Test Report issued under the responsibility of:

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

Report Number. .....:	GZES230100125901
Date of issue .....:	2023-02-01
Total number of pages	72
Name of Testing Laboratory preparing the Report.....:	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
Applicant's name.....:	Zhejiang CHISAGE New Energy Technology Co., Ltd
Address .....:	No. 1828 Fuqing South RD. Panhuo ST. Yinzhou District Ningbo Zhejiang 315000 China
Test specification:	
Standard.....:	EN 62109-1:2010 IEC 62109-1:2010 (First Edition)
Test procedure .....:	SGS-CSTC
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62109_1B
Test Report Form(s) Originator.....:	VDE Testing and Certification Institute
Master TRF.....:	Dated 2016-04

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

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Test item description .....:	Single phase inverter
Trade Mark .....:	CHISAGE
Manufacturer.....:	Zhejiang CHISAGE New Energy Technology Co., Ltd
Address .....:	No. 1828 Fuqing South RD. Panhuo ST. Yinzhou District Ningbo Zhejiang 315000 China
Model/Type reference.....:	See model list in page 7
Ratings .....:	See model list in Page 7 to 8. Hardware version: Ver2.3 DC Software version: Ver0107 AC Software version: Ver2.5

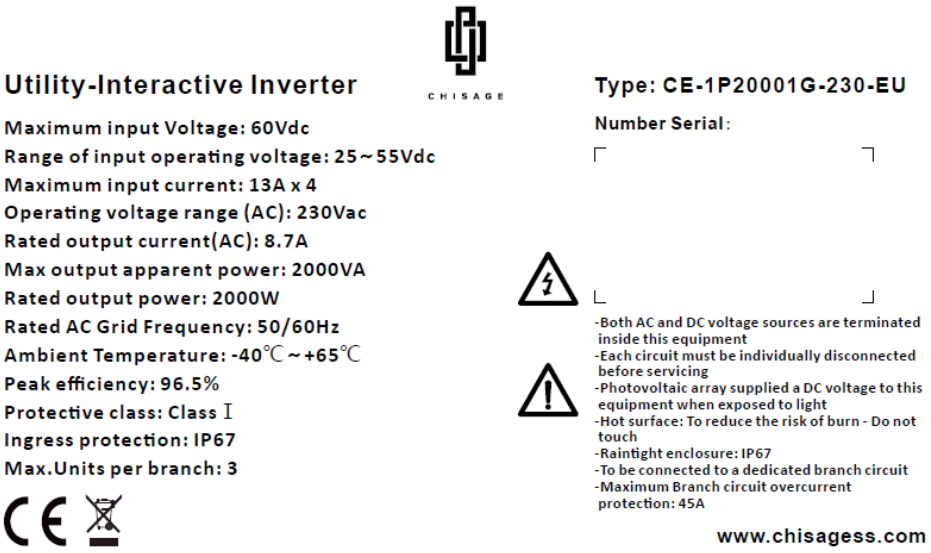
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ **Testing Laboratory:**	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch	
Location/ address .....:	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China	
Tested by (name, function, signature) .....:	Doris Tao (Project Engineer)	Doris Tao
Approved by (name, function, signature ....:	Roger Hu (Technical Reviewer)	Roger Hu

List of Attachments (including a total number of pages in each attachment): 63 Page ~72 Page
Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
The equipment has been tested according to the standard: EN 62109-1:2010 and IEC 62109-1:2010. All test results are from the original report GZES210602035101, issued by SGS-CTS Standards Technical Services Co., Ltd Guangzhou Branch.	See page 2

Summary of compliance with National Differences (List of countries addressed): No National Differences are addressed to this test report

Copy of marking plate(representative):



Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the side surface of enclosure and visible after installation
3. Labels of other models are as the same with **CE-1P20001G-230-EU**'s except the parameters of rating.
4. As declared by the applicant, the importer (and manufacturer, if it is different)'s name, registered trade name or registered trademark and the postal address will be marked on the products before being place on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

Test item particulars:	Single Phase Inverter
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 systems
IT testing, phase-phase voltage (V):	N/A
Class of equipment:	☒ Class I ☐ Class II ☐ Class III ☐ Not classified
Mass of equipment (kg):	3,5 kg for all model
Pollution degree:	Outside PD3; Inside PD2
IP protection class:	IP 67
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:	N/A
Date (s) of performance of tests:	2020-09-06 to 2020-09-28

General remarks:	
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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).....:	**NingBo Deye Inverter Technology Co., Ltd.** No.26 South YongJiang Road, Daqi, Beilun, NingBo, China.

General product information:

Product covered by this report is grid-connected PV inverter for indoor or outdoor installation. The connection to the DC input and AC output are through connectors.

The Solar inverter converts DC voltage into AC voltage.
The input and output are protected by varistors to Earth. The unit is providing EMC filtering at the output toward mains. The unit does not provide galvanic separation from input to output (transformerless). The output is switched off redundant by the high-power switching bridge and two relays. This assures that the opening of the output circuit can operate in case of single fault.

Equipment Under Testing:

CE-1P3001G-230-EU, CE-1P5001G-230-EU, CE-1P6001G-230-EU, CE-1P8001G-230-EU, CE-1P10001G-230-EU, CE-1P13001G-230-EU, CE-1P16001G-230-EU, CE-1P18001G-230-EU, CE-1P20001G-230-EU(1)

(1) Except for 4.2.2.6 TABLE: mains supply electrical data in normal condition is All models test, the other test clause model is CE-1P20001G-230-EU.

Model Number	CE-1P3001G-230-EU	CE-1P5001G-230-EU	CE-1P6001G-230-EU	CE-1P8001G-230-EU	CE-1P10001G-230-EU
Input (DC)					
Max. input power	400W	600W	800W	1200W	1200W
Max. input voltage	60V				
MPPT voltage range	25~55V				
Max. input current	13A	13A	13A×2	13A×2	13A×2
Output (AC)					
Rated grid voltage	230V				
Rated grid frequency	50Hz				
Rated output power	300W	500W	600W	800W	1000W
Rated output current	1.3A	2.2A	2.6A	3.8A	4.8A
Power factor	＞0.99				
Ambient temperature	-40 ºC ~ 65 ºC				
Ingress protection	IP67				
Protective class	Class I				

Model Number	CE-1P13001G -230-EU	CE-1P16001G -230-EU	CE-1P18001G -230-EU	CE-1P20001G -230-EU
Input (DC)				
Max. input power	1600W	2400W	2400W	2400W
Max. input voltage	60V			
MPPT voltage range	25~55V			
Max. input current	13A×4	13A×4	13A×4	13A×4
Output (AC)				
Rated grid voltage	230V			
Rated grid frequency	50Hz			
Rated output power	1300W	1600W	1800W	2000W
Rated output current	6.2A	7.7A	8.6A	9.6A
Power factor	＞0.99			
Ambient temperature	-40 ºC ~65 ºC			
Ingress protection	IP67			
Protective class	Class I			

IEC/EN 62109-1:2010			
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
4.2.1.1	Reference test conditions		P
4.2.1.2	Environmental conditions		P
4.2.2.3	Position of equipment	The equipment was installed In accordance with the manufacturer's instructions, in the configuration that results in the worst-case test conditions	P
4.2.2.4	Accessories		P
4.2.2.5	Covers and removable parts	No accessories or operator Interchangeable parts	N/A
4.2.2.6	Mains supply a) Voltage: b) Frequency: c) Polarity: d) Earthing: e) Over-current Protection:		P
4.2.2.7	Supply ports other than the mains	PV input	P
4.2.2.7.1	Photovoltaic supply sources a) Open circuit voltage: b) Short-circuit current:		P
4.2.2.7.2	Battery inputs	No batteries for energy storage	P
4.2.2.8	Conditions of loading for output ports	DC-AC inverter a.c. output port was loaded with linear loads to obtain the maximum rated output power. Continuous operation ratings, until steady conditions are established.	P
4.2.2.9	Earthing terminals		P

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Clause	Requirement – Test	Result – Remark	Verdict
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		P
4.4	Testing in single fault condition	(see appended table 4.4)	P
4.4.1	General		P
4.4.2	Test conditions and duration for testing under fault conditions		P
4.4.2.1	General		P
4.4.2.2	Duration of tests		P
4.4.3	Pass/fail criteria for testing under fault conditions		P
4.4.3.1	Protection against shock hazard		P
4.4.3.2	Protection against the spread of fire		P
4.4.3.3	Protection against other hazards		P
4.4.3.4	Protection against parts expulsion hazards		P
4.4.4	Single fault conditions to be applied		P
4.4.4.1	Component fault tests		P
4.4.4.2	Equipment or parts for short-term or intermittent operation	Not for short-term or intermittent operation	N/A
4.4.4.3	Motors		P
4.4.4.4	Transformer short circuit tests		P
4.4.4.5	Output short circuit	Line and Neutral.	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		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

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Clause	Requirement – Test	Result – Remark	Verdict
4.4.4.14	Printed wiring board short-circuit test		P
4.5	Humidity preconditioning		P
4.5.1	General		P
4.5.2	Conditions		P
4.6	Backfeed voltage protection		P
4.6.1	Backfeed tests under normal conditions		P
4.6.2	Backfeed tests under single-fault conditions		P
4.6.3	Compliance with backfeed tests		P
4.7	Electrical ratings tests	(see appended table 4.2.2.6)	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		P
	Equipment shall bear markings as specified in 5.1 and 5.2	The marking plate is on the outer surface of enclosure.	P
	Graphic symbols may be used and shall be in accordance with Annex C or IEC 60417 as applicable.	All used graphic symbols are accordance with Annex C.	P
	Graphic symbols shall be explained in the documentation provided with the PCE.	See the user manual	P
5.1.2	Durability of markings	See below	P
	Markings required by this clause to be located on the PCE shall remain clear and legible under conditions of NORMAL USE and resist the effects of cleaning agents specified by the manufacturer	After this test there was no damage to the label. The marking on the label did not fade. There was no curling nor lifting on the label edge	P
5.1.3	Identification		P
	The equipment shall, as a minimum, be permanently marked with:	See below	P
	a) the name or trade mark of the manufacturer or supplier	CHISAGE	P
	b) model number, name or other means to identify the equipment	CE-1P3001G-230-EU, CE-1P5001G-230-EU, CE-1P6001G-230-EU, CE-1P8001G-230-EU, CE-1P10001G-230-EU, CE-1P13001G-230-EU, CE-1P16001G-230-EU, CE-1P18001G-230-EU, CE-1P20001G-230-EU	P

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		P
5.1.4	Equipment ratings	See below.	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 the rating 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 the rating plate	P
	– the ingress protection (IP) rating as in 6.3 below	See the rating plate	P
5.1.5	Fuse identification	The fuse was placed inside of enclosure, and can't be accessed by non-professional person	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.	The indications were provided adjacent to AC and DC terminal.	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 function	N/A
	A multiple-voltage unit shall be marked to indicate the	No such function	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	particular voltage for which it is set when shipped from the factory. The marking is allowed to be in the form of a paper tag or any other nonpermanent material.		
	A unit with d.c. terminals shall be plainly marked indicating the polarity of the connections, with:		P
	– the sign "+" for positive and "-„ for negative; or	The "+" and "-" marking were provided adjacent to the DC input terminal.	P
	– a pictorial representation illustrating the proper polarity where the correct polarity can be unambiguously determined from the representation		N/A
5.1.6.1	Protective Conductor Terminals		P
	The means of connection for the protective earthing conductor shall be marked with:		P
	– symbol 7 of Annex C; or		P
	– the letters "PE"; or		P
	– 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.		P
5.1.8	Class II Equipment	This is a class I equipment.	N/A
	Equipment using Class II protective means throughout shall be marked with symbol 12 of Annex C. Equipment which is only partially protected by DOUBLE INSULATION or REINFORCED INSULATION shall not bear symbol 12 of Table Annex C.	This is a class I equipment.	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	This is a class I equipment.	N/A
5.1.9	Terminal boxes for External Connections	No such parts.	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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	acceptable marking		
5.2	Warning markings		P
5.2.1	Visibility and legibility requirements for warning markings		P
	Warning markings shall be legible, and shall have minimum dimensions as follows:		P
	– Printed symbols shall be at least 2,75 mm high	>2,75mm	P
	– Printed text characters shall be at least 1,5 mm high and shall contrast in color with the background	>1,5mm and contrast in color with the background	P
	– Symbols or text that are molded, stamped or engraved in a material shall have a character height of at least 2,0 mm, and if not contrasting in color from the background, shall have a depth or raised height of at least 0,5 mm.		P
	If it is necessary to refer to the instruction manual to preserve the protection afforded by the equipment, the equipment shall be marked with symbol 9 of Annex C		P
	Symbol 9 of Annex C is not required to be used adjacent to symbols that are explained in the manual		P
5.2.2	Content for warning markings		P
5.2.2.1	Ungrounded heatsinks and similar parts		N/A
	An ungrounded heat sink or other part that may be mistaken for a grounded part and involves a risk of electric shock in accordance with 7.3 shall be marked with symbol 13 of Annex C, or equivalent. The marking may be on or adjacent to the heatsink and shall be clearly visible when the PCE is disassembled to the extent that a risk of contact with the heatsink exists.	All accessible metal parts were grounded	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.	The symbol 14 of Annex C provided on the marking plate	P
5.2.2.3	Coolant	No coolant contained in this inverter.	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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	HAZARDS internal to the equipment		
5.2.2.4	Stored energy		N/A
	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.		N/A
5.2.2.5	Motor guarding	No such parts.	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	No sonic hazard.	N/A
	If required by 10.2.1 a PCE shall:		N/A
	a) be marked to warn the operator of the sonic pressure hazard; or		N/A
	b) be provided with installation instructions that specify how the installer can ensure that the sound pressure level from equipment at its point of use after installation, will not reach a value, which could cause a hazard. These instructions shall include the measured sound pressure level, and shall identify readily available and practicable protective materials or measures which may be used.		N/A
5.2.4	Equipment with multiple sources of supply		N/A
	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.	Connected to one energy source only.	N/A
	The symbol shall be located on the outside of the unit or shall be prominently visible behind any cover giving access to hazardous parts.		N/A
5.2.5	Excessive touch current		P
	Where required by 7.3.6.3.7 the PCE shall be marked with symbol 15 of Annex C. See also 5.3.2 for information to be provided in the installation manual.	Symbol 15 of Annex C provided on the marking plate.	P
5.3	Documentation		P
5.3.1	General		P
	The documentation provided with the PCE shall provide the information needed for the safe operation, installation, and (where applicable) maintenance of the equipment. The documentation shall include the items required in 5.3.2 through 5.3.4, and the following:	See below	P
	a) explanations of equipment makings, including symbols used	See user manual	P

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Clause	Requirement – Test	Result – Remark	Verdict
	b) location and function of terminals and controls	See user manual	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:	See user manual	P
	– ENVIRONMENTAL CATEGORY as per 6.1	See user manual	P
	– WET LOCATIONS classification fort he intended external environment as per 6.1	See user manual	P
	– POLLUTION DEGREE classification for the intended external environment as per 6.2	See user manual	P
	– INGRESS PROTECTION rating as per 6.3	IP67	P
	– Ambient temperature and relative humidity ratings	-40°C～+65°C	P
	– MAXIMUM altitude rating	<4000m	P
	– OVERVOLTAGE CATEGORY assigned to each input and output port as per 7.3.7.1.2, accompanied by guidance regarding how to ensure that the installation complies with the required overvoltage categories;	Mains: Ⅲ PV: Ⅱ	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	See below.	P
	Instructions related to safety shall be in a language that is acceptable in the country where the equipment is to be installed.	In English, the instruction manual will be translated into the 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.	The hardcopy of documentation will be provided and delivered with the PCE.	P
	For equipment which requires the use of a computer for both installation and operation, documentation may be provided in electronic format without accompanying printed format.	Hardcopy provided.	P
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:		P

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Clause	Requirement – Test	Result – Remark	Verdict
	a) assembly, location, and mounting requirements:	Provided in the user manual.	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;	Provided in the user manual.	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;	Provided in the user manual.	P
	d) explanation of the pin-out of connectors for external connections, unless the connector is used for a standard purpose (e.g. RS 232)		N/A
	e) ventilation requirements;	Provided in the user manual.	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;	No hazardous sound level.	N/A
	h) where required by 14.8.1.3, instructions for the adequate ventilation of the room or location in which PCE containing vented or valve-regulated batteries is located, to prevent the accumulation of hazardous gases;	No battery used in the PCE.	N/A
	i) tightening torque to be applied to wiring terminals;	The explanations are provided in the manual	P
	j) values of backfeed short-circuit currents available from the PCE on input and output conductors under fault conditions, if those currents exceeds the max. rated current of the circuit, as per 4.4.4.6;	The back feed current was prevented.	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	Provided in the user manual.	P
	l) compatibility with RCD and RCM;	The unit was insulation type.	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:		N/A
	n) where required by 7.3.8, the installation instructions shall include the following or equivalent wording:	.	N/A
	“This product can cause a d.c. current in the external protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in a case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.“		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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		P
	Instructions for use shall include any operating instructions necessary to ensure safe operation, including the following, as applicable:		P
	– Instructions for adjustment of controls including the effects of adjustment;	The explanations are provided in the manual.	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:	See below	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);	Provided in the user manual.	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;	No any operator replaceable part.	N/A
	– Instructions for safe cleaning (if recommended)		P
	– Where there is more than one source of supply energizing the PCE, information shall be provided in the manual to indicate which disconnect device or devices are required to be operated in order to completely isolate the equipment.		N/A
5.3.4.1	Battery maintenance	No battery used.	N/A
	Where required by 14.8.5, the documentation shall include the applicable items from the following list of instructions regarding maintenance of batteries:		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	– Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions		N/A
	– When replacing batteries, replace with the same type and number of batteries or battery packs		N/A
	– General instructions regarding removal and installation of batteries		N/A
	– CAUTION: Do not dispose of batteries in a fire. The batteries may explode.		N/A
	– CAUTION: Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.		N/A
	– CAUTION: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:		N/A
	a) Remove watches, rings, or other metal objects.		N/A
	b) Use tools with insulated handles.		N/A
	c) Wear rubber gloves and boots.		N/A
	d) Do not lay tools or metal parts on top of batteries		N/A
	e) Disconnect charging source prior to connecting or disconnecting battery terminals		N/A
	f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).		N/A
6	**ENVIRONMENTAL REQUIREMENTS AND CONDITIONS**		P
	The manufacturer shall rate the PCE for the following environmental conditions:		P
	– ENVIRONMENTAL CATEGORY, as in 6.1 below	Outdoor	P
	– Suitability for WET LOCATIONS or not	Suitability for wet location	P
	– POLLUTION DEGREE rating in 6.2 below	See 6.2	P
	– INGRESS PROTECTION (IP) rating, as in 6.3 below	See 6.3	P
	– Ultraviolet (UV) exposure rating, as in 6.4 below	Metal enclosure used	N/A
	– Ambient temperature and relative humidity ratings, as in 6.5 below	See 6.5	P

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Clause	Requirement – Test	Result – Remark	Verdict
6.1	Environmental categories and minimum environmental conditions		P
6.1.1	Outdoor		P
6.1.2	Indoor, unconditioned		N/A
6.1.3	Indoor, conditioned		N/A
6.2	Pollution degree	2	P
6.3	Ingress Protection	IP67	P
6.4	UV exposure	Metal enclosure used	N/A
6.5	Temperature and humidity	-40°C～+65°C	P
7	**PROTECTION AGAINST ELECTRIC SHOCK AND ENERGY HAZARDS**		P
7.1	General	Considered.	P
7.2	Fault conditions	Considered.	P
7.3	Protection against electric shock		P
7.3.1	General	Figure 1 was complied.	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)	PV and MAINS circuit are considered as DVC-C.	P
7.3.2.3	Short-terms limits of accessible voltages under fault conditions	The communication port is considered as DVC-A.	P
7.3.2.4	Requirements for protection (according table 7)	Communication port (DVC-A) is separated from input and output (DVC-C) by reinforced insulation.	P
7.3.2.5	Connection to PELV and SELV circuits	Considered: the SELV classification of the external circuit will not change.	P
7.3.2.6	Working voltage and DVC		P
7.3.2.6.1	General	Considered.	P
7.3.2.6.2	AC working voltage (see Figure 2)	Considered.	P
7.3.2.6.3	DC working voltage (see Figure 3)	Considered.	P
7.3.2.6.4	Pulsating working voltage (see Figure 4)	Considered.	P
7.3.3	protective separation	See below.	P
	Protective separation shall be achieved by:	See below.	P
	▪ double or reinforced insulation, or	Communication port is separated from input to output by reinforced insulation.	P
	▪ protective screening, i.e. by a conductive screen connected to earth by protective bonding in the PCE, or connected to the protective earth	All accessible metal parts were earthed and separated from	P

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Clause	Requirement – Test	Result – Remark	Verdict
	conductor itself, whereby the screen is separated from live parts by at least basic insulation, or	live parts basic insulation.	
	▪ 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	Considered.	P
7.3.4	Protection against direct contact		P
7.3.4.1	General		P
	Protection against direct contact is employed to prevent persons from touching live parts that do not meet the requirements of 7.3.5 and shall be provided by one or more of the measure given in 7.3.4.2 (enclosures and barriers) and 7.3.4.3 (insulation).		P
	Open type sub-assemblies and devices do not require protective measures against direct contact but the instruction provided with the equipment must indicate that such measures must be provided in the end equipment or in the installation.		P
	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.		P
7.3.4.2	Protection by means of enclosures and barriers	By enclosure	P
	The following requirements apply where protection against contact with live parts is provided by enclosures or barriers, not by insulation in accordance with 7.3.4.3.		P
7.3.4.2.1	General	All live parts are provided within the enclosure.	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).	The enclosure cannot be opened or removed without a Tool to get access to hazardous live parts.	P
	Polymeric materials used to meet these requirements shall also meet the requirements of 13.6	Considered.	P
7.3.4.2.2	Access probe criteria		P
	Protection is considered to be achieved when the separation between the test probes and live parts, when tested as described below, is as follows:	User interfaces for interconnection in the final installation are provided which could be touched. These interfaces are supplied by SELV circuits which were considered to re resent DVC A circuits. For the DVC A circuits	P

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Clause	Requirement – Test	Result – Remark	Verdict
		clause 7.3.5 was applied.	
	a) decisive voltage classification A, (DVC A) - the probe may touch the live parts	Communication port is considered as DVC A circuit.	N/A
	b) decisive voltage classification B, (DVC B) - the probe must not touch bare live parts		N/A
	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:	See below.	P
	a) Inspection; and	The earthed metal enclosure covered all live parts and no openings provided in the enclosure.	P
	b) Tests with the test finger (Figure D.1) and test pin (Figure D.2) of 0E, the results of which shall comply with the requirements of 7.3.4.2.1 a), b), and c) as applicable. Probe tests are performed on openings in the enclosures after removal of parts that can be detached or opened by an operator without the use of a tool, including fuseholders, and with operator access doors and covers open. It is permitted to leave lamps in place for this test. Connectors that can be separated by an operator without use of a tool, shall also be tested during and after disconnection. Any movable parts are to be put in the most unfavorable position.	No opening in enclosure and it is not user accessible parts.	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.		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.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.4.2.4	Service access areas		P
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:	The requirements of 7.3.4.2 are met.	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 "‡" 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:		N/A
	– is of decisive voltage class A and complies with 7.3.5.2, or	No such parts.	N/A
	– is provided with protective impedance according to 7.3.5.3, or	No such parts.	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		N/A
7.3.5.3	Protection by means of protective impedance		N/A
	Circuits and conductive parts do not require protection against direct contact if any connection to circuits of DVC-B or DVC-C is through protective impedance, and the accessible circuit or part is otherwise provided with protective separation from circuits of DVC-B or DVC-C according 7.3.3.		N/A
7.3.5.3.1	Limitation of current through protective impedance		N/A
	The current available through protective impedance to earth and between simultaneously accessible parts, measured at the accessible live parts, shall not exceed a value of 3,5 mA a.c. or 10 mA d.c. under		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	normal and single-fault conditions.		
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 earthling), class II (double or reinforced insulation) or class III (limitation of voltages)	Protective class I (basic insulation plus protective earthling)	P
	That part of a PCE meets the requirements of 7.3.6.2 and 7.3.6.3 is defined as protective class I		P
	That part of a PCE meets the requirements of 7.3.6.4 is defined as protective class II.		N/A
	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
	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

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Clause	Requirement – Test	Result – Remark	Verdict
	Accessible conductive parts of equipment shall be separated from live parts by insulation meeting the requirements of Table 7 or by clearances as specified in 7.3.7.4 and creepages as specified in 7.3.7.5		P
7.3.6.3	Protective class I – Protective bonding and earthing		P
7.3.6.3.1	General		P
	Equipment of protective class I shall be provided with protective earthing, and with protective bonding to ensure electrical contact between accessible conductive parts and the means of connection for the external protective earthing conductor, except bonding is not required for:		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.		N/A
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;		N/A
	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.		N/A
	For moving or removable parts, hinges or sliding contacts designed and maintained to have a low resistance are examples of acceptable means if they comply with the requirements of 7.3.6.3.3.		N/A
	Metal ducts of flexible or rigid construction and metallic sheaths shall not be used as protective bonding conductors, unless the device or material has been investigated as suitable for protective bonding purposes.		N/A
7.3.6.3.3	Rating of protective bonding		P
	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		P

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Clause	Requirement – Test	Result – Remark	Verdict
	long as a fault to the accessible conductive parts persists or until an upstream protective device removes power from the part.		
	Protective bonding shall meet following requirements:		P
	a) For PCE with an overcurrent protective device rating of 16 A or less, the impedance of the protective bonding means shall not exceed 0,1 Ω during or at the end of the test below.		P
	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.		N/A
	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;		N/A
	c) For a circuit or part of the equipment for which an overcurrent protective device is provided as part of the equipment, the rating of the provided overcurrent device.		P
	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 conncection 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		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		
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:		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.	32A 120s	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.		N/A
	c) During and after the test, there shall be no melting, loosening, or other damage that would impair the effectiveness of the protective bonding means.	The EUT passed the test after the requirements of this standard.	P
	The test current is derived from an a.c or d.c supply source, the output of which is not earthed.		P
	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)		P
	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:		P

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Clause	Requirement – Test	Result – Remark	Verdict
	▪ 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:		P
	▪ the test duration may be reduced to no less than 2 s		P
	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.		P
	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).	32A 120s	P
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.		N/A
	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:		N/A
	▪ 2,5 mm² if mechanical protection is provided;		N/A
	▪ 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.		P
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		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		
	The means of connection for the protective earthing conductor shall be permanently marked with:		P
	• symbol 7 of Annex C; or		P
	• the color 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		P
	The requirements of this sub-clause shall be satisfied to maintain safety in case of damage to or disconnection of the protective earthing conductor.		P
	For pluggable equipment type A, the touch current measured in accordance with 7.5.4 shall not exceed 3,5 mA a.c. or10 mA d.c.		N/A
	For all other PCE, one or more of the following measure shall be applied, unless the touch current measured in accordance with 7.5.4 using the test network of IEC 60990 test figure 4 shall not exceed 3,5 mA a.c. or 10 mA d.c.	See below	P
	a) Permanently connected wiring, and:		N/A
	• 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		N/A
	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.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		P
	When it is intended and allowed to connect two or more PCEs in parallel using one common PE conductor, the above touch current requirements apply to the maximum number of the PCEs to be connected in parallel, unless one of the measures in a)		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	The unit is Class I type	N/A
	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:		N/A
	• 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;		N/A
	• 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		P
7.3.7.1	General		P
	This subclause gives minimum requirements for insulation, based on the principles of IEC 60664.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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	pollution degree 2	P
	• overvoltage category	Mains: Ⅲ, PV: Ⅱ	P
	• supply earthing system	TN system	P
	• insulation voltage	Considered.	P
	• location of insulation	Considered.	P
	• type of insulation	Considered.	P
	Compliance of insulation, creepage distances, and clearance distances, shall be verified by measurement or visual inspection, and the tests of 7.5.	Considered.	P
7.3.7.1.3	Supply earthing systems		P
	Three basic types of earthing system are described in IEC 60364-1. They are:		P
	• TN system: has one point directly earthed, the accessible conductive parts of the installation being connected to that point by protective conductors. Three types of TN systems, TN-C, TN-S and TN-C-S, are defined according to the arrangement of the neutral and protective conductor.	Considered.	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 sytem: has all live parts isolated from earth or one point connected to earth through an impedance, the accessible conductive parts of the installation being earthed independently or collectively to the earthing system.		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 withstand voltage and the temporary overvoltage.	Considered.	P
7.3.7.2	Insulation between a circuit and its surroundings	Considered.	P
7.3.7.2.1	General		P
	For creepage distances, the r.m.s. value of the working voltage is used.	See below	P
7.3.7.2.2	Circuits connected directly to the mains		P

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.7.2.3	Circuits other than mains circuits		N/A
	Clearances and solid insulation between circuits other than the mains and their surroundings		N/A
7.3.7.2.4	Insulation between circuits		P
7.3.7.3	Functional insulation		P
7.3.7.4	Clearance distances		P
7.3.7.4.1	Determination		P
	Clearances for use in altitudes above 2 000 m shall be calculated with a correction factor according to Table A.2 of IEC 60664-1		P
7.3.7.4.2	Electric field homogeneity		P
7.3.7.4.3	Clearance to conductive enclosures		P
7.3.7.5	Creepage distances		P
7.3.7.5.1	General		P
7.3.7.5.2	Voltage	See below	P
7.3.7.5.3	Materials	See below	P
	CTI		P
7.3.7.6	Coating		P
7.3.7.7	PWB spacings for functional insulation		P
	• the PWB has flammability rating of V-0 (see IEC 60695-11-10)		P
	• the PWB base material has a minimum CTI of 175		P
	• the equipment complies with the PWB short-circuit test (see 4.4.4.14).		P
7.3.7.8	Solid insulation		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
	Solid insulation shall withstand the applicable impulse withstand voltage test (7.5.1) and the a.c. or d.c. voltage test (7.5.2)	See below	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
	Insulation consisting of thin (less than 0,7 mm) sheet or tape materials is permitted		P
	Where more than one layer of insulation is used, there is no requirement for all layers to be of the same material.		P

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.7.8.3.2	Material thickness not less than 0,2 mm		P
	• Basic or supplementary insulation		P
	• Double insulation		N/A
	• Reinforced insulation		N/A
7.3.7.8.3.3	Material thickness less than 0,2 mm		N/A
	• Basic or supplementary insulation		N/A
	• Double insulation		N/A
	• Reinforced insulation		N/A
7.3.7.8.3.4	Compliance		P
	Compliance is checked by the tests described in 7.5.1 to 7.5.3	See below	P
7.3.7.8.4	Printed wiring boards (PWBs)		P
7.3.7.8.4.1	General		P
	Insulation between conductor layers in double-sided single-layer PWBs, multi-layer PWBs and metal core PWBs	The PWBs in the unit is multi-layer type	P
	For the inner layers of multi-layer PWBs, the insulation between adjacent tracks on the same layer shall be treated as:		P
	• a creepage distance for pollution degree 1 and a clearance as in air		N/A
	• as solid insulation		P
7.3.7.8.4.2	Use of coating materials		N/A
	Type 1 protection		N/A
	Type 2 protection		N/A
7.3.7.8.5	Wound components		P
7.3.7.8.6	Potting materials		P
7.3.7.9	Insulation requirements above 30 kHz		N/A
7.3.8	Residual Current Detection (RCD) or Monitoring (RCM) device compatibility	The unit was insulation type	N/A
	Pluggable type A PCE shall be designed so that, under normal and single-fault conditions, any resulting d.c. component in the residual current does not exceed the d.c. current withstand requirements in IEC 60755 and IEC 62020 for RCD and RCM of type A.		N/A
	PCE that is pluggable type B or fixed equipment, may have a d.c. residual current component present in excess of the d.c. current withstand requirements in IEC 60755 and IEC 62020 for RCD and RCM of type A, if the information required by 5.3.2 item l) is provided in the installation instructions.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.7.9	Insulation requirements above 30 kHz	Considered.	P
7.3.8	Residual Current-operated protective (RCD) or monitoring (RCM) device compatibility		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.		P
7.3.9.2	Service access areas	No such areas.	N/A
	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.		N/A
7.4	Protection against energy hazards		P
7.4.1	Determination of hazardous energy level		N/A
	A hazardous energy level is considered to exist if		N/A
	a) The voltage is 2 V or more, and power available after 60 s exceeds 240 VA.		N/A
	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: $E = 0,5\ CU^2$		N/A
7.4.2	Operator Access Areas	Considered.	P
	Equipment shall be so designed that there is no risk of energy hazard in operator access areas from accessible circuits.	Considered.	P
7.4.3	Services Access Areas	Considered.	P
	Energy storage devices located behind panels that are removable for servicing, installation or disconnection shall present no risk of electric energy hazard from charge stored after disconnection of the PCE.	Considered.	P
	Energy storage devices within a PCE shall be discharged to an energy level less than 20 J, as in 7.4.1, within 10 s after the removal	Considered.	P
7.5	Electrical tests related to shock hazard		P
7.5.1	Impulse voltage test (type test)		P

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Clause	Requirement – Test	Result – Remark	Verdict
	The impulse voltage test is performed with a voltage having a 1,2/50 µs waveform	See below	P
7.5.2	Voltage test (dielectric strength test) (type test and routine test)		P
7.5.2.1	Purpose of test		P
7.5.2.2	Value and type of test voltage	See below	P
7.5.2.3	Humidity pre-conditioning		P
7.5.2.4	Performing the voltage test	See below	P
7.5.2.5	Duration of the a.c. or d.c. voltage test	1min	P
	The duration of the test shall be at least 60 s for the type test and 1 s for the routine test.		P
7.5.2.6	Verification of the a.c. or d.c. voltage test	See below	P
7.5.3	Partial discharge test (type test or sample test)	See below	P
7.5.4	Touch current measurement (type test)		P
	The touch current shall be measured if required by 7.3.6.3.7 and shall not be greater than 3.5 mA a.c. or 10 mA d.c. or special measures of protection as given in 7.3.6.3.7 are required.		P
	For type tests on PCE for which wet locations requirements apply according to 6.1, the humidity pre-conditioning of 4.5 shall be performed immediately prior to the touch current test.		P
7.5.6	Equipment with multiple sources of supply		N/A
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		N/A
	Moving parts shall not be able to crush, cut or pierce parts of the body of an OPERATOR likely to contact them, nor severely pinch the OPERATOR's skin. Hazardous moving parts of equipment, that is moving parts which have the potential to cause injury, shall be so arranged, enclosed or guarded as to provide adequate protection against the risk of personal injury.	No such device	N/A
8.2.1	Protection of service persons		P
	Protection shall be provided such that unintentional		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		
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.	Fixed equipment	N/A
8.4	Provisions for lifting and carrying		P
	If carrying handles or grips are fitted to, or supplied with, the equipment, they shall be capable of withstanding a force of four times the weight of the equipment.	No such device	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
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.	No such device.	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.	Considered.	P
9.1.1	Reducing the risk of ignition and spread of flame	Considered.	P
	For equipment or a portion of equipment, there are two alternative methods of providing protection against ignition and spread of flame that could affect materials, wiring, wound components and electronic components such as integrated circuits, transistors, thyristors, diodes, resistors and capacitors.		P
9.1.2	Conditions for a fire enclosure		P
	A FIRE ENCLOSURE is required for equipment or parts of equipment for which Method 2 is not fully applied and complied with.		P
9.1.2.1	Parts requiring a fire enclosure		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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	Considered	P
	– components in SECONDARY CIRCUITS supplied by power sources which exceed the limits for a LIMITED POWER SOURCE as specified in 9.2;	Considered	P
	– 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;	Considered	P
	– 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;	Considered	P
	– 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	Considered	P
	– insulated wiring, except as permitte in 9.1.2.2.	Considered	P
9.1.2.2	Parts not requiring a fire enclosure	Fire enclosure is required.	N/A
9.1.3	Materials requirements for protection against fire hazard		P
9.1.3.1	General		P
	ENCLOSURES, components and other parts shall be so constructed, or shall make use of such materials, that the propagation of fire is limited.		P
9.1.3.2	Materials for fire enclosures	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.		P
9.1.3.3	Materials for components and other parts outside fire enclosures	All components and parts are enclosed within fire enclosure.	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 electronic components are soldered and mounted on V-0	P

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Clause	Requirement – Test	Result – Remark	Verdict
		PCB.	
9.1.3.5	Materials for air filter assemblies		N/A
9.1.4	Openings in fire enclosures	No openings in IP 67 enclosure.	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
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		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,		P

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Clause	Requirement – Test	Result – Remark	Verdict
	and adequate information shall be provided to allow proper selection of external wiring and external protective devices.		
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.	Overcurrent protection fuse be used in ports.	P
9.3.3	Protective devices provided or specified shall have adequate breaking capacity to interrupt the maximum short circuit current specified for the port to which they are connected. If protection that is provided integral to the PCE for an input port is not rated for the short-circuit current of the circuit in which it is used, the installation instructions shall specify that an upstream protective device, rated for the prospective short-circuit current of that port, shall be used to provide backup protection.		P
10	**PROTECTION AGAINST SONIC PRESSURE HAZARDS**		P
10.1	General		P
	The equipment shall provide protection against the effect of sonic pressure. Conformity tests are carried out if the equipment is likely to cause such HAZARDS.		P
10.2	Sonic pressure and Sound level		P
10.2.1	Hazardous Noise Levels		P
11	**PROTECTION AGAINST LIQUID HAZARDS**		N/A
11.1	Liquid Containment, Pressure and Leakage		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

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Clause	Requirement – Test	Result – Remark	Verdict

12	**CHEMICAL HAZARDS**		N/A
12.1	General		N/A
13	**PHYSICAL REQUIREMENTS**		P
13.1	Handles and manual controls		P
	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 selfhardening 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.		N/A
13.1.1	Adjustable controls		P
13.2	Securing of parts		P
13.3	Provisions for external connections		P
13.3.1	General		P
13.3.2	Connection to an ac. Mains supply		P
13.3.2.1	General		P
	For safe and reliable connection to a MAINS supply, equipment shall be provided with one of the following:		P
	– terminals or leads or a non-detachable power supply cord for permanent connection to the supply; or		P
	– a non-detachable power supply cord for connection to the supply by means of a plug	No such device.	N/A
	– an appliance inlet for connection of a detachable power supply cord; or	No such device.	N/A
	– a mains plug that is part of direct plug-in equipment as in 13.3.8	No such device.	N/A
13.3.2.2	Permanently connected equipment	Terminal block used for AC connection.	P
13.3.2.3	Appliance inlets		N/A
13.3.2.4	Power supply cord		N/A
13.3.2.5	Cord anchorages and strain relief	Not provided with product	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

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Clause	Requirement – Test	Result – Remark	Verdict
13.3.2.6	Protection against mechanical damage	No sharp points or cutting edge at the bushing.	P
13.3.3	Wiring terminals for connection of external conductors	No such parts.	P
13.3.3.1	Wiring terminals	The terminal can accommodate the conductors which specified in the owner's manual and the temperature rise did not exceed manufacturer's rating.	P
13.3.3.2	Screw terminals	A ring terminal and washer were used to each external power supply conductor and secured to terminal block by screw.	P
13.3.3.3	Wiring terminal sizes	The terminals associated with a particular input or output circuit were located in proximity to each other and the terminals for mains supply connection and protective earthing terminal were locate don the same terminal block.	P
13.3.3.4	Wiring terminal design	All cords and wires were fixed well to prevent accidental contacting.	P
13.3.3.5	Grouping of wiring terminals	The terminals associated with a particular input or output circuit were located in proximity to each other and the terminals for mains supply connection and protective earthing terminal were locate don the same terminal block.	P
13.3.3.6	Stranded wire	All cords and wires were fixed well to prevent accidental contacting.	P
13.3.4	Supply wiring space	The space of power supply cords connection met this requirement.	P
13.3.5	Wire bending space for wires 10 mm² and greater	The wire bending space met the requirement of table 26.	N/A
13.3.6	Disconnection from supply sources	The PCE only provide a DC disconnection switch. For the disconnection of AC mains, a circuit breaker should be provided.	P
13.3.7	Connectors, plugs and sockets	The misconnection is unlikely for PV DC connectors (if used)	P
13.3.8	Direct plug-in equipment	Not direct plug-in equipment.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
13.4	Internal wiring and connections		P
13.4.1	General	All wires were used suitably and are fixed well to prevent mechanical damage during installation.	P
13.4.2	Routing	The wires were routed away from all parts which could abrade the insulation of wires.	P
13.4.3	Colour coding		P
13.4.4	Splices and connections		P
13.4.5	Interconnections between parts of the PCE		P
13.5	Openings in enclosures		N/A
13.5.1	Top and side openings		N/A
	Openings in the top and sides of ENCLOSURES shall be so located or constructed that it is unlikely that objects will enter the openings and create hazards by contacting bare conductive parts.		N/A
13.6	Polymeric Materials		N/A
13.6.1	General	No such enclosure used	N/A
13.6.1.1	Thermal index or capability		N/A
13.6.2	Polymers serving as enclosures or barriers preventing access to hazards		N/A
13.6.2.1	Stress relief test		N/A
13.6.3	Polymers serving as solid insulation		N/A
13.6.3.1	Resistance to arcing		N/A
13.6.4	UV resistance		N/A
	Polymeric parts of an OUTDOOR ENCLOSURE required for compliance with this standard shall be sufficiently resistance to degradation by ultra-violet (UV) radiation		N/A
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	250N force applied to metal enclosure. After the test, all live parts remain inaccessible.	P
13.7.3	7-J impact test for polymeric enclosures	Metal enclosure used	N/A
13.7.4	Drop test	Not hand-held, direct plug-in and transportable equipment.	N/A
13.8	Thickness requirements for metal enclosures		P
13.8.1	General		P
13.8.2	Cast metal		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
13.8.3	Sheet metal		N/A
14	**COMPONENTS**		P
14.1	General		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:	Refer to “List of critical components”.	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;	Considered.	P
	b) the requirements of this standard and, where necessary for the application, any additional applicable safety requirements of the relevant IEC component standard;	Considered.	P
	c) if there is no relevant IEC standard, the requirements of this standard;	Considered.	P
	d) applicable safety requirements of a non-IEC standard which are at least as high as those of the applicable IEC standard, provided that the component has been approved to the non-IEC standard by a recognized testing authority.	Considered.	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.	Considered.	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	The PCB is UL certified with Flammability classification of	P

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Clause	Requirement – Test	Result – Remark	Verdict
	flammability classification of V-1 of IEC 60707 or better.	V-0 minimum.	
	This requirements 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.	The PCB is UL certified with Flammability classification of V-0 minimum.	P
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.	No such parts.	N/A
14.8	Batteries		N/A
	Equipment containing batteries shall be designed to reduce the risk of fire, explosion and chemical leaks under normal conditions and after a single fault in the equipment including a fault in circuitry within the equipment battery pack.	No battery used.	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 nonmetallic 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

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Clause	Requirement – Test	Result – Remark	Verdict
	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
	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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex ZA	Normative references to international publications with their corresponding European publications	Considered	P

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Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.6	TABLE: mains supply electrical data in normal condition					P
Type	U (V) DC*	I (A)	P (W) DC*	U (V) grid	I (A) AC	P (W) AC
CE-1P3001G-230-EU	25,04	10,46	262,04	195,45	1,29	249,95
	36,05	7,96	287,08	195,65	1,41	274,11
	55,06	5,23	288,19	195,70	1,41	275,37
	25,02	9,17	229,50	229,51	1,10	249,71
	35,99	8,69	312,76	229,62	1,31	299,00
	55,08	5,66	311,51	229,75	1,31	299,30
	25,03	10,46	261,87	253,05	1,00	249,01
	36,00	8,74	314,79	253,15	1,20	300,80
	55,07	5,61	309,20	252,77	1,18	297,78
CE-1P5001G-230-EU	25,00	12,54	313,50	195,53	1,54	298,73
	36,02	12,49	449,72	195,69	2,20	428,61
	55,07	8,94	492,54	195,72	2,41	469,93
	24,97	12,52	312,61	229,54	1,32	298,42
	36,06	12,45	449,11	229,63	1,87	427,31
	55,15	9,43	519,79	229,79	2,18	499,00
	24,82	12,60	312,65	253,10	1,20	297,84
	36,06	12,49	450,51	253,19	1,71	429,26
	55,03	9,35	514,76	252,81	1,97	495,70
CE-1P6001G-230-EU	25,06	8,22*2	526,31	195,84	2,58	504,13
	36,02	5,40*2	592,52	196,00	2,89	564,83
	55,01	10,55*2	593,62	195,98	2,90	567,28
	25,10	8,72*2	529,41	229,75	2,18	499,23
	36,05	5,65*2	628,46	230,00	2,56	587,84
	55,08	10,49*2	622,89	229,73	2,61	598,48
	25,03	8,79*2	525,00	253,27	1,99	500,84
	36,01	5,74*2	633,40	253,49	2,39	604,87
	55,12	12,46*2	633,04	252,75	2,42	609,64

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Clause	Requirement – Test	Result – Remark	Verdict

CE-1P8001G-230-EU	25,05	10,77*2	624,15	195,85	3,07	598,63
	36,07	7,04*2	776,79	196,00	3,80	744,25
	55,08	12,51*2	775,54	196,00	3,81	744,73
	25,08	11,62*2	627,43	229,79	2,63	601,74
	36,01	7,58*2	836,91	230,01	3,51	805,33
	55,28	8,45*2	838,55	230,25	3,51	807,26
	25,16	11,51*2	425,36	253,08	1,62	407,77
	36,02	7,54*2	829,15	253,01	3,17	798,37
	55,28	12,46*2	833,41	253,28	3,18	803,88
CE-1P10001G-230-EU	25,07	12,50*2	624,99	195,81	3,07	598,65
	36,05	8,92*2	901,19	195,98	4,41	862,36
	55,05	12,56*2	982,10	196,00	4,81	940,63
	25,00	12,50*2	627,84	229,74	2,63	601,18
	35,99	9,52*2	900,10	229,97	3,75	860,71
	55,23	12,53*2	1051,78	230,23	4,40	1010,42
	25,07	12,50*2	628,12	252,62	2,39	600,03
	36,02	9,52*2	900,21	252,83	3,42	862,57
	55,13	8,22*2	1049,68	253,26	3,98	1005,86
CE-1P13001G-230-EU	24,98	10,52*4	1051,62	195,41	5,18	1009,74
	36,02	8,77*4	1263,06	195,55	6,22	1213,96
	55,14	5,70*4	1258,20	195,28	6,20	1209,39
	25,00	10,50*4	1050,45	229,91	4,39	1005,43
	36,03	9,44*4	1360,50	230,12	5,67	1303,17
	55,10	6,19*4	1365,00	230,38	5,70	1310,78
	25,02	10,46*4	1047,09	252,92	4,00	1007,33
	36,05	9,38*4	1352,41	253,16	5,16	1302,17
	55,14	6,15*4	1357,20	253,47	5,16	1306,71
CE-1P16001G-230-EU	25,06	12,46*4	1248,85	196,04	6,13	1199,25
	35,99	10,92*4	1572,44	196,14	7,72	1512,93
	55,18	7,07*4	1561,33	196,12	7,67	1502,33
	25,02	12,42*4	1242,56	230,07	5,20	1193,20
	36,06	11,68*4	1684,65	230,22	7,01	1610,40
	55,14	7,62*4	1679,89	230,38	7,01	1612,11
	25,41	12,34*4	1253,90	253,10	4,75	1200,33
	36,07	11,56*4	1668,28	253,30	6,35	1605,37
	54,87	7,61*4	1670,77	253,72	6,34	1605,87

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Clause	Requirement – Test	Result – Remark	Verdict

CE-1P18001G-230-EU	26,05	11,92*4	1242,47	196,09	6,11	1195,80
	36,08	12,17*4	1756,99	196,19	8,61	1686,43
	55,08	7,95*4	1750,51	196,16	8,57	1680,20
	25,02	12,51*4	1252,02	230,13	5,25	1206,12
	36,03	13,07*4	1883,33	230,22	7,87	1809,34
	55,09	8,50*4	1872,70	230,44	7,83	1800,80
	25,04	12,50*4	1251,95	253,02	4,76	1202,17
	36,15	13,01*4	1880,79	253,29	7,15	1807,37
	55,14	8,55*4	1885,18	253,51	7,17	1813,93
CE-1P20001G-230-EU	24,99	12,53*4	1252,33	196,03	6,14	1201,99
	36,03	12,52*4	1804,15	196,16	8,81	1726,92
	55,08	8,90*4	1960,92	196,16	9,61	1883,87
	25,07	12,44*4	1247,65	230,11	5,22	1199,93
	36,07	12,52*4	1805,72	230,23	7,53	1731,57
	55,07	9,46*4	2083,02	230,45	8,69	2000,74
	25,15	12,46*4	1253,86	253,14	4,74	1197,53
	36,02	12,47*4	1796,72	253,31	6,80	1720,56
	55,14	9,45*4	2083,63	253,55	7,88	1993,86

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Clause	Requirement – Test	Result – Remark	Verdict

4.3	TABLE: heating temperature rise measurements						P
	test voltage (V dc) ..... :	36	36	55	25	36	—
	test voltage (V ac) ..... :	230	230	230	230	195	—
	Ambient (°C) .....:	45	60	45	45	45	—
temperature rise dT of part/at:		Max. temperature measured, (°C)					Max. temperature limit, (°C)
Model: CE-1P20001G-230-EU							
Current sensor U6		90,59	81,91	98,36	68,26	95,96	125
C34（225）		96,68	87,14	107,93	72,62	90,36	125
C29		70,32	66,19	74,57	56,09	73,33	105
U23		79,68	76,47	83,54	64,81	82,72	105
QS1		99,72	86,41	113,04	72,01	107,42	150
QS2		109,03	95,86	114,63	76,69	117,93	150
D62		86,42	81,75	96,11	65,40	92,98	175
DC cable（inside)		97,08	88,52	109,40	70,81	88,57	200
D22		97,11	87,80	112,64	70,24	107,83	175
PCB near IGBT		89,73	84,17	101,32	67,34	97,12	130
core of TX6		80,65	78,13	94,22	62,50	84,53	125
Y capacitance C86		81,43	78,00	91,74	62,40	87,02	125
X capacitance C227		83,64	79,82	96,19	63,86	89,15	110
U32		79,17	77,43	87,25	61,94	83,90	105
Common mode inductance L8		83,87	79,35	95,93	63,48	90,49	130
Common mode inductance L9		81,07	77,45	91,22	61,96	87,02	130
Varistor RV4		81,65	78,13	77,32	62,50	87,42	105
T1		84,22	81,45	80,44	65,16	89,22	125
Optoacoplado IS1		86,21	82,04	80,76	65,63	92,57	100
X cap (DC side)C77		82,28	77,71	80,96	62,17	87,88	110
RV1		79,83	75,74	74,71	60,59	85,48	105
wire of TX1		85,07	82,13	79,82	65,70	90,14	125
Y capC41（DC）		73,99	72,55	80,24	58,04	77,90	105
XcapC78（AC）		77,93	74,62	86,36	59,70	82,79	110
wire of TX6		95,05	87,16	92,95	69,73	84,99	130

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Clause	Requirement – Test	Result – Remark	Verdict

C73	81,08	77,12	91,38	61,70	72,05	105
Optoacoplador IS6	78,70	76,44	86,43	61,15	83,24	125
WIFI	77,48	76,66	84,50	61,33	81,62	85
front side of enclosure	74,14	73,05	76,67	58,44	77,99	90
bottom side of enclosure	66,54	67,07	70,20	53,66	69,07	90
left side of enclosure	74,15	73,29	80,69	58,63	78,32	90
right side of enclosure.	72,25	71,36	77,58	57,09	75,79	90
back side of enclosure	82,53	79,20	91,41	63,36	88,21	90
top side of enclosure	72,07	71,81	78,29	57,45	75,84	90
DC connector（outside)	66,59	75,04	64,25	60,03	72,38	85
DC cable（outside)	62,56	84,13	63,20	66,03	66,96	200
AC connector（outside)	47,34	62,78	59,21	50,22	59,55	85
AC cable（outside)	52,10	68,16	58,93	54,53	56,70	90
Ambient	47,20	63,54	49,26	49,25	48,10	--
Enclosure mounting port	51,06	69,00	55,90	49,29	59,85	90
AC cable(inside)	87,31	78,07	87,01	70,33	79,77	90
Relay K1	73,21	71,12	71,21	68,21	69,21	85

Note:

The above temperatures are recorded at tamb1. The values measured are subtracted with tamb1 and tamb2 (°C) (specified max. operation temp.) added. Therefore above measured temperatures are the absolute temperatures in °C at maximum ambient.

*The heatsinks are marked with the hot surface marking of symbol 14 of Annex C,

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Clause	Requirement – Test	Result – Remark	Verdict

4.3	TABLE: heating temperature rise measurements						P
	test voltage (V dc) ..... :	55	25	36	55	25	—
	test voltage (V ac) ..... :	195	195	253	253	253	—
	Ambient (°C) .....:	45	45	45	45	45	—
temperature rise dT of part/at:		Max. temperature measured, (°C)					Max. temperature limit, (°C)
Model: CE-1P20001G-230-EU							
Current sensor U6		97,13	74,60	87,85	85,78	65,93	125
C34（225）		105,77	79,59	95,32	90,90	70,06	125
C29		74,47	60,43	68,78	74,81	54,33	105
U23		83,69	69,17	77,76	83,75	62,94	105
QS1		111,45	79,50	95,76	112,27	69,22	150
QS2		114,96	85,18	103,23	121,79	72,96	150
D62		97,15	72,31	83,33	94,91	62,72	175
DC cable（inside)		110,88	79,41	88,36	90,53	67,63	200
D22		114,48	78,96	92,79	110,18	67,08	175
PCB near IGBT		102,54	74,98	86,36	99,66	64,38	130
core of TX6		93,54	67,86	78,65	94,30	60,43	125
Y capacitance C86		92,19	68,58	79,31	90,94	60,10	125
X capacitance C227		95,97	69,95	81,73	95,71	61,51	110
U32		87,50	67,48	77,46	86,78	59,72	105
Common mode inductance L8		96,69	70,22	81,27	94,40	60,97	130
Common mode inductance L9		91,70	68,47	78,81	90,02	59,66	130
Varistor RV4		84,20	69,12	79,49	91,37	60,24	105
T1		87,07	70,85	82,49	96,19	62,96	125
Optoacoplado IS1		88,54	72,29	83,71	96,12	63,05	100
X cap (DC side)C77		87,50	68,22	80,09	95,89	59,77	110
RV1		81,78	66,80	77,53	88,74	58,26	105
wire of TX1		95,21	71,63	83,06	95,43	63,47	125
Y capC41（DC）		80,28	63,01	72,63	80,17	55,96	105
XcapC78（AC）		86,60	65,54	76,01	86,10	57,59	110
wire of TX6		110,25	76,76	92,07	100,35	67,11	130
C73		91,64	67,87	78,97	90,77	59,45	105
Optoacoplador IS6		86,61	66,61	76,95	86,25	58,90	125
WIFI		84,42	66,37	76,26	84,30	59,41	85

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Clause	Requirement – Test	Result – Remark	Verdict

front side of enclosure	76,90	63,52	73,08	76,87	56,52	90
bottom side of enclosure	70,57	57,61	65,03	70,34	51,92	90
left side of enclosure	80,99	63,58	72,95	80,48	56,49	90
right side of enclosure.	77,68	61,95	70,83	77,54	55,20	90
back side of enclosure	82,10	69,71	79,83	80,12	60,82	90
top side of enclosure	78,43	62,03	70,97	78,01	55,58	90
DC connector（outside)	63,50	58,12	64,12	63,79	54,54	85
DC cable（outside)	60,68	61,63	66,26	60,63	49,78	200
AC connector（outside)	57,99	47,35	49,09	53,92	46,26	85
AC cable（outside)	57,15	51,90	55,41	57,46	50,01	90
Ambient	45,78	45,77	47,37	45,81	45,64	--
Enclosure mounting port	50,66	49,72	50,69	50,84	50,14	90
AC cable(inside)	82,12	80,05	77,10	81,45	66,69	90
Relay K1	78,21	74,44	75,32	72,12	74,21	85

Note:

The above temperatures are recorded at tamb1. The values measured are subtracted with tamb1 and tamb2 (°C) (specified max. operation temp.) added. Therefore above measured temperatures are the absolute temperatures in °C at maximum ambient.

*The heatsinks are marked with the hot surface marking of symbol 14 of Annex C,

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Clause	Requirement – Test	Result – Remark	Verdict

4.4	Testing in single fault condition							P
	ambient temperature (°C) ..... :					23,8		—
	model/type of power supply/transformer :					AC:MX30 DC:62150H-1000S		—
	manufacturer of power supply/transformer ..... :					AC:AMTEK DC: Chroma		—
	rated markings of power supply/transformer ..... :					AC:300V, 30kVA DC: 1000V, 15kW*3		—
Component No.	Fault	test voltage (V)		Test time	fuse No.	fuse current (A)		Result
		AC	DC		(AC)	AC	DC	
Model: CE-1P20001G-230-EU								
component PCE	Overload 120%	230V 8,6A	40V, 15 A *4	2h	F3	230V8 ,6A	40V, 15 A *4	Unit normal operations, no damage, no hazard, no fire
PV+ to PV-	Reverse	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, Electrolytic capacitor damage, no hazard, no fire
L&N	Reverse	230V 8,6A	40,0V 12,5A*4	30min	F3	230V 8,6A	40,0V 12,5A*4	Unit normal operations, no damage, no hazard, no fire
PV+ to PV-	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	0V, 0,01A	Unit shut down, no damage, no hazard, no fire
T1 Pin4 to pin5	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
T1 Pin1 to pin2	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
X cap(DCside) C77	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
X Cap (AC side) C73	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire

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Clause	Requirement – Test	Result – Remark	Verdict

Y cap(DC side) C78	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
Y cap (AC)side C41	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
Optocoupler IS6	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
PV voltage resistance monitoring+ R121	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V 6,52	40V 12,5A*3	Unit normal operations, no output from PV1,no damage, no hazard, no fire
PV voltage resistance monitoring+ R121	open circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V 6,52	40V 12,5A*3	Unit normal operations, no output from PV1,no damage, no hazard, no fire
PV current resistance monitoring,+ R88	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V 6,52	40V 12,5A*3	Unit normal operations, no output from PV1,no damage, no hazard, no fire
PV current resistance monitoring,+ R88	open circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V 6,52	40V 12,5A*3	Unit normal operations, no output from PV1,no damage, no hazard, no fire
PV array insulation resistance monitoring,+ R279	short circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
PV array insulation resistance monitoring,+ R279	open circuit	230V 8,6A	40,0V 12,5A*4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
Main cpu, U28 loss control	short circuit pin9 to pin10	230V 8,6A	40,0V 12,5A*4	10min	F3	230V 4,35	40V 12,5A*2	Unit normal operations, no output from PV1 and PV2,no damage, no hazard, no fire

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Clause	Requirement – Test	Result – Remark	Verdict

Slave cpu, U23 loss control	short circuit pin9 to pin10	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V 4,35	40V 12,5A* 2	Unit normal operations, no output from PV3 and PV4,no damage, no hazard, no fire
L Grid voltage resistance monitoring,+ R301	short circuit	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
L Grid voltage resistance monitoring,+ R301	open circuit	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
N Grid voltage resistance monitoring,+ R299	short circuit	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
N Grid voltage resistance monitoring,+ R299	open circuit	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
Frequency resistance monitoring,+ R125	short circuit	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
Frequency resistance monitoring,+ R125	open circuit	230V 8,6A	40,0V 12,5A* 4	10min	F3	230V, 0,01A	40V, 0,01A	Unit shut down, no damage, no hazard, no fire
Relay K1	short circuit before start up	230V, 0,01A	40V, 0,01A	10min	F3	230V, 0,01A	40V, 0,01A	Unit can't start up, no damage, no hazard, no fire
Note: Silicon glue was covered all the PCB and critical components which for basic insulation and reinforce insulation used.								

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Clause	Requirement – Test	Result – Remark	Verdict

7.3.2	TABLE: DVC and Working Voltage Measurement Tests		P
Location	rms voltage (V)	peak voltage (V)	Classification
Model: CE-1P20001G-230-EU			
Transformer T6			
Pin 1 to Pin 2	74,6	140	DVC-C
Pin 3 to Pin 4	238	352	DVC-C
Supplementary information:			

7.3.5, 7.3.6, 7.5.4	TABLE: Touch current measurement	P

The unit was connected to Max. Input voltage, Output 230Vac, 50Hz. The outputs were loaded to the rated value. The current measuring circuit according to Figure 4 of IEC 60990 was taken.

Single phase equipment			
Parts tested	Measured voltage (V)	Calculated current (mA)	Comments
Model: CE-1P20001G-230-EU			
Metal enclosure → Earth	1,109	2,22	Normal condition

Comments:

Humidity preconditioning according to 4.5 was performed before this test

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. 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.

Compliance is checked by the following type test. The PCE shall be set up without any connection to the earth and shall be operated at rated voltage. Under these conditions, the touch current shall be measured between the means of connection for the external PROTECTIVE EARTHING CONDUCTOR and the external PROTECTIVE EARTHING CONDUCTOR itself with the probe of Figure 4 of IEC 60990.

7.3.6.3.3	TABLE: Ground Continue Test				P
Location	resistant measures (Ω)	Test Current(A)	Voltage Drop (V)	Time (s)	
Model: CE-1P20001G-230-EU					
PE to enclosure cover	0,010	32	0,32	120s	
PE to enclosure back	0,011	32	0,32	120s	

Supplementary information:

Protective bonding shall meet following requirement:

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.
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.

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

7.3.7	**TABLE: clearance and creepage distance measurements**					**P**
clearnace cl and creepage distance dcr at / of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Model: CE-1P20001G-230-EU						
L line to N(BI)	--	230	3,0	5,26	3,0	>5,26
PV+ to PV-(BI)	60	--	0,2	2,77	0,2	>2,77
PV+ to enclosure (BI)	60	--	0,2	4,52	0,2	>4,52
transformer T3 Primary to Secondly(BI)	--	230	5,5	11,68	5,5	>11,68
Bus capacitor C114 to enclosure(BI)	60	--	0,2	2,74	0,2	>2,74
Notes: BI: Basic insulation; RI: Reinforced insulation						

7.3.7.8.3.2 to 7.3.7.8.3.3	**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)
Model: CE-1P20001G-230-EU				
Transformer insulation tape (Reinforced Insulation)	230	2860rms ac	0,2	>0,2

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

7.3.9	**TABLE: Capacitor discharge**			**P**
A storage oscilloscope was connected across the external point of disconnection of the mains supply.				
Measurement location		Initial voltage	Time to decay to 60V or limit of 7.3.5.4	Inverter Status
Model: CE-1P20001G-230-EU				
AC output:				
L to N		941,1V	0,550s	feeding power to grid
L to N		272,9V	0,236s	stand by
DC input:				
PV+ to PV-		49,81V	0,048s	feeding power to grid
PV+ to PV-		51,34V	1,238s	stand by

Comments:

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.

In the case of plugs, connectors, or similar devices that can be disconnected without the use of a tool, the withdrawal of which results in the exposure of conductors (e.g. pins), the discharge time to reduce the voltage to DVC A (See 7.3.2.2) or to a stored charge level below the limits specified in 7.3.5.4 shall not exceed 1s.

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.

Capacitors within a PCE shall be discharged to a voltage less than DVC A (See 7.3.2.2), or an energy level below the limits specified in 7.3.5.4, within 10 s after the removal of power from the PCE. If this re-quirement is not achievable for functional or other reasons, the warning symbol 21 of Table D-1 and an indication of the discharge time shall be placed in a clearly visible position on the enclosure, the capacitor protective barrier, or at a point close to the capacitor(s) concerned (depending on the construction). The time required for the capacitors to discharge after the removal of power from the PCE shall also be stated in the servicing instructions. See 5.3.4 for marking.

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

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
Model: CE-1P20001G-230-EU				
Output terminal to enclosure(BI)	1500 Va.c.	4000	--	P
input terminal to enclosure(BI)	160 Va.c.	800	--	P
AC output terminal to communication port(RI)	3500 Va.c.	6000	--	P
DC Input terminal to communication port(RI)	320 Va.c.	1500	--	P
Note: BI: Basic insulation; RI: Reinforced insulation Humidity preconditioning according to 4.5 was performed before this test.				

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
CE-1P20001G-230-EU					
DC connector	Dongguan Vaconn Electronic Technology.,Ltd	D4B	1100VDC 30A -40°-+85°	IEC62852:2014 EN 62852:2015	R 50396796
DC cable	DONGGUAN ZHONGZHEN ENERGY TECHNOLOGY CO.,LTD	3135	600V 200°	UL94	E355578
AC connector	Wuxi Betteri Electronic Technology Co.,LTD	BC03A/B	-40°-+85°	IEC 62852	B 180385127008
AC cable	Suzhou Baohing Electric Wire & Cable CO.,LTD	TC-ER 12AWG 3C	-40℃ to +90℃	UL1581	E335648
Inverter Choke(L8,L9)	JiangSu FuJun Electronic Technology Co.,Ltd.	FJ0268-051	130℃0.8mH	--	--
Insulation tape of INV inductance	YaHua	Epoxy FR-4	--	--	--
wire of INV inductance	SAINT	MW79#	155	--	--
Core of INV	TianMing	T18*10*10C M10K	--	--	--
XCapacitor (C27,C77,C79, C250, C225,C227, C228,C332)	EPCOS India Private Ltd	B32922	0.33uF,305Vac, X2,110℃	EN 60384-14,	40010694
YCapaci-tor(C73, C85, C41,C42,C53 C66, C67,C75 C86,C87,,C97, C129)	EPCOS India Private Ltd	B32021	4700pF, 300Vac,Y2, 105℃	EN 60384-14	40018909

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Electroanaly-siscapacitor (C28,~C30, C54~C56, C81~C83, C113, ~C115)	SAMXON	GY 63V2700μF	2700uF, 63V, 105℃ φ18X40	--	--
Varistor (RV4,RV8)	CERGLASSMFG INC	B72210S2301K101	470Vac, -40~105℃	--	--
Current Sensors（U6, U7, U10, U11, U12, U13, U15, U17）	Weifang Jin Haidi Electronics Co Ltd	JHD-EE5-13-B-100-2.0	Φ0.08×1 50:1 >2.0mH	--	--
PCB	HUIZHOU Kingsum Circuit Electronics Co Ltd	KSE-M	130℃, V-0	UL94	E345887
Optocoupler (IS6)	NOVOSENSE	NSi8140S0	Cr: ≥4.2mm, 3000V, CI:≥5mm	DIN VDE V 0884-11:2017-01	40050121
Diode	CREE	C4D02120E	V RRM = 1200 V I F (T C =135˚C) = 4.5 A Q c = 11 nC	--	--
Fuse	HOLLYAND CO LTD	5ET	250Vac,10A	UL94	E156471
High Voltage Resistor (R291,R293)	YAGEO	RC2512JK-075R1L	-55℃ to 155℃ 5%	--	--
Power MOSFET	AOS	AONS66521	V DS 150V I D (at V GS =10V) 100A	--	--

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

14	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
			R DS(ON) (at V GS =10V) < 9.8mΩ R DS(ON) (at V GS =8V) < 11.5mΩ		
AB glue	Dongguan City Jia Di New Materials Co Ltd	JD	105°	UL94	E485392
Insulation spacer	ZHEJIANG SAINTYEAR ELECTRONIC TECHNOLOGIES CO LTD	SY-SP6000	-40°~150°	--	--
Insulation tape of transformer	YuSheng	TIW-B	130°	--	--
Wire of transformer	KaiZhongHeDong	wire	130°	--	--
Core of transformer	KaiYuan	Ferrite Core PQ3415	KP95	--	--
realy	Xiamen Hongfa Electroacoustics Co., Ltd	HF115F	-40°~85°	UL60947	E134517

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

Annex 1. Instrument list

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

No,	Equipment	Internal No,	Type/characteristics	Manufacturer	Last Calibration	Due Data
1	Oscilloscope	A4089024SH	P4034B	Tektronix	07/Jul/20	06/Jul/21
2	Oscilloscope	A4089036SH	DL850	YOKOGAWA	12/Aug/20	11/Aug/21
3	Voltage probe	A4089004SH	P2220	Tektronix	11/Oct/19	10/Oct/20
4	Current probe	A4089037SH	960 30	YOKOGAWA	11/Oct/19	12/Oct/20
5	Current probe	A4089038SH	960 30	YOKOGAWA	11/Oct/19	12/Oct/20
6	Current probe	A4089039SH	960 30	YOKOGAWA	11/Oct/19	12/Oct/20
7	AC power supply	A7040071SH	61512	Chroma	17/Feb/20	16/Feb/22
8	AC power supply	A7040057SH	61512	Chroma	07/Jul/19	06/Jul/21
9	AC power supply	A7040077SH	MX-30	AMETEK	-	-
10	Programmable DC source	A7040058SH	62150H-1000S	Chroma	-	-
11	Programmable DC source	A7040059SH	62150H-1000S	Chroma	-	-
12	Programmable DC source	A7040069SH	62150H-1000S	Chroma	-	-
13	Programmable DC source	A7040074SH	62150H-1000S	Chroma	-	-
14	Programmable DC source	A7040075SH	62150H-1000S	Chroma	-	-

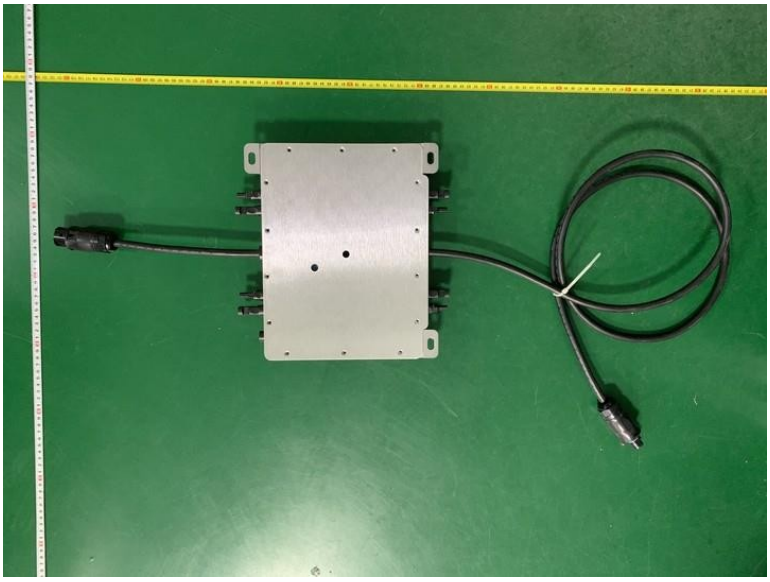
IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

15	Programmable DC source	A7040076SH	62150H-1000S	Chroma	-	-
16	Programmable DC source	A7040070SH	62150H-1000S	Chroma	-	-
17	Analisador de potência	A1240097SH	WT3000	YOKOGAWA	27/Apr/20	26/Apr/21
18	Power Analyzer	A1240096SH	LMG500	ZES ZIMMER	11/Oct/19	10/Oct/20
19	Power Analyzer	A1240101SH	WT3000	YOKOGAWA	07/Jul/20	06/Jul/21
20	Anti-isolating test stystem	A7150074SH	ACTL-380SH	qunling	-	-
21	Load cabinet	A7150083SH	WSTF-LDJ60K/300	shanghai wen shun	-	-
22	Load cabinet	A7150084SH	WSTF-LDJ45K/0385	shanghai wen shun	-	-
23	Load cabinet	A7150085SH	WSTF-LDJ45K/0385	shanghai wen shun	-	-
24	Load cabinet	A7150075SH	WSTF-RC25k/0,3D 0,001kVA-25kVA	shanghai wen shun	-	-
25	Temperature recorder	A740037SH	G820	GRAPHIEC	11/Oct/19	10/Oct/20
26	Load cabinet(for flick)	A7150090SH	200Ω , 250V;1200W	shanghai wen shun	-	-
27	Variable resistor	A7150076SH	BX8-67	LingOu	-	-

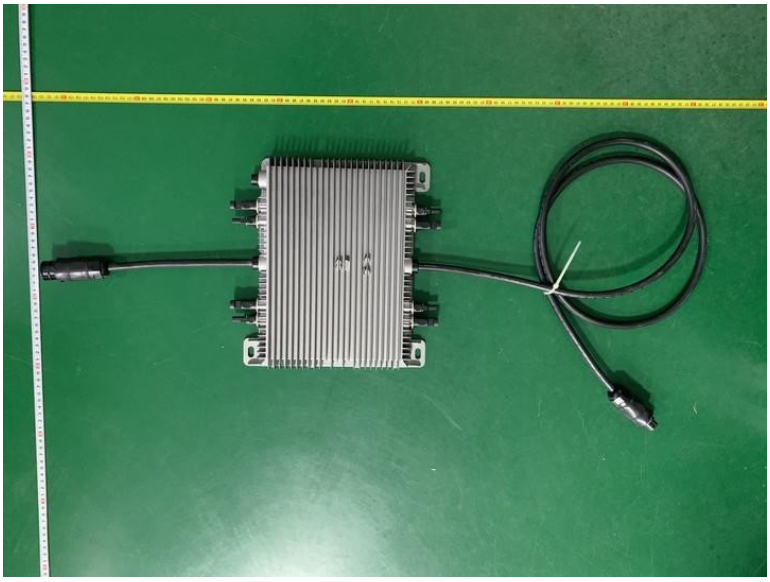
IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

Annex 2. Pictures of the unit

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

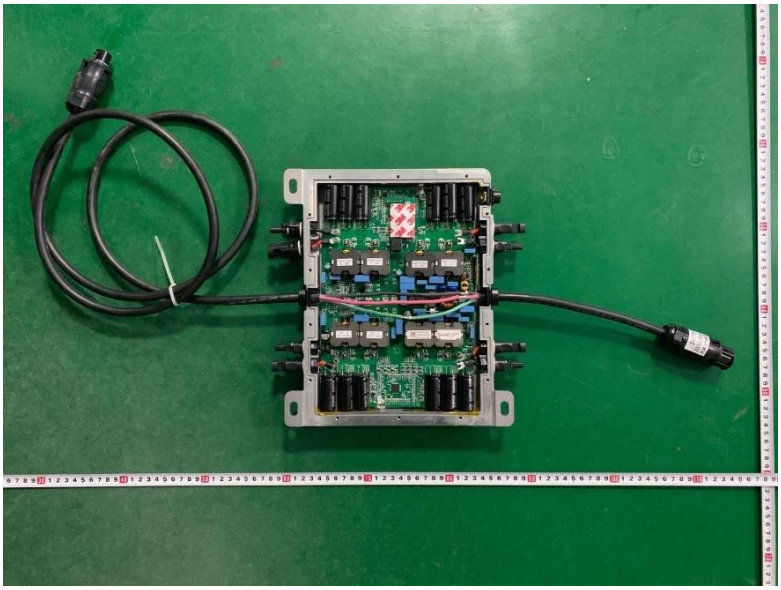


Enclosure rear for all model

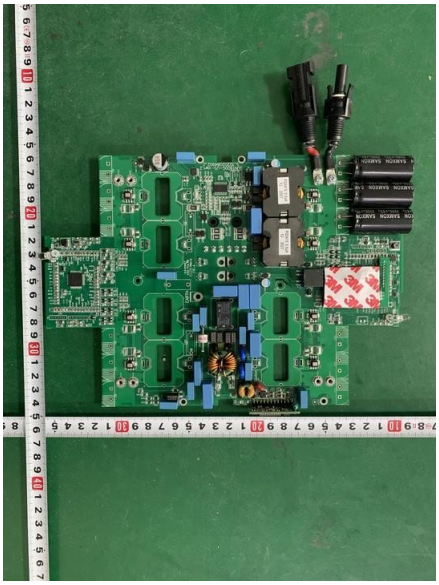


Enclosure rear for all model

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

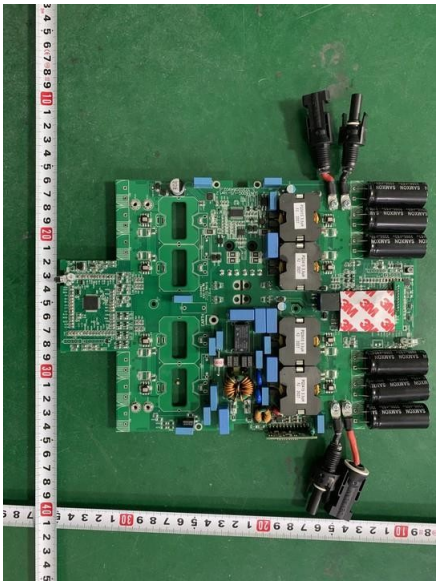


Interior view with epoxy compound for all model

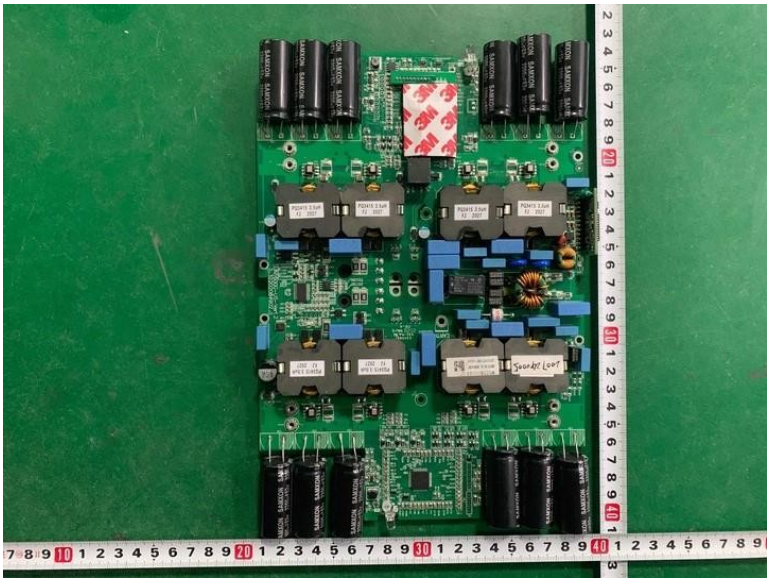


Main board for CE-1P3001G-230-EU, CE-1P5001G-230-EU

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

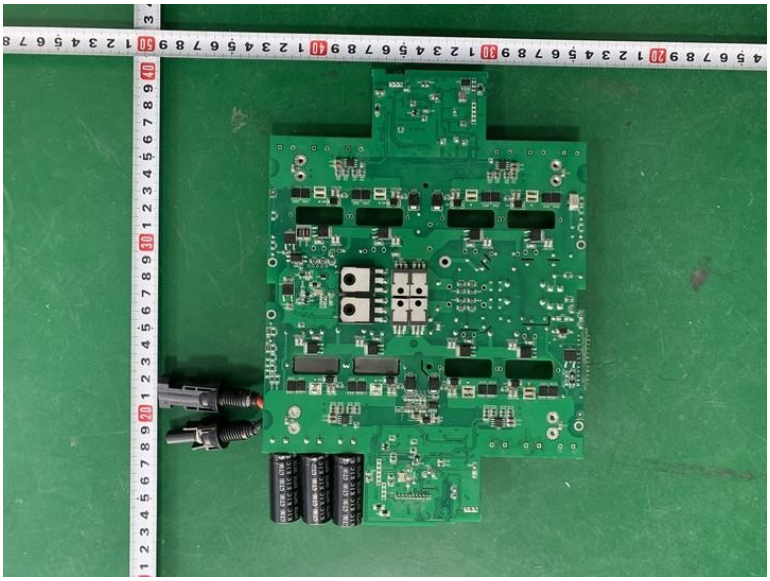


Main board for CE-1P6001G-230-EU, CE-1P8001G-230-EU, CE-1P10001G-230-EU

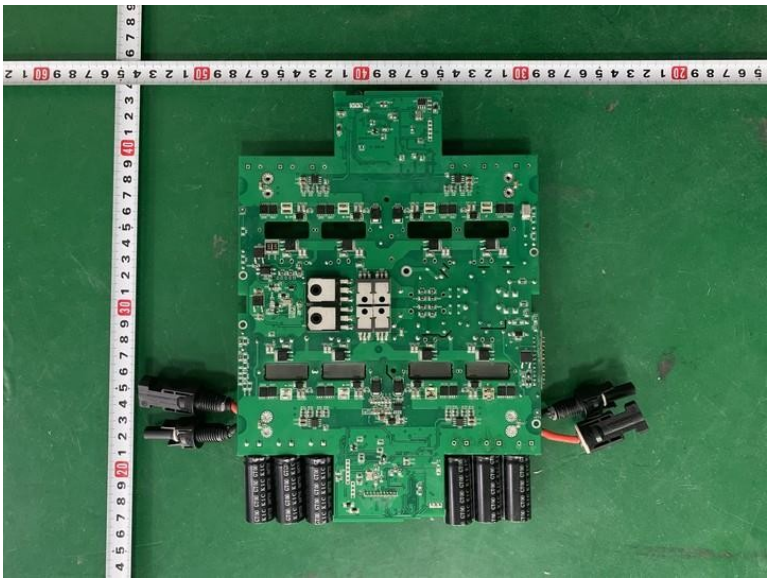


Main board for CE-1P13001G-230-EU, CE-1P16001G-230-EU, CE-1P18001G-230-EU, CE-1P20001G-230-EU

IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict

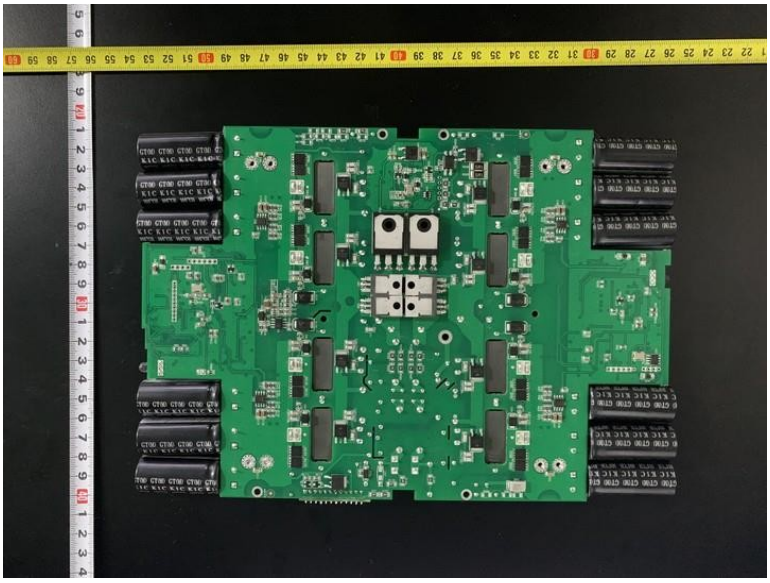


Main board solder side for CE-1P3001G-230-EU, CE-1P5001G-230-EU



Main board solder side for CE-1P6001G-230-EU, CE-1P8001G-230-EU, CE-1P10001G-230-EU

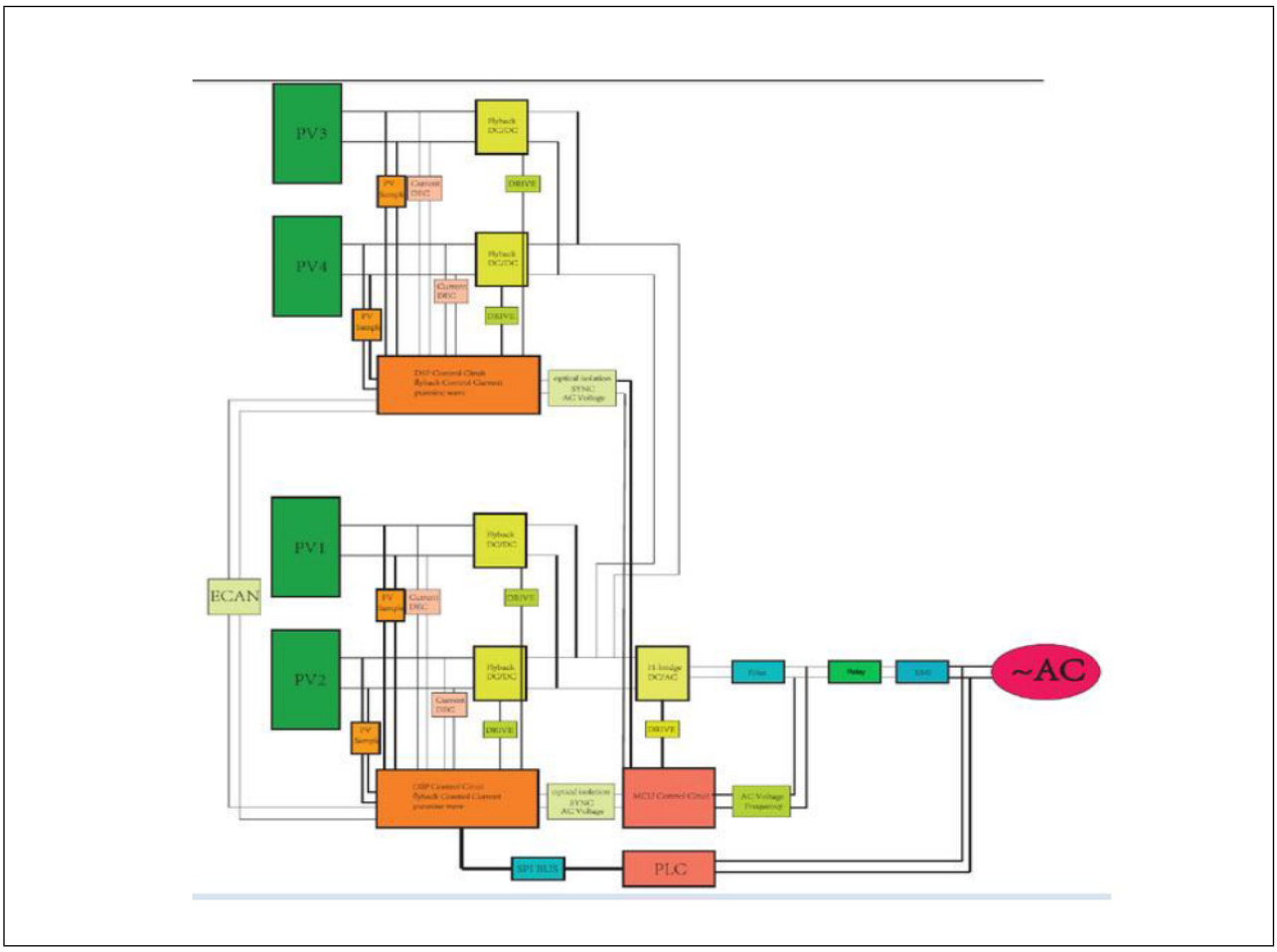
IEC/EN 62109-1:2010			
Clause	Requirement – Test	Result – Remark	Verdict



Main board solder side for CE-1P13001G-230-EU, CE-1P16001G-230-EU, CE-1P18001G-230-EU, CE-1P20001G-230-EU

PE terminal view for all model

ELECTRICAL Schemes



----------End of report----------