNS103	-40°C~ 85°C, UL 60730-1(E477656)	IEC 62109-1	Tested with appliance

Appendix1 Photos:

Overview

Overview


Appendix1 Photos:

Overview-

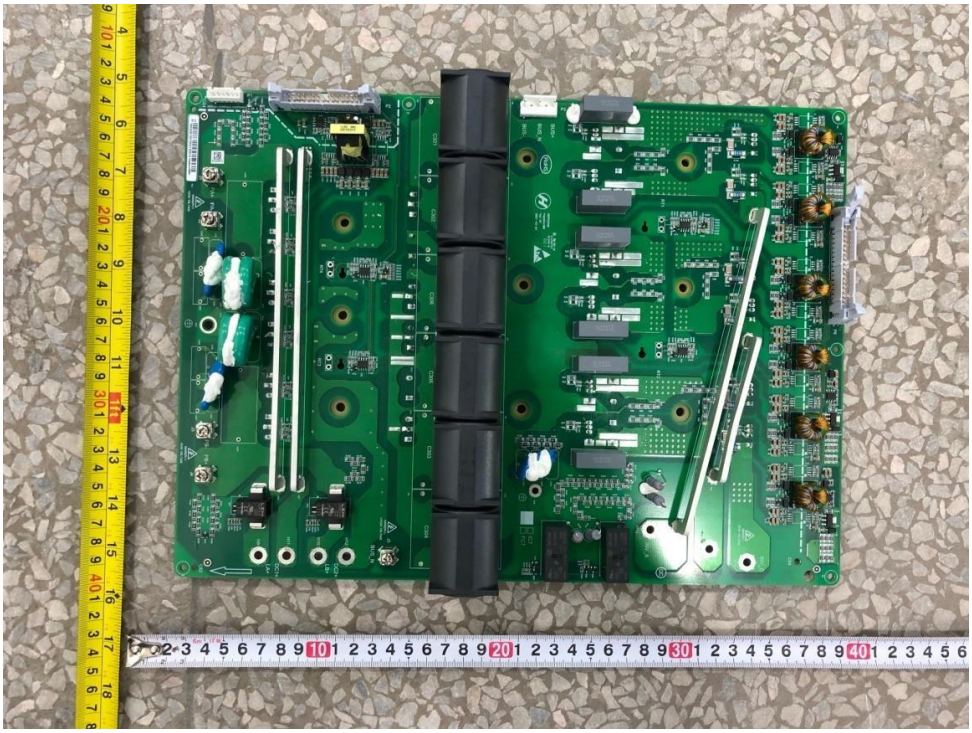
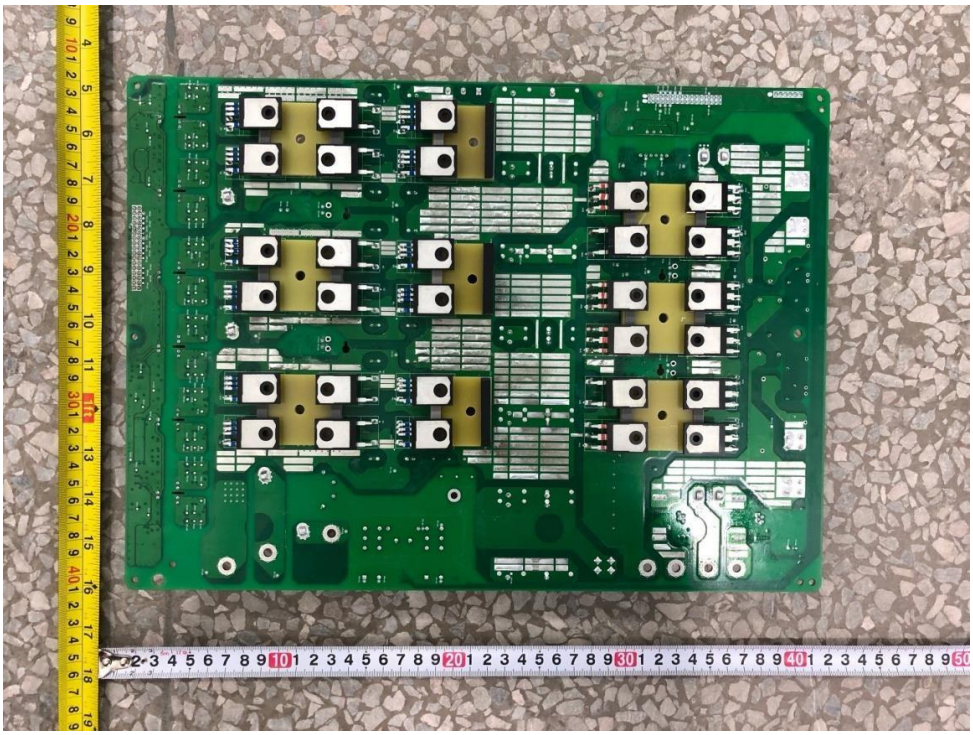
Overview


Appendix1 Photos:

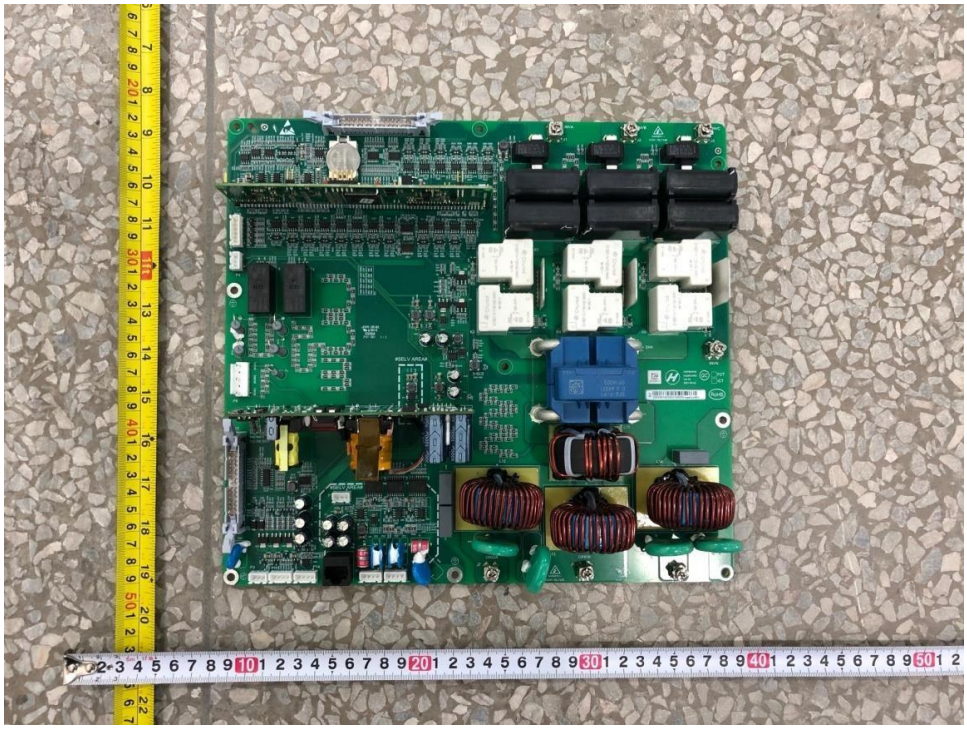
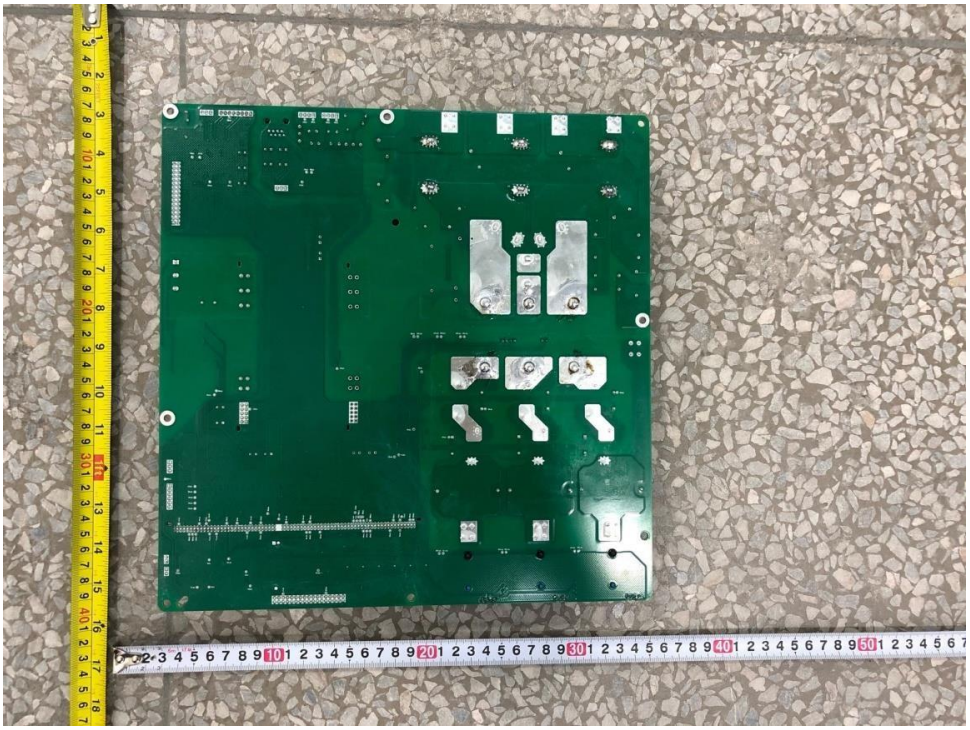
Overview

Open view

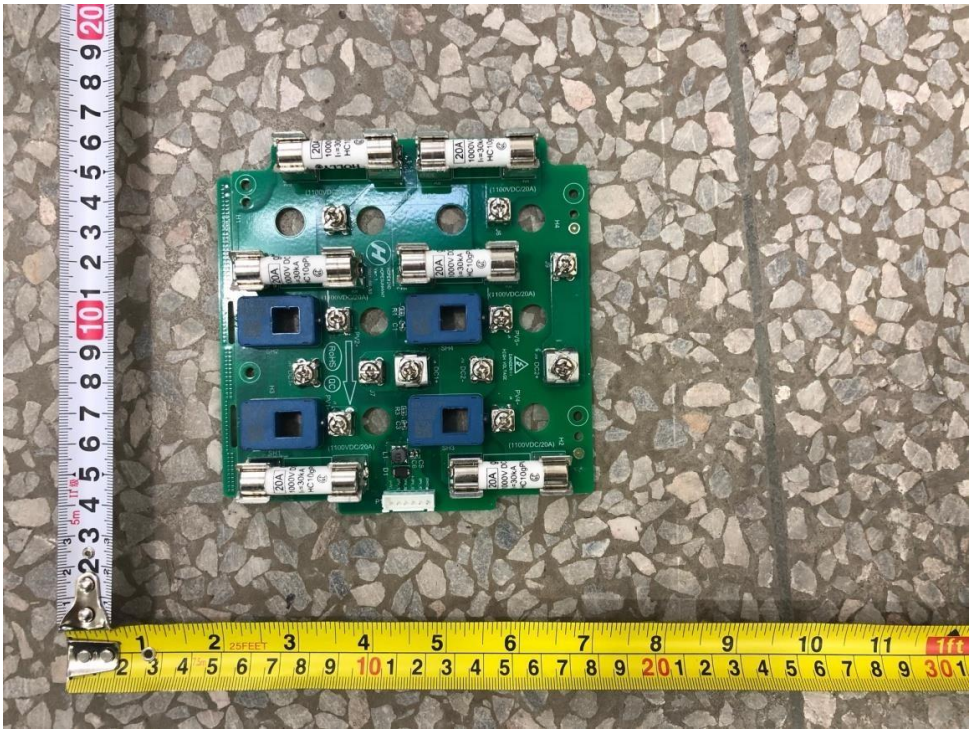
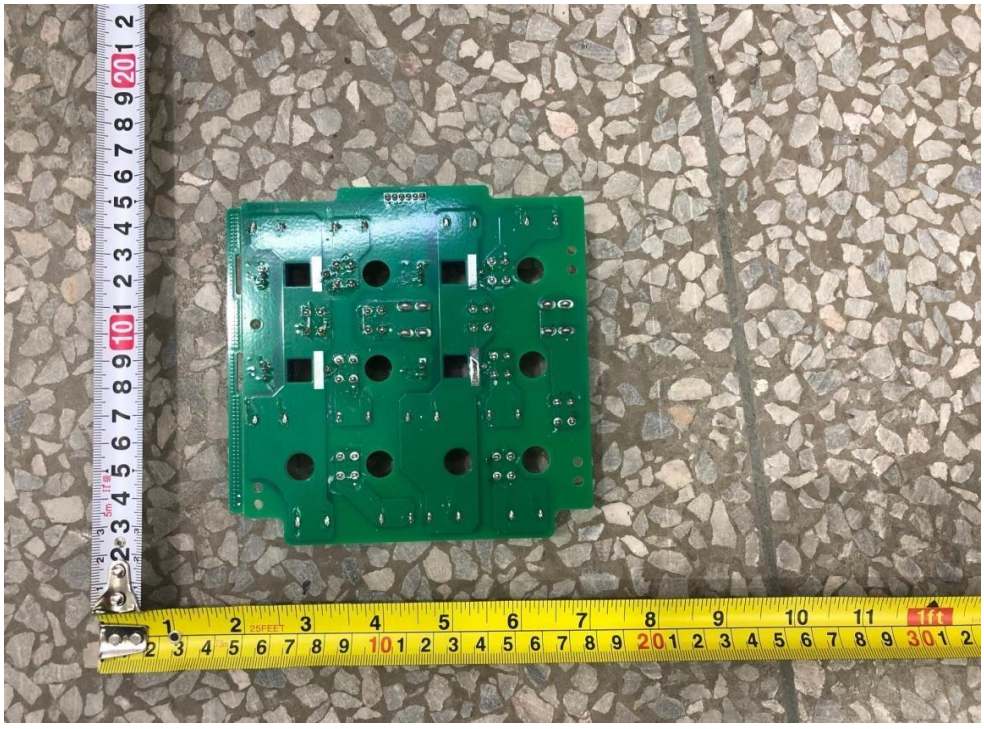

Appendix1 Photos:

Open view



Appendix1 Photos:

Open view



Appendix1 Photos:

Open view



End of Test Report