TEST REPORT
IEC 61010-1
Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 1: General requirements

Report Number. .....:	68.240.24.0042.01
Date of issue .....:	2025-03-07
Total number of pages.....:	84
Name of Testing Laboratory preparing the Report.....:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Applicant's name .....:	Marstek energy Co., Ltd.
Address .....:	1-4F, BLDG#9, 1/F, BLDG#5, West Industrial Park, South of the Intersection of Ma'anshanTunnel and Zhangshe Avenue, Xiangxi High-tech Zone, 416007 Xiangxi, Hunan Province, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard.....:	IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016
Test procedure .....:	Safety report
Non-standard test method .....:	N/A
TRF template used.....:	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No. .....:	IEC61010_1P
Test Report Form(s) Originator ....:	VDE Prüf- und Zertifizierungsinstitut GmbH
Master TRF.....:	2021-04-12

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

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description..... :	Three Phase Meter
Trade Mark..... :	MARSTEK
Manufacturer ..... :	Same as Applicant
Model/Type reference..... :	TPM-100CTW
Ratings..... :	Input: 100-260VAC, 50/60Hz, 3W

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch	
Testing location/ address ..... :		Building 12&13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District, Shenzhen, Guangdong 518052, China	
Tested by (name, function, signature)..... :		Sidney Li Project Handler	
Approved by (name, function, signature) .. :		Yager Bi Designated Reviewer	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address ..... :			
Tested by (name, function, signature)..... :			
Approved by (name, function, signature) .. :			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address ..... :			
Tested by (name, function, signature)..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment)		
Document No.	Documents included / attached to this report (description)	Page No.
1	EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES	1
2	Test Report for EN IEC 61010-2-030:2021/A11:2021	26
3	Photo documents	5

Documents referenced by this report (available on request):		
Document Name or No.	Documents description	Page No.
N/A		

Summary of testing:	
Clause	**Comment**
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Test Report History: This report may consist of more than one report and is only valid with additional or previous issued reports:	
Report Ref. No.	Item
N/A	
Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were tested and found to comply with the requirements of: - EN 61010-1:2010/A1:2019 - EN IEC 61010-2-030:2021/A11:2021 All applicable tests as described in the compliance checklist were performed	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District, Shenzhen, Guangdong 518052, China
Summary of compliance with National Differences (List of countries addressed): See the attachment No. 1 of EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES for details. ☒ **The product fulfils the requirements of** EN 61010-1:2010/A1:2019, EN IEC 61010-2-030:2021/ A11:2021.	

Statement concerning the uncertainty of the measurement systems used for the tests
(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

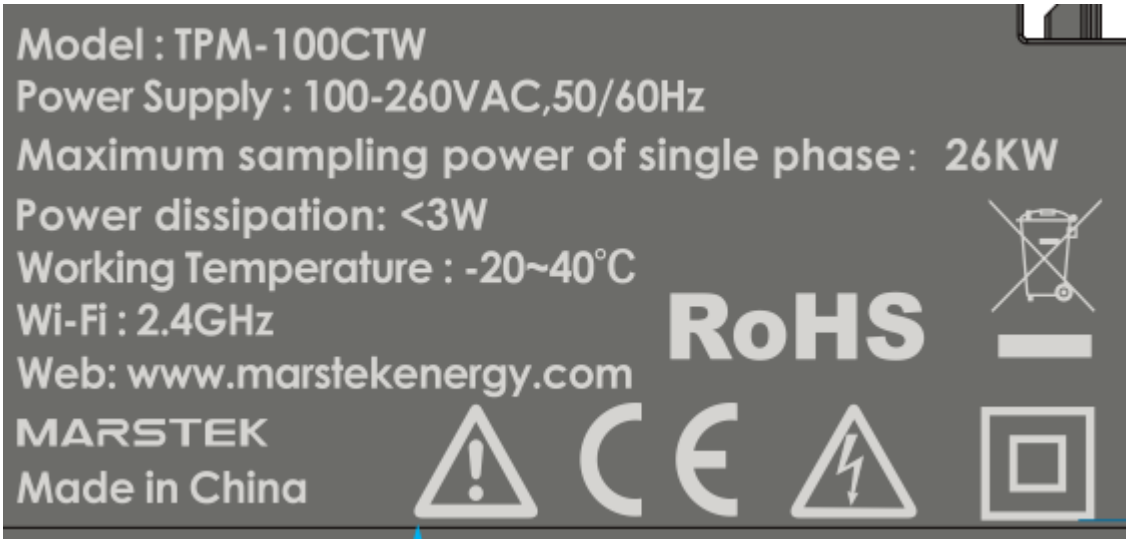
Procedure number, issue date and title:

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

☒ **Statement not required by the standard used for type testing**

Copy of marking plate:

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



Remark: height of WEEE symbol at least 7mm, height of CE marking at least 5mm, height of symbol at least 2.75mm.

Test item particulars:	
Type of item ..... :	Measurement
Description of equipment function..... :	Three Phase Meter
Connection to MAINS supply ..... :	L, N terminals
Overvoltage category..... :	II
POLLUTION DEGREE..... :	2
Means of protection..... :	Built-in component, consider in end system
Environmental conditions ..... :	~~Normal /~~ Extended (Specify): Indoor use Altitude: up to 2000m Tempearture: -20-40°C Humidity: 5-80% Mains supply voltage fluctuation: ±10%
For use in wet locations..... :	~~Yes /~~ No
Equipment mobility..... :	~~Portable / Hand-held / Floor standing / Fixed /~~ Built-in
Operating conditions..... :	Continuous ~~/ Short-time / Intermittent~~
Overall size of equipment (W x D x H)..... :	65.4mm x 26.5mm x 83mm
Mass of equipment (kg)..... :	0.159
Marked degree of protection to IEC 60529 ..... :	IPX0
Possible test case verdicts:	
- Test case does not apply to the test object .....:	N/A (Not Applicable)
- Test object does meet the requirement.....:	P (Pass)
- Test object does not meet the requirement.....:	F (Fail)
Testing:	
Date of receipt of test item.....:	2024-09-19
Date (s) of performance of tests .....:	From 2024-12-06 to 2025-02-13

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
"(see ENCLOSURE #)" refers to additional information appended to the report.
"(see Form A.xx)" refers to a Table appended to the report.
Bottom lines for measurement Tables Forms A.xx are optional if used as record.

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

For EU directives and regulations which have been harmonized with (EU) 2019/1020 in its Annex I, the name, registered trade name or registered trade mark, and contact details, including the postal address of the economic operator (EU manufacturer, EU importer, EU authorised representative, or EU fulfilment service provider where no other economic operator as mentioned in the first 3 options) shall be indicated on the product or on its packing, the parcel or an accompanying document

Name and address of factory (ies) .....:	**Hunan Planck Esstechnology Co., Ltd.** Building 12, West Industrial Park, South of intersection of Maanshan Tunnel and Zhangshe Avenue, Xiangxi High-tech Zone, 416000 Jishou City, Hunan Province, PEOPLE'S REPUBLIC OF CHINA

General product information and other remarks:
Description of unit:

When installing the equipment, all requirements of the mentioned standard must be fulfilled.

Built-in component, suitable enclosure should be provided by end system.

The maximum operating temperature is 40°C.

Clearance was evaluated for operating altitude up to 2000m above sea level.

The enclosure and terminals are considered as non-accessible parts.

Description of model differences:
N/A

Description of special features:
(HV circuits, high pressure systems etc.)
N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	**TESTS**		P
4.4	Testing in SINGLE FAULT CONDITIONS		P
4.4.1	Fault tests	(see Form A.1)	P
4.4.2	Application of SINGLE FAULT CONDITIONS		P
4.4.2.1	SINGLE FAULT CONDITIONS not covered by 4.4.2.2 to 4.4.2.14	(see Form A.1)	P
4.4.2.2	PROTECTIVE IMPEDANCE		N/A
4.4.2.3	PROTECTIVE CONDUCTOR	(see Form A.6)	N/A
4.4.2.4	Equipment or parts for short-term or intermittent operation		N/A
4.4.2.5	Motors		—
	– stopped while fully energized		N/A
	– prevented from starting		N/A
	– one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors		N/A
4.4.2.7	MAINS transformers		N/A
4.4.2.7.2	Short circuit	(see Form A.39)	N/A
4.4.2.7.3	Overload	(see Forms A.26B and A.40)	N/A
4.4.2.8	Outputs		N/A
4.4.2.9	Equipment for more than one supply		N/A
4.4.2.10	Cooling	(see Form A.26A)	—
	– air holes closed		N/A
	– fans stopped		N/A
	– coolant stopped		N/A
	– loss of cooling liquid		N/A
4.4.2.11	Heating devices		—
	– timer overridden		N/A
	– temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks		N/A
4.4.2.14	Voltage selectors		N/A
4.4.3	Duration of tests	(see Form A.1)	—
4.4.4	Conformity after application of fault conditions	(see Forms A.1, A.6 and A.18)	P
5	**MARKING AND DOCUMENTATION**		P
5.1	**Marking**		P
5.1.1	General		P
	Required equipment markings		—

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Clause	Requirement + Test	Result - Remark	Verdict
	– Visible from the exterior; or		P
	– Visible after removing cover or opening door		N/A
	– Visible after removal from a rack or panel		N/A
	Not put on parts which can be removed by an operator		P
	Letter symbols (IEC 60027) used		P
	Graphic symbols of Table 1 used		P
5.1.2	Identification		P
	Equipment is identified by:		—
	a) Manufacturer's or supplier's name or trademark	MARSTEK	P
	b) Model number, name or other means	TPM-100CTW	P
	Manufacturing location identified	Only one manufacturing location	N/A
5.1.3	MAINS supply		P
	Equipment is marked as follows:		—
	a) Nature of supply:		—
	1) a.c. RATED MAINS frequency or range of frequencies ..... :	50/60Hz	—
	2) d.c. with symbol 1..... :	-	—
	b) RATED supply voltage(s) or range ..... :	100-260V	—
	c) Max. RATED power (W or VA) or input current ..... :	3W	—
	The marked value not less than 90 % of the maximum value	(see Form A.2)	P
	If more than one voltage range:		—
	Separate values marked; or		N/A
	Values differ by less than 20 %	(see Form A.2)	N/A
	d) OPERATOR-set for different RATED supply voltages:		—
	Indicates the equipment set voltage		N/A
	PORTABLE EQUIPMENT indication is visible from the exterior		N/A
	Changing the setting changes the indication		N/A
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:		—
	With the voltage if it is different from the MAINS supply voltage.....:		—
	For use only with specific equipment		N/A
	If not marked for specific equipment it is marked with:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	The maximum RATED current or power; or		N/A
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		N/A
	OPERATOR replaceable fuse marking (see also 5.4.5).....:	No operator replaceable fuse	—
5.1.5	TERMINALS, connections and operating devices		P
5.1.5.1	General		P
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		P
	If insufficient space, symbol 14 used		P
	Push-buttons and actuators of emergency stop devices and indicators:		—
	– used only to indicate a warning of danger; or		N/A
	– the need for urgent action		N/A
	– coloured red		N/A
	– coded as specified in IEC 60073		N/A
	Supplementary means of coding provided, if meaning of colour relates (see IEC 60073):		—
	– to safety of persons; or		N/A
	– safety of the environment		N/A
5.1.5.2	TERMINALS		—
	MAINS supply TERMINAL identified		P
	Other TERMINAL marking:		—
	a) FUNCTIONAL EARTH TERMINALS marked with symbol 5		N/A
	b) PROTECTIVE CONDUCTOR TERMINALS:		—
	Symbol 6 is placed close to or on the TERMINAL; or		N/A
	Part of appliance inlet		N/A
	c) TERMINALS of circuits (symbol 7 used)		N/A
	d) HAZARDOUS LIVE TERMINALS supplied from the interior		N/A
	Standard MAINS socket outlet used; or		N/A
	RATINGS marked; or		N/A
	Symbol 14 used		N/A
5.1.6	Switches and circuit-breakers		N/A
	If disconnecting device, off position clearly marked		N/A
	If push-button used as power supply switch:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	– Symbol 9 and 15 used for on-position		N/A
	– Symbol 10 and 16 used for off-position		N/A
	– Pair of symbols 9, 15 and 10, 16 close together		N/A
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION		P
	Protected throughout (symbol 11 used)		P
	Only partially protected (symbol 11 not used)		N/A
5.1.8	Field-wiring TERMINAL boxes		N/A
	If TERMINAL or ENCLOSURE exceeds 60 °C:	(see Form A.26A)	—
	Cable temperature RATING marked ..... :		—
	Marking visible before and during connection or beside TERMINAL		N/A
5.2	**Warning markings**		P
	Visible when ready for NORMAL USE		P
	Are near or on applicable parts		P
	Symbols and text correct dimensions and colour:		—
	a) Symbols min 2,75 mm and text 1,5 mm high and contrasting in colour with background		P
	b) Symbols and text moulded, stamped or engraved in material min. 2,0 mm high and		N/A
	0,5 mm depth or raised if not contrasting in colour		N/A
	If necessary marked with symbol 14, or	⚠ symbol provided on label	P
	Additional symbols such as symbol 12, 13 or 17 used to indicate the nature of HAZARD		N/A
	Statement to place equipment in a safe state before access by using a tool to HAZARDOUS parts is permitted		N/A
5.3	**Durability of markings**		P
	The required markings remain clear and legible in NORMAL USE	(see Form A.3)	P
5.4	**Documentation**		P
5.4.1	General	English / French manual provided	P
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY		P
	Safety documentation for service personnel authorized by the manufacturer		P
	Documentation necessary for safe operation is provided in printed media or		P
	in electronic media if available at any time		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Documentation includes:		—
	a) Intended use		P
	b) Technical specification		P
	c) Name and address of manufacturer or supplier		P
	d) Information specified in 5.4.2 to 5.4.6		P
	e) Information to mitigate residual RISK (see also subclause 17)		N/A
	f) Accessories for safe operation of the equipment specified		P
	g) Guidance provided to check correct function of the equipment, if incorrect reading may cause a HAZARD from harmful or corrosive substances of HAZARDOUS live parts		P
	h) Instructions for lifting and carrying		N/A
	Warning statements and a clear explanation of warning symbols:		—
	– provided in the documentation; or		P
	– information is marked on the equipment		P
5.4.2	Equipment RATINGS		P
	Documentation includes:		—
	a) Supply voltage or voltage range..... :	100-260VDC	—
	Frequency or frequency range ..... :	50/60Hz	—
	Power or current rating..... :	3W	—
	b) Description of all input and output connections in accordance to 6.6.1 a)		P
	c) RATING of insulation of external circuits in accordance to 6.6.1 b)		N/A
	d) Statement of the range of environmental conditions (refer to 1.4):		—
	1) indoor or outdoor use,		P
	2) altitude,		P
	3) temperature,		P
	4) relative humidity,		P
	5) MAINS supply voltage fluctuations,		P
	6) OVERVOLTAGE CATEGORY,		P
	7) WET LOCATION, if applicable,		N/A
	8) POLLUTION DEGREE of the intended environment		P
	e) Degree of ingress protection (IEC 60529)	IPX0	P
	f) If impact rating less than 5 J:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	IK code in accordance to IEC 62262 marked; or		N/A
	symbol 14 of Table 1 marked, with		N/A
	RATED energy level and test method stated		N/A
5.4.3	Equipment installation		P
	Documentation includes instructions for:		—
	a) Assembly, location and mounting requirements		P
	b) Instructions for protective earthing		P
	c) Connections to supply		P
	d) PERMANENTLY CONNECTED EQUIPMENT:		—
	1) Supply wiring requirements		N/A
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
	e) Ventilation requirements		N/A
	f) Safety characteristics for special external services (e. g. maximum and minimum temperature, pressure, flow of air, cooling liquid)		N/A
	g) Instructions relating to sound level		N/A
5.4.4	Equipment operation		P
	Instructions for use include:		—
	a) Identification and description of operating controls		P
	b) Positioning for disconnection		P
	c) Instructions for interconnection to accessories or other equipment		P
	d) Specification of intermittent operation limits		N/A
	e) Explanation of symbols used		P
	f) Replacement of consumable materials		N/A
	g) Cleaning and decontamination		N/A
	h) Listing of any poisonous or injurious gases and quantities		N/A
	i) RISK reduction procedures relating to flammable liquids (see 9.5 c)		N/A
	j) RISK reduction procedures relating burn from surfaces permitted to exceed limits of 10.1		N/A
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and service		P
	Instructions for RESPONSIBLE BODY include:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:		—
	Instruction against the use of detachable MAINS supply cord with inadequate RATING		N/A
	Specific battery type of user replaceable batteries		N/A
	Any manufacturer specified parts		N/A
	RATING and characteristics of fuses		N/A
	Instructions include following subjects permitting safe servicing and continued safety:		—
	a) Product specific RISKS may affect service personnel		N/A
	b) Protective measures for these RISKS		N/A
	c) Verification of the safe state after repair		N/A
5.4.6	Integration into systems or effects resulting from special conditions		N/A
	Aspects described in documentation		N/A
6	**PROTECTION AGAINST ELECTRIC SHOCK**		P
6.1	**General**	(see Forms A.14 and A.15)	P
6.1.1	Requirements		P
	Protection against electric shock maintained in NORMAL CONDITION and SINGLE FAULT CONDITION		N/A
	ACCESSIBLE parts not HAZARDOUS LIVE		N/A
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:		—
	ACCESSIBLE parts and earth		N/A
	two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m		N/A
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		N/A
6.1.2	Exceptions		N/A
	Following HAZARDOUS LIVE parts may be ACCESSIBLE to an OPERATOR:		—
	a) parts of lamps and lamp sockets after lamp removal		N/A
	b) parts to be replaced by OPERATOR only by the use of tool and warning marking		N/A
	Those parts not HAZARDOUS LIVE 10 s after interruption of supply	(see Form A.5)	N/A
	Capacitance test if charge is received from internal capacitor	(see Forms A.4 and A.5)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.2	**Determination of ACCESSIBLE parts**	(see Form A.4)	N/A
6.2.1	General	Built-in component, considered in end system	N/A
	Unless obviously determination of ACCESSIBLE parts as specified in 6.2.2 to 6.2.4		N/A
6.2.2	Examination		N/A
	– with jointed test finger (as specified B.2)		N/A
	– with rigid test finger (as specified B.1) and a force of 10 N		N/A
6.2.3	Openings above parts that are HAZARDOUS LIVE		N/A
	– test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls	No such openings	N/A
	– test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.3	**Limit values for ACCESSIBLE parts**	Built-in component, considered in end system	N/A
6.3.1	Levels in NORMAL CONDITION	(see Form A.5)	N/A
	a) Voltage limits less than 30 V r.m.s. and 42,4 V peak or 60 V d.c.		N/A
	for WET LOCATIONS voltage limits less than 16 V r.m.s. and 22,6 V peak or 35 V d.c.		N/A
	Voltages are not HAZARDOUS LIVE the levels of:		—
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non-sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A
	for WET LOCATIONS measuring circuit A.4 used		N/A
	70 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	c) Levels of capacitive charge or energy less:		—
	1) 45 µC for voltages up to 15 kV peak or d.c. or line A of Figure 3		N/A
	2) 350 mJ stored energy for voltages above 15 kV peak or d.c.		N/A
6.3.2	Levels in SINGLE FAULT CONDITION	(see Form A.6)	N/A
	a) Voltage limits less than 50 V r.m.s. and 70 V peak or 120 V d.c.		N/A
	for WET LOCATIONS voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		N/A
	Voltages are not HAZARDOUS LIVE the levels of:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Current less than 3,5 mA r.m.s. for sinusoidal, 5 mA peak non-sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		P
	for WET LOCATIONS measuring circuit A.4 used		N/A
	500 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	c) Levels of capacitive charge or energy less line B of Figure 3		N/A
6.4	**Primary means of protection**		P
6.4.1	General		P
	ACCESSIBLE parts prevented from being HAZARDOUS LIVE by one or more of following means:		—
	a) ENCLOSURES or PROTECTIVE BARRIERS (see 6.4.2)		P
	b) BASIC INSULATION (see 6.4.3)		P
	c) Impedance (see 6.4.4)		N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	(see Forms A.15 and A.16)	P
	– meet rigidity requirements of 8.1		P
	– meet requirements for BASIC INSULATION, if protection is provided by insulation		P
	– meet requirements of 6.7 for CREEPAGE and – CLEARANCES between ACCESSIBLE parts and – HAZARDOUS live parts, if protection is provided by – limited access		P
6.4.3	BASIC INSULATION	(see Forms A.15 and A.16)	P
	– meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.4.4	Impedance	(see Forms A.12 and A.15)	N/A
	Impedance used as primary means of protection meets all the following requirements:		—
	a) limits current or voltage to level of 6.3.2	(see Form A.6)	N/A
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7	(see Form A.15)	N/A
6.5	**Additional means of protection in case of SINGLE FAULT CONDITION**		P
6.5.1	General		P
	ACCESSIBLE parts are prevented from becoming HAZARDOUS live by the primary means of protection and supplemented by one of:		—
	a) PROTECTIVE BONDING (see 6.5.2)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) SUPPLEMENTARY INSULATION (see 6.5.3)		P
	c) automatic disconnection of the supply (see 6.5.5)		N/A
	d) current- or voltage-limiting device (see 6.5.6)		N/A
	Alternatively one of the single means of protection is used:		—
	e) REINFORCED INSULATION (see 6.5.3)		P
	f) PROTECTIVE IMPEDANCE (see 6.5.4)		N/A
6.5.2	PROTECTIVE BONDING	(see Forms A.7, A.8, A.9, A.10 or A.11)	N/A
6.5.2.1	General		N/A
	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		—
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		N/A
	Separated by conductive screen or barrier bonded to PROTECTIVE CONDUCTOR TERMINAL		N/A
6.5.2.2	Integrity of PROTECTIVE BONDING		—
	a) PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N/A
	b) Soldered connections:		—
	Independently secured against loosening		N/A
	Not used for other purposes		N/A
	c) Screw connections are secured		N/A
	d) PROTECTIVE BONDING not interrupted; or		N/A
	except as removable part that carries MAINS SUPPLY input connection to the whole equipment		N/A
	e) Any movable PROTECTIVE BONDING connection specifically designed, and meets 6.5.2.4		N/A
	f) No external metal braid of cables used (not regarded as PROTECTIVE BONDING)		N/A
	g) IF MAINS SUPPLY passes through:		—
	Means provided for passing protective conductor;		N/A
	Impedance meets 6.5.2.4		N/A
	h) Protective conductors bare or insulated, if insulated, green/yellow		N/A
	Exceptions:		—
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3		N/A
6.5.2.3	PROTECTIVE CONDUCTOR TERMINAL		—
	a) Contact surfaces are metal		N/A
	b) Appliance inlet used		N/A
	c) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		N/A
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		—
	Is near terminals of circuit for which protective earthing is necessary		N/A
	External if other terminals external		N/A
	e) Equivalent current-carrying capacity to MAINS supply TERMINALS	(see Form A.7)	N/A
	f) If plug-in, makes first and breaks last		N/A
	g) If also used for other bonding purposes, PROTECTIVE CONDUCTOR:		—
	Applied first;		N/A
	Secured independently;		N/A
	Unlikely to be removed by servicing		N/A
	h) PROTECTIVE CONDUCTOR of measuring circuit:		—
	1) Current RATING equivalent to measuring circuit TERMINAL;		N/A
	2) PROTECTIVE BONDING: not interrupted by any switch or interrupting device		N/A
	i) FUNCTIONAL EARTH TERMINALS allow independent connection		N/A
	j) If a binding screw used for PROTECTIVE CONDUCTOR TERMINAL:		—
	Suitable size for bond wire		N/A
	Not smaller than M 4		N/A
	At least 3 turns of screw engaged		N/A
	Passes tightening torque test	(see Form A.8)	N/A
	k) Contact pressure not capable being reduced by deformation of materials		N/A
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment	(see Form A.9)	N/A
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		—
	– less than 0,1 Ohm; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– less than 0,2 Ohm if equipment is provided with non-detachable cord		N/A
6.5.2.5	Impedance of PROTECTIVE BONDING of PERMANENTLY CONNECTED EQUIPMENT	(see Form A.10)	N/A
6.5.2.6	Transformer PROTECTIVE BONDING screen	(see Form A.11)	N/A
	Transformer provided with screen for PROTECTIVE BONDING:		—
	screen bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses (see 6.5.2.2 a)		N/A
	screen bonding with soldered connection (see 6.5.2.2 b) is:		—
	– Independently secured against loosening		N/A
	– Not used for other purposes		N/A
6.5.3	SUPPLEMENTARY and REINFORCED INSULATION		P
	Meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.5.4	PROTECTIVE IMPEDANCE	(see TABLE 1.A and Form A.12)	N/A
	Limits current or voltage to level of 6.3.1 in NORMAL and to level of 6.3.2 in SINGLE FAULT CONDITION		N/A
	CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of DOUBLE or REINFORCED INSULATION of 6.7	(see Form A.15)	N/A
	The PROTECTIVE IMPEDANCE consists of one or more of the following:	(see TABLE 1.A and Form A.12)	—
	a) appropriate single component suitable for safety and reliability for protection, it is:		—
	1) RATED twice the maximum WORKING VOLTAGE		N/A
	2) resistor RATED for twice the power dissipation for maximum WORKING VOLTAGE		N/A
	b) combination of components		N/A
	Single electronic device not used as PROTECTIVE IMPEDANCE		N/A
6.5.5	Automatic disconnection of the supply		N/A
	a) RATED to disconnect the load within time specified in Figure 2		N/A
	b) RATED for the maximum load conditions of the equipment		N/A
6.5.6	Current- or voltage-limiting devices	(see Form A.13)	N/A
	Device complies with all of:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) RATED to limit the current or voltage to the level of 6.3.2	(see Form A.6)	N/A
	b) RATED for the maximum WORKING VOLTAGE; and		N/A
	RATED for the maximum operational current if applicable		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of SUPPLEMENTARY INSULATION of 6.7	(see Forms A.14 and A.15)	N/A
6.6	**Connections to external circuits**		P
6.6.1	General		P
	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		—
	– the external circuits		P
	– the equipment		P
	Protection achieved by separation of circuits; or		P
	short circuit of separation does not cause a HAZARD		N/A
	Instructions or markings for each terminal include:	Provided in manual	—
	a) RATED conditions for TERMINAL		P
	b) Required RATING of external circuit insulation		P
6.6.2	TERMINALS for external circuits		P
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE after 10 s of interrupting supply connection	(see Form A.5)	P
6.6.3	Circuits with terminals which are HAZARDOUS LIVE		P
	These circuits are:		—
	Not connected to ACCESSIBLE conductive parts; or		P
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential		N/A
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE		P
6.6.4	Terminals for stranded conductors		N/A
	No RISK of accidental contact because:		—
	– Located or shielded		N/A
	– Self-evident or marked whether or not connected to ACCESSIBLE conductive parts		N/A
	Complies as applicable:		—
	a) Manufacturer's specified maximum length of removed insulation, or		N/A
	b) 8 mm length of insulation removed		N/A
6.7	**Insulation requirements**	(see Form A.14)	P

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.1	The nature of insulation		P
6.7.1.1	General		P
	Insulation between ACCESSIBLE parts or between separate circuits consist of CLEARANCES, CREEPAGE DISTANCES and solid insulation if provided as protection against a HAZARD		P
6.7.1.2	CLEARANCES		P
	Required CLEARANCES reflecting factors of 6.7.1.1	(see Forms A.14 and A.15)	P
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied	≤2000m	P
6.7.1.3	CREEPAGE DISTANCES		P
	Required CREEPAGE DISTANCES reflecting factors of 6.7.1.1 a) to d)	(see Forms A.14 and A.15)	P
	CTI material group reflected by requirements	Assumed IIIb	P
	CTI test performed		N/A
6.7.1.4	Solid insulation		P
	Required solid insulation reflecting factors of 6.7.1.1 a) to d)	(see Forms A.14 and A.15)	P
6.7.1.5	Requirements for insulation according to type of circuit	(see Forms A.14 and A.15)	P
	a) 6.7.2 MAINS circuits of OVERVOLTAGE CATEGORY II up to nominal supply voltage of 300 V		P
	b) 6.7.3 secondary circuits separated from circuits defined in a) by transformer		N/A
	c) K.1 MAINS circuits of OVERVOLTAGE CATEGORY III and IV or OVERVOLTAGE CATEGORY II over 300 V		N/A
	d) K.2 secondary circuits separated from circuits defined in c) by transformer		N/A
	e) K.3 circuits having one or more of:		—
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) WORKING VOLTAGE with a frequency above 30 kHz		N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(see Forms A.14 and A.15)	—
	Values for MAINS CIRCUITS of Table 4 are met		P
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.2.2	Solid insulation		P
6.7.2.2.1	General		P
	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		P
	Equipment passed voltage tests of 6.8.3 with values of Table 5	(see Form A.18)	P
	Complies as applicable:		—
	a) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	b) moulded and potted parts requirements of 6.7.2.2.2		N/A
	c) inner layers of printed wiring boards requirements of 6.7.2.2.3		N/A
	d) thin-film insulation requirements of 6.7.2.2.4		N/A
6.7.2.2.2	Moulded and potted parts		—
	Conductors between same two layers are separated by at least 0,4 mm after moulding is completed		N/A
6.7.2.2.3	Inner insulating layers of printed wiring boards		—
	Separated by at least 0,4 mm between same two layers		N/A
	REINFORCED INSULATION has adequate electric strength; one of following methods used:		—
	a) thickness of insulation is at least 0,4 mm		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A
	c) insulation is assembled of minimum two separate layers, where the combination is rated for test voltage of Table 5 for REINFORCED INSULATION		N/A
6.7.2.2.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.2.1		N/A
	REINFORCED INSULATION have adequate electric strength; one of the following methods used:		—
	a) thickness through the insulation at least 0,4 mm		N/A
	b) insulation is assembled of min. two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION	(see Form A.18)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) insulation is assembled of min. three separate layers, where the combination of two layers passed voltage tests of 6.8.3 with values of Table 5 for REINFORCED INSULATION	(see Form A.18)	N/A
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		N/A
6.7.3.1	General		N/A
	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:		—
	– REINFORCED INSULATION		N/A
	– DOUBLE INSULATION		N/A
	– screen connected to the PROTECTIVE CONDUCTOR TERMINAL		N/A
6.7.3.2	CLEARANCES	(see Forms A.14 and A.15)	N/A
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or		N/A
	twice the values of Table 6 for REINFORCED INSULATION; or		N/A
	b) pass the voltage tests of 6.8 with values of Table 6;	(see Form A.18)	N/A
	with following adjustments:		—
	1) values for reinforced insulation are 1,6 times the values for basic insulation		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
	3) minimum CLEARANCE is 0,2 mm for POLLUTION DEGREE 2 and 0,8 mm for POLLUTION DEGREE 3		N/A
6.7.3.3	CREEPAGE DISTANCES	(see Forms A.14 and A.15)	N/A
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		N/A
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation		N/A
6.7.3.4.1	General		N/A
	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		—
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with VALUES of Table 6 for BASIC and SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) if WORKING VOLTAGE exceeds 300 V, equipment passed voltage test of 6.8.3.1 for 1 min with a test voltage of 1,5 times working voltage for BASIC or SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	value for REINFORCED INSULATION are twice the WORKING VOLTAGE		N/A
	Complies as applicable:		—
	1) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		—
	Conductors between same two layers are separated by applicable distances of Table 8		N/A
6.7.3.4.3	Inner insulation layers of printed wiring boards		—
	Separated by at least the applicable distances of Table 8 between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION	(see Form A.18)	N/A
	c) insulation is assembled of min. two separate layers, where the combination is RATED for 1,6 times the test voltage of Table 6	(see Form A.18)	N/A
6.7.3.4.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.3.2 and 6.7.3.3		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of min. two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION	(see Form A.18)	N/A
	c) insulation is assembled of min. three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	—
	a.c. test of 6.8.3.1; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	d.c. test of 6.8.3.2 for circuits stressed only by d.c. voltages		N/A
6.8	**Procedure for voltage tests**	(see Forms A.14 and A.18)	P
6.9	**Constructional requirements for protection against electric shock**		P
6.9.1	General		P
	If a failure could cause a HAZARD:		—
	a) security of wiring connections		P
	b) screws securing removable covers		N/A
	c) accidental loosening		P
	d) CLEARANCES and CREEPAGE DISTANCES not reduced below the values of basic insulation by loosening of parts or wires		P
6.9.2	Insulating materials		P
	Material not to be used for safety relevant insulation:		—
	a) easily damaged materials not used		P
	b) non-impregnated hygroscopic materials not used		P
6.9.3	Colour coding		N/A
	Green-and-yellow insulation shall not be used except:		—
	a) protective earth conductors;		N/A
	b) PROTECTIVE BONDING conductors;		N/A
	c) potential equalization conductors;		N/A
	d) functional earth conductors		N/A
6.10	**Connection to MAINS supply source and connections between parts of equipment**		P
6.10.1	MAINS supply cords	Built-in component, consider in end system.	N/A
	RATED for maximum equipment current (see 5.1.3 c)		N/A
	Cable complies with IEC 60227 or IEC 60245		N/A
	Heat-resistant if likely to contact hot parts		N/A
	Temperature RATING (cord and inlet) .....:		—
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		N/A
	Detachable cords with IEC 60320 MAINS connectors:		—
	Conform to IEC 60799; or		N/A
	Have the current RATING of the MAINS connector		N/A
6.10.2	Fitting of non-detachable MAINS supply cords		N/A
6.10.2.1	Cord entry		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) inlet or bushing with a smoothly rounded opening; or		N/A
	b) insulated cord guard protruding >5 D (diameter)		N/A
6.10.2.2	Cord anchorage		—
	Protective earth conductor is the last to take the strain		N/A
	a) cord is not clamped by direct pressure from a screw		N/A
	b) knots are not used		N/A
	c) cannot push the cord into the equipment to cause a HAZARD		N/A
	d) no failure of cord insulation in anchorage with metal parts		N/A
	e) not to be loosened without a tool		N/A
	f) cord replacement does not cause a HAZARD and method of strain relief is clear		N/A
	Push-pull and or torque test	(see Form A.19)	N/A
6.10.3	Plugs and connectors		P
	MAINS supply plugs, connectors etc., conform with relevant specifications		P
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		—
	Plugs of supply cords do not fit MAINS sockets above rated SUPPLY voltage		N/A
	MAINS type plugs used only for connection to MAINS supply		N/A
	Plug pins which receive a charge from an internal capacitor	(see Form A.5)	P
	Accessory MAINS socket outlets:		—
	a) marking if accepts a standard MAINS supply plug (see 5.1.3e)		N/A
	b) input has a protective earth conductor if outlet has EARTH TERMINAL CONTACT		N/A
6.11	**Disconnection from supply source**	Built-in component, considered in end system	N/A
6.11.1	Disconnects all current-carrying conductors		N/A
6.11.2	Exceptions		N/A
6.11.3	Requirements according to type of equipment		N/A
6.11.3.1	PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment		N/A
	Employs switch or circuit-breaker		N/A
	If switch or circuit-breaker is not part of the equipment, documentation requires:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) switch or circuit-breaker to be included in building installation		N/A
	b) suitable location easily reached		N/A
	c) marking as disconnecting for the equipment		N/A
6.11.3.2	Single-phase cord-connected equipment		N/A
	Equipment is provided with one of the following:		—
	a) switch or circuit-breaker		N/A
	b) appliance coupler (disconnectable without tool)		N/A
	c) separable plug (without locking device)		N/A
6.11.4	Disconnecting devices		N/A
6.11.4.1	General		N/A
	Disconnecting device part of equipment		N/A
	Electrically close to the SUPPLY		N/A
	Power-consuming components not electrically located between the supply source and the disconnecting device		N/A
	Except electromagnetic interference suppression circuits permitted to be located on the supply side of the disconnecting device		N/A
6.11.4.2	Switches and circuit-breakers		N/A
	When used as disconnection device:		—
	Circuit breaker meets the relevant requirements IEC 60947-2 and is suitable for the application		N/A
	Switch meets the relevant requirements IEC 60947-3 and is suitable for the application		
	Marked to indicate function.....:		—
	Not incorporated in MAINS cord		N/A
	Does not interrupt PROTECTIVE EARTH CONDUCTOR		N/A
6.11.4.3	Appliance couplers and plugs		N/A
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.3.2):		—
	Readily identifiable and easily reached by the operator		N/A
	Single-phase portable equipment cord length not more than 3 m		N/A
	PROTECTIVE EARTH CONDUCTOR connected first and disconnected last		N/A
7	**PROTECTION AGAINST MECHANICAL HAZARDS**		P
7.1	**General**		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment does not cause a mechanical HAZARD in NORMAL nor in SINGLE FAULT CONDITION		P
	Conformity is checked by 7.2 to 7.7		P
7.2	**Sharp edges**		P
	Easily-touched parts are smooth and rounded		P
	Do not cause injury during NORMAL USE and		P
	Do not cause injury during SINGLE FAULT CONDITION		P
7.3	**Moving parts**		N/A
7.3.1	General		N/A
	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5		N/A
	RISK assessment in accordance with 7.3.3 carried out		N/A
7.3.2	Exceptions		N/A
	Access to HAZARDOUS moving parts permitted under following circumstances:		—
	a) obviously intended to operate on parts or materials external of the equipment		N/A
	inadvertent touching of moving parts minimized by equipment design (e .g. guards or handles)		N/A
	b) If OPERATOR access is unavoidable outside NORMAL USE following precautions have been taken:		—
	1) access requires TOOL		N/A
	2) statement about training in the instructions		N/A
	3) warning markings on covers prohibiting access by untrained OPERATORS		N/A
	or symbol 14 with full details in documentation		N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts		N/A
	RISK is reduced to a tolerable level by protective measures as specified in Table 12		N/A
	Minimum protective measures:		—
	A. Low level measures		N/A
	B. Moderate measures		N/A
	C. Stringent measures		N/A
7.3.4	Limitation of force and pressure	(see Form A.20)	N/A
	Following levels are met in NORMAL and SINGLE FAULT CONDITION:		—
	Continuous contact pressure below 50 N / cm² with force below 150 N		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Temporary force below 250 N for an area at least of 3 cm² for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts	(see Form A.20)	N/A
7.3.5.1	Access normally allowed		—
	If levels of 7.3.4 exceeded and a body part may be inserted minimum gap as specified in Table 13 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.3.5.2	Access normally prevented		—
	Maximum gap as specified in Table 14 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.4	**Stability**		N/A
	Equipment not secured to building structure is physical stable		N/A
	Stability maintained after opening of drawers etc. by automatic means, or		N/A
	warning marking requires the application of means		N/A
	Compliance checked by following tests as applicable:	(see Form A.20A)	—
	a) 10° tilt test for other than handheld equipment		N/A
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg		N/A
	c) downward force test for floor-standing equipment		N/A
	d) overload test with 4 times maximum load for castor or support foot that supports greatest load, or		N/A
	e) castor or support foot that supports greatest load removed from equipment		N/A
7.5	**Provisions for lifting and carrying**		N/A
7.5.1	General		N/A
	Equipment more than 18 kg.....:		N/A
	Has means for lifting or carrying; or		N/A
	Directions are given in documentation		N/A
7.5.2	Handles and grips		N/A
	Handles or grips withstand four times weight		N/A
7.5.3	Lifting devices and supporting parts		N/A
	RATED for maximum load; or		N/A
	Tested with four times maximum static load		N/A
7.6	**Wall mounting**		N/A
	Mounting brackets withstand four times weight	(see Form A.20B)	N/A
	One fastener removed and test repeated with two times weight	(see Form A.20B)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.7	**Expelled parts**		N/A
	Equipment contains or limits the energy		N/A
	Protection not removable without the aid of a tool		N/A
8	**RESISTANCE TO MECHANICAL STRESSES**		N/A
8.1	**General**	Built-in component, considered in end system	N/A
	Equipment does not cause a HAZARD when subjected to mechanical stresses in NORMAL USE		N/A
	Normal protection level is 5 J		N/A
	Levels below 5 J but not less than 1 J are acceptable if all of the following criteria are met:		—
	a) Lower level justified by RISK assessment of manufacturer		N/A
	b) Equipment installed in its intended application is not easily touched		N/A
	c) Only occasional access during NORMAL USE		N/A
	d) IK code in accordance to IEC 62262 marked or symbol 14 used with full information in the documentation		N/A
	for non-metallic ENCLOSURES rated below 2 °C ambient temperature value chosen for minimum RATED temperature		N/A
	impact energies between IK values, the IK code marked for nearest lower value		N/A
	Conformity is checked by performing following tests:	(see Form A.16)	—
	1) Static test of 8.2.1		N/A
	2) Impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT		N/A
	if specified impact energy is not 5 J alternate method of IEC 62262 used		N/A
	3) Drop test of 8.3.1 or 8.3.2 except for FIXED EQUIPMENT and equipment with mass over 100 kg		N/A
	Equipment RATED with an impact rating of IK 08 that obviously meets the criteria		N/A
	After the tests inspection with following results:		—
	– HAZARDOUS LIVE parts above the limits of 6.3.2 not ACCESSIBLE		N/A
	– insulation pass the voltage tests of 6.8	(see Form A.30)	N/A
	i) No leaks of corrosive and harmful substances		N/A
	ii) ENCLOSURE shows no cracks resulting in a HAZARD		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	iii) CLEARANCES not less than their permitted values		N/A
	iv) Insulation of internal wiring remains undamaged		N/A
	v) PROTECTIVE BARRIERS not damaged or loosened		N/A
	vi) No moving parts exposed, except permitted by 7.3		N/A
	vii) No damage which could cause spread of fire		N/A
8.2	**ENCLOSURE rigidity test**		N/A
8.2.1	Static test	(see Form A.21A)	N/A
	– 30 N with 12 mm rod applied to each part of ENCLOSURE		N/A
	– in case of doubt test conducted at maximum RATED ambient temperature		N/A
8.2.2	Impact test	(see Form A.21A)	N/A
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged		N/A
	Impact energy level and corresponding IK code.....:	IK08	—
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		N/A
8.3	**Drop test**	(see Form A.21B)	N/A
8.3.1	Other than HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		N/A
	Tests conducted with a drop height or angle of .....:	(see Form A.21B)	—
8.3.2	HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		N/A
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		N/A
	Drop test conducted with an height of 1 m		N/A

9	**PROTECTION AGAINST THE SPREAD OF FIRE**		P
9.1	**General**		P
	No spread of fire in NORMAL and SINGLE FAULT CONDITION		P
	MAINS supplied equipment meets requirements of 9.6 additionally		P
	Conformity is checked by minimum one or a combination of the following (see Figure 11):	(see Form A.22)	—
	a) SINGLE FAULT test of 4.4; or	(see Form A.1)	P
	b) Application of 9.2 (eliminating or reducing the sources of ignition); or		N/A
	c) Application of 9.3 (containment of fire within the equipment)		P
9.2	**Eliminating or reducing the sources of ignition within the equipment**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) 1) Limited-energy circuit (see 9.4); or		N/A
	2) BASIC INSULATION provided for parts of different potential; or	(see Forms A.14 and A.18)	N/A
	Bridging the insulation does not cause ignition	(see Form A.1)	N/A
	b) Surface temperature of liquids and parts (see 9.5)		N/A
	c) No ignition in circuits designed to produce heat	(see Form A.1)	N/A
9.3	**Containment of the fire within the equipment, should it occur**		P
9.3.1	General		P
	Spread of fire outside equipment reduced to a tolerable level if:		—
	a) Energizing of the equipment is controlled by an OPERATOR held switch		N/A
	b) ENCLOSURE is conform with constructional requirements of 9.3.2; and		P
	Requirements of 9.5 are met		N/A
9.3.2	Constructional requirements		P
	a) Connectors and insulating material have flammability classification V-2 or better	(see TABLE 1.A or Form A.23)	P
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)	(see TABLE 1.A or Form A.23)	P
	c) ENCLOSURE meets following requirements:	(see Form A.22)	—
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		—
	i) no openings; or		P
	ii) perforated as specified in Table 16; or		N/A
	iii) metal screen with a mesh; or		N/A
	iv) baffles as specified in Figure 12		N/A
	2) Material of ENCLOSURE and any baffle or flame barrier is made of:		—
	Metal (except magnesium); or		N/A
	Non-metallic materials have flammability classification V-1 or better	(see TABLE 1.A or Form A.22)	P
	3) ENCLOSURE and any baffle or flame barrier have adequate rigidity		P
9.4	**Limited-energy circuit**	(see Form A.24)	N/A
	a) Potential not more than 30 r.m.s. and 42,4 V peak, or 60 V d.c.		N/A
	b) Current limited by one of following means:		—
	1) Inherently or by impedance (see Table 17); or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Overcurrent protective device (see Table 18); or		N/A
	3) A regulating network limits also in SINGLE FAULT CONDITION (see Table 17)		N/A
	c) Is separated by at least BASIC INSULATION		N/A
	Fuse or a nonadjustable electromechanical device is used		N/A
9.5	**Requirements for equipment containing or using flammable liquids**		N/A
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire	(see Form A.25)	N/A
	RISK is reduced to a tolerable level:		—
	a) The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N/A
	b) The quantity of liquid is limited		N/A
	c) Flames are contained within the equipment		N/A
	Detailed instructions for RISK-reduction provided		N/A
9.6	**Overcurrent protection**		P
9.6.1	General		P
	MAINS supplied equipment protected		P
	BASIC INSULATION between MAINS parts of opposite polarity provided	(see Forms A.14 and A.15)	P
	Overcurrent protection devices not fitted in the protective conductor		P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase equipment)		P
9.6.2	PERMANENTLY CONNECTED EQUIPMENT		P
	Overcurrent protection device:		—
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		P
9.6.3	Other equipment		N/A
	Protection within the equipment		N/A
10	**EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT**		P
10.1	**Surface temperature limits for protection against burns**		P
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION:	(see Form A.26A)	—
	– at an specified ambient temperature of 40 °C		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C		N/A
	Heated surfaces necessary for functional reasons exceeding specified values:		—
	– Are recognizable as such by appearance or function; or		N/A
	– Are marked with symbol 13		N/A
	– Guards are not removable without tool		N/A
10.2	**Temperatures of windings**		N/A
	Limits not exceeded in:	(see Form A.26B)	—
	NORMAL CONDITION		N/A
	SINGLE FAULT CONDITION		N/A
10.3	**Other temperature measurements**		P
	Following measurements conducted if applicable:	(see Form A.26A)	—
	a) Value of 60 °C of field-wiring terminal box not exceeded		N/A
	b) Surface of flammable liquids and parts in contact with this liquids		N/A
	c) Surface of non-metallic ENCLOSURES		N/A
	d) Parts made of insulating material supporting parts connected to MAINS supply		P
	e) Terminals carrying a current more than 0,5 A		P
10.4	**Conduct of temperature tests**		P
10.4.1	General		P
	Tests conducted under reference test conditions and manufacturer's instructions	(see Form A.26A)	P
	Tests alternatively conducted at the least favourable ambient temperature within the RATED ambient temperature .....:	-	—
10.4.2	Temperature measurement of heating equipment		N/A
	Tests conducted in test corner	(see Form A.26A)	N/A
10.4.3	Equipment intended for installation in a cabinet or wall		N/A
	Equipment built in as specified in installation instructions	(see Form A.26A)	N/A
10.5	**Resistance to heat**		P
10.5.1	Integrity of CLEARANCE and CREEPAGE DISTANCES	(see Form A.16)	N/A
10.5.2	Non-metallic ENCLOSURES	(see Form A.27)	N/A
	Within 10 min after treatment:		—
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.5.3	Insulating material		P
	a) Parts supporting parts connected to MAINS supply		P
	b) TERMINALS carrying a current more than 0,5 A		P
	Examination of material data; or		P
	in case of doubt:		P
	1) Ball pressure test; or	(see Form A.28)	P
	2) Vicat softening test of ISO 306	(see Form A.29)	N/A
11	**PROTECTION AGAINST HAZARDS FROM FLUIDS AND SOLID FOREIGN OBJECTS**		P
11.1	**General**		P
	Protection to OPERATORS and surrounding area provided by EQUIPMENT		P
	All fluids specified by manufacturer considered		N/A
11.2	**Cleaning**	(see Form A.30)	P
11.3	**Spillage**	(see Form A.30)	N/A
11.4	**Overflow**	(see Form A.30)	N/A
11.5	**Battery electrolyte**		N/A
	Battery electrolyte leakage presents no HAZARD		N/A
11.6	**Equipment RATED with a degree of ingress protection (IP code)**	(see Form A.30)	N/A
11.6.1	General		N/A
	Equipment marked with IP code ..... :		—
	Conditions specified in the documentation		N/A
11.6.2	Conditions for testing		N/A
	Equipment in clean and new condition, all parts in place and mounted as specified by manufacturer		N/A
	Complete equipment tested, or		N/A
	representative parts tested		N/A
	HAND-HELD EQUIPMENT and PORTABLE EQUIPMENT placed in least favourable position of NORMAL use		N/A
	Other equipment positioned or installed as specified		N/A
	TERMINALS provided with protective cap or cover, are installed as specified by manufacturer		N/A
	The equipment is operating (energized) during the treatment except:		—
	a) If manufacturer specifies degrees of protection for non-operating (de-energized) equipment, or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Equipment is operating or non-operating during the treatment with does not affect the test results		N/A
11.6.3	Protection against solid foreign objects (including dust)		N/A
	Applicable test of IEC 60529 for protection against solid foreign objects conducted		N/A
	Additionally inspection of equipment resulted:		—
	a) No deposit on insulation parts that could lead to a HAZARD		N/A
	b) No created accumulations that have the potential to cause spread of fire		N/A
11.6.4	Protection against water		N/A
	Applicable test of IEC 60529 for protection against water conducted		N/A
	If any water has entered, safety is not impaired, inspection of equipment resulted:		—
	a) No deposit on insulation parts that could lead to a HAZARD		N/A
	b) Water has not reached hazardous live parts or windings which are not designed to operate when wet		N/A
	c) No accumulations near the end of cable nor enter the cable where it could cause a HAZARD		N/A
	d) No accumulations where it could lead to a HAZARD taking in consideration movement of the equipment		N/A
11.7	**Fluid pressure and leakage**		N/A
11.7.1	Maximum pressure ..... :	(see Form A.31)	—
	Maximum pressure of any part does not exceed P_{RATED}		N/A
11.7.2	Leakage and rupture at high pressure		N/A
	Fluid-containing parts checked by inspection or if a HAZARD could arise subjected to hydraulic test, if:	(see Form A.31)	—
	a) product of pressure and volume > 200 kPa·l; and		N/A
	b) pressure > 50 kPa		N/A
	Safety evidence established by calculation in acc. to national authorities (e.g. Pressure Equipment Directive 2014/68/EU)		N/A
	Parts of refrigerating systems meets pressure-related requirements of EN 378-2 or IEC 60335-2-89 as applicable		N/A
11.7.3	Leakage from low-pressure parts	(see Form A.32)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
11.7.4	Overpressure safety device		N/A
	Does not operate in NORMAL USE		N/A
	a) Connected as close as possible to parts intended to be protected		N/A
	b) Easy access for inspection, maintenance and repair		N/A
	c) Adjustment only with TOOL		N/A
	d) No discharge towards person		N/A
	e) No HAZARD from deposit of discharged material		N/A
	f) Adequate discharge capacity		N/A
	No shut-off valve between overpressure safety device and protected parts		N/A
12	**PROTECTION AGAINST RADIATION, INCLUDING LASER SOURCES, AND AGAINST SONIC AND ULTRASONIC PRESSURE**		P
12.1	**General**	Only LED indicator used	P
	Equipment provides protection		N/A
12.2	**Equipment producing ionizing radiation**		N/A
12.2.1	Ionizing radiation	(see Form A.33)	N/A
12.2.1.1	General		N/A
	Equipment meets the following requirements:		—
	a) if intended to emit radiation meets requirements of 12.2.1.2; or		N/A
	tested, classified and marked in accordance to IEC 62598		N/A
	b) if only emits stray radiation meets requirements of 12.2.1.3		N/A
12.2.1.2	Equipment intended to emit radiation		—
	Effective dose rate of radiation measured.....:		—
	If dose rate exceeds 5 µSv/h marked with the following:		—
	a) symbol 17 (ISO 361)		N/A
	b) abbreviations of the radionuclides.....:		—
	c) with maximum dose at 1 m; or .....:		—
	with dose rate value between 1 µSv/h and 5 µSv/h in m.....:		—
12.2.1.3	Equipment not intended to emit radiation	(see Form A.34)	—
	Limit for unintended stray radiation of 1 µSv/h at any easily reached point kept .....:		N/A
12.2.2	Accelerated electrons		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Compartments opened only by the use of a TOOL		N/A
12.3	**Optical radiation**		P
	No unintentional HAZARDOUS escape of optical radiation as ultraviolet, visible or infrared radiation, including light emitting diodes:		—
	– Checked by inspection; and	Only LED indicator used	P
	– Radiation sources assessed in acc. to the requirements of IEC 62471, except for sources considered to be safe (Table 22) or conditionally safe (Table 23).		N/A
	– Lamp and lamp systems assessed to Risk Groups 1, 2, or 3 of IEC 62471 are labelled in acc. to IEC 62471-2		N/A
	– If labelling impractical, lamp or lamp systems marked with symbol 14		N/A
	– Protective measures, restrictions on use, and operating instructions that may be necessary are provided, including the applicable conditions of use of Table 23.		N/A
12.4	**Microwave radiation**	No microwave radiation	N/A
	Power density does not exceed 10 W/m^2 ..... :		N/A
12.5	**Sonic and ultrasonic pressure**	No sonic and ultrasonic pressure	N/A
12.5.1	Sound level	(see Form A.35)	N/A
	No HAZARDOUS sound emission		N/A
	Maximum sound pressure level measured and calculated for maximum sound power level as specified in ISO 3746 or ISO 9614-1		N/A
	Instruction describes measures for protection		N/A
12.5.2	Ultrasonic pressure	(see Form A.36)	N/A
	Equipment not intended to emit ultrasound does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	Equipment intended to emit ultrasound:		N/A
	Outside useful beam does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	If inside useful beam above values exceeded:		—
	Marked with Symbol 14 of Table 1		N/A
	and following information in the documentation:		—
	a) dimensions of useful beam		N/A
	b) area where ultrasonic pressure exceed 110 dB		N/A
	c) maximum sound pressure inside beam area		N/A
12.6	**Laser sources**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment meets requirements of IEC 60825-1		N/A
13	**PROTECTION AGAINST LIBERATED GASES AND SUBSTANCES, EXPLOSION AND IMPLOSION**		P
13.1	**Poisonous and injurious gases and substances**		P
	No hazardous substances liberated in NORMAL CONDITION and in SINGLE FAULT CONDITION		P
	If potentially-hazardous substances are liberated:		—
	Operator is not directly exposed to a quantity of the substance that could cause harm		N/A
	Requirements to discharge of hazardous substances during NORMAL operation in accordance to manufacturer's instructions not considered as liberation		N/A
	Attached data/test reports demonstrate conformity		N/A
13.2	**Explosion and implosion**		P
13.2.1	Components		P
	Components liable to explode:		—
	Pressure release device provided; or		N/A
	Apparatus incorporates operator protection (see also 7.7)		P
	Pressure release device:	No pressure release device	—
	Discharge without danger		N/A
	Cannot be obstructed		N/A
13.2.2	Batteries and battery charging	(see Form A.37)	N/A
	If explosion or fire HAZARD could occur:		—
	Protection incorporated in the equipment; or		N/A
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		—
	No HAZARD; or		N/A
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		—
	Warning against the charging of non-rechargeable batteries; and		N/A
	Type of rechargeable battery indicated; or		N/A
	Symbol 14 used		N/A
	Battery compartment design		N/A
	Single component failure		N/A
	Polarity reversal test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
13.2.3	Implosion of cathode ray tubes	No CRT	N/A
	If maximum face dimensions > 160 mm.....:		—
	Intrinsically protected and correctly mounted; or		N/A
	ENCLOSURE provides protection:		N/A
	If non-intrinsically protected:		—
	Screen not removable without TOOL		N/A
	If glass screen, not in contact with surface of tube		N/A
14	**COMPONENTS AND SUBASSEMBLIES**		P
14.1	**General**		P
	Where safety is involved, components and subassemblies meet relevant requirements	(see TABLE 1.A)	P
14.2	**Motors**		N/A
14.2.1	Motor temperatures		N/A
	Does not present a HAZARD when stopped or prevented from starting; or	(see Forms A.1 and A.26B)	N/A
	Protected by over-temperature or thermal protection device conform with 14.3		N/A
14.2.2	Series excitation motors		N/A
	Connected direct to device, if overspeeding causes a HAZARD		N/A
14.3	**Overtemperature protection devices**		N/A
	Devices operating in a SINGLE FAULT CONDITION	(see Form A.38)	N/A
	a) Reliable function is ensured		N/A
	b) RATED to interrupt maximum current and voltage		N/A
	c) Does not operate in NORMAL USE		N/A
	If self-resetting device used to prevent a HAZARD, protected part requires intervention before restarting		N/A
14.4	**Fuse holders**		N/A
	No access to HAZARDOUS LIVE parts		N/A
14.5	**MAINS voltage selecting devices**		N/A
	Accidental change not possible		N/A
14.6	**MAINS transformers tested outside equipment**	(see Forms A.39 and A.40)	N/A
14.7	**Printed wiring boards**		P
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or	V-0	P
	Test shows conformity with V-1 of IEC 60695-11-10 or better	(see Form A.23)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	**Circuits used to limit TRANSIENT OVERVOLTAGES**		P
	Test conducted between each pair of MAINS SUPPLY TERMINALS	(see Form A.41)	P
	No ignition or overheating of other materials :		—
	– no ignition		P
	– no heat to other parts above the self-ignition points		P
	Safely suppressing and properly functional after applied tests		P
15	**PROTECTION BY INTERLOCKS**		N/A
15.1	**General**		N/A
	Interlocks are designed to remove a HAZARD before OPERATOR exposed		N/A
15.2	**Prevention of reactivation**		N/A
15.3	**Reliability**		N/A
	Single fault unlikely to occur; or		N/A
	Cannot cause a HAZARD		N/A
16	**HAZARDS RESULTING FROM APPLICATION**		P
16.1	**REASONABLY FORESEEABLE MISUSE**		P
	No HAZARDS arising from settings not intended and not described in the instructions		P
	Other cases of REASONABLY FORESEEABLE MISUSE addressed by RISK assessment		N/A
16.2	**Ergonomic aspects**		N/A
	Factors giving rise to a HAZARD the RISK assessment is reflecting those aspects:		—
	a) limitation of body dimensions		N/A
	b) displays and indicators		N/A
	c) accessibility and conventions of controls		N/A
	d) arrangement of TERMINALS		N/A
17	**RISK ASSESSMENT**		N/A
	RISK assessment conducted, if HAZARD might arise and not covered by Clauses 6 to 16	Covered by clauses 6 to 16	N/A
	TOLERABLE RISK achieved by iterative documented process covering the following:		—
	a) RISK analysis		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Identifies HAZARDS and estimates RISK		N/A
	b) RISK evaluation		N/A
	Plan to judge acceptability of resulting RISK level based on the estimated severity and likelihood of a RISK		N/A
	c) RISK reduction		N/A
	Initial RISK reduced by counter measures;		N/A
	Repeated RISK evaluation without new RISKS introduced		N/A
	RISKS remaining after RISK assessment addressed in instructions to RESPONSIBLE BODY:		—
	Information contained how to mitigate these RISKS		N/A
	Following principles in methods of RISK reduction applied by manufacturer in given order:		—
	1) RISKS eliminated or reduced as far as possible		N/A
	2) Protective measures taken for RISKS that cannot be eliminated		N/A
	3) User information about residual RISK due to any defect of the protective measures		N/A
	Indication of particular training is required		N/A
	Specification of the need for personal protective equipment		N/A
	Conformity checked by evaluation of the RISK assessment documentation		N/A

ANNEX F	**ROUTINE TESTS**		N/A
	Manufacturer ´s declaration		N/A

ANNEX H	**QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION**		N/A
H.1	**General**		N/A
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N/A
H.2	**Technical properties**		N/A
	Technical properties of conformal coatings are suitable for the intended application. In particular:		—
	a) Manufacturer indicate that it is a coating for PWBs;		N/A
	b) RATED operating temperature include the temperature range of the indicated application;		N/A
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N/A
	e) Flammability RATING of the coating is at least the required flammability RATING of the applied PWB.		N/A
H.3	**Qualification of coatings**	(see Form A.42)	N/A
	Coating complies with the conformity requirements.		N/A
ANNEX K	**INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7**	(see Forms A.15 and A.18) Insulation of measuring circuits according to EN 61010-2-030	P

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Clause	Requirement — Test	Result — Remark	Verdict

4.4	**TABLE: Testing in SINGLE FAULT CONDITION – Results**			**Form A.1**	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
4.4.2.12	1	D6 S/C	10 min	Unit shut down, no damage, no hazards.	P
4.4.2.12	2	RV1 S/C	10 min	Unit shut down, no damage, no hazards.	P
4.4.2.12	3	D3 S/C	10 min	Unit shut down, no damage, no hazards.	P
4.4.2.12	4	C10 S/C	10 min	Unit shut down, no damage, no hazards.	P
4.4.2.12	5	C11 S/C	10 min	Unit working normal, no damage, no hazards.	P
4.4.2.12	6	U1 pin 5-2 S/C	10 min	Unit working normal, no damage, no hazards.	P
4.4.2.12	7	U1 pin 1-2 S/C	10 min	Unit working normal, no damage, no hazards.	P
4.4.2.12	8	VB to after R6 S/C	10 min	Unit working normal, no damage, no hazards.	P
4.4.2.12	9	J1 S/C	10 min	Unit shut down, no damage, no hazards.	P

NOTE Td = Test duration in hh:mm:ss
Record dielectric strength test on Form A.18 and temperature tests on Forms A.26A and / or A.26B.
Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.

Supplementary information:
S/C: short-circuit
Operating condition:
EUT operated under the least favourable combination of the conditions given in the user manual.

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

5.1.3c)	**TABLE: MAINS supply**		**Form A.2**	P
	Marked rating ..... :	100-260	VAC	—
	Phase ..... :	Single		—
	Frequency ..... :	50/60	Hz	—
	Current ..... :	-	A	—
	Power ..... :	3	W	—
	Power ..... :	-	VA	—

Test No.	Voltage [V]	Frequency [Hz]	Current [mA]	Power [W]	Power [VA]	Comments
1	90	50	0.013	1.17	-	Normal operation
2	90	60	0.014	1.26	-	
3	100	50	0.013	1.30	-	
4	100	60	0.014	1.40	-	
5	260	50	0.010	2.60	-	
6	260	60	0.011	2.86	-	
7	286	50	0.010	2.60	-	
8	286	60	0.011	2.86	-	

NOTE – Measurements are only required for marked ratings. Initial inrush currents are not regarded.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

5.3	**TABLE: Durability of markings**	**Form A.3**	P

Marking method (see NOTE)	Agent
1) Adhesive label	A Water
2) Ink printed	B Isopropyl alcohol 70%
3) Laser marked	C (specify agent)
4) Film-coated (plastic foil control panel)	D (specify agent)
5) Imprinted on plastic (moulded in)	E (specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	2)
MAINS supply (5.1.3)	2)
Fuses (5.1.4)	N/A
Terminals and operating devices (5.1.5.2)	2)
Switches and circuit breakers (5.1.6)	N/A
Double/reinforced equipment (5.1.7)	2)
Field wiring Terminal boxes (5.1.8)	N/A
Warning marking (5.2)	2)
Battery charging (13.2.2)	N/A

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
2)	A, B	Yes	-	-	Pass

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.2	**TABLE: List of ACCESSIBLE parts**	**Form A.4**	N/A
6.1.2	Exceptions		—
6.2	Determination of ACCESSIBLE parts		—

Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2)
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4).
NOTE 4 – Capacitance test may be required (see Form A.5).
NOTE 5 – The determination methods are:
V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6	**TABLE: Values in NORMAL CONDITION**	**Form A.5**	P
6.1.2	Exceptions	11.2 Cleaning and decontamination	—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)	11.3 Spillage	—
6.6.2	Terminals for external circuit	11.4 Overflow	—
6.10.3	Plugs and connections		—

Item	Voltage			Current				Capacitance		10 s / 5 s test (NOTE)			Comments
(see Form A.4)	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μC	mJ	V	μC	mJ	
VA to VN (discharged test, 5s)	-	-	-	-	-	-	-	-	-	0	-	-	-

NOTE – A 10 s test is specified in 6.1.2 a) b). A. 5 s test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.3.2	**TABLE: Values in SINGLE FAULT CONDITION**										**Form A.6**	N/A
Item	Subclause and	Voltage			Transient (see NOTE)		Current				Capacitance	Comments
(see Form A.4)	fault No. (see Form A.1)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	µF (see NOTE)	

NOTE – Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.5.2.2	**TABLE: Cross-sectional area of bonding conductors**	**Form A.7**	N/A

Conductor location	CROSS-SECTIONAL AREA [mm²]	Verdict

Supplementary information:

6.5.2.3	**TABLE: Tightening torque test**	**Form A.8**	N/A

Conductor location	Size of screw	Tightening torque [Nm]	Verdict

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.5.2.4	**TABLE: BONDING impedance of plug-connected equipment** **Form A.9**	N/A

ACCESSIBLE part under test	Test current [A]	Voltage attained after 2 min [V]	Calculated resistance (Maximum 0,1 or 0,2 Ω) [Ω] (NOTE 1)	Verdict

NOTE 1 – For none-detachable power cord the impedance between protective conductor plug pin of MAINS cord and each ACCESSIBLE part shall not exceed 0,2 Ohm.

Supplementary information:

6.5.2.5	**TABLE: BONDING impedance of PERMANENTLY CONNECTED EQUIPMENT** **Form A.10**	N/A

ACCESSIBLE part under test	Test current [A]	Voltage attained after 1 min (maximum 10 V) [V]	Verdict

Supplementary information:

6.5.2.6	**TABLE: Transformer PROTECIVE BONDING screen** **Form A.11**	N/A

ACCESSIBLE part under test	Test current (see NOTE) [A]	Voltage attained after 1 min (maximum 10 V) [V]	Calculated resistance (maximum 0,1 Ω) [Ω]	Verdict

NOTE – Test current must be twice the value of the overcurrent protection means of the winding. Test is specified in 6.5.2.6 a) or b).

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.5.4	**TABLE: PROTECTIVE IMPEDANCE**	**Form A.12**	N/A

A single component

Component	Location	Measured		Calculated	Rated		Verdict	Comments
		Working voltage [V]	Current [A]	Power dissipation [W]	Working voltage [V]	Power dissipation [W]		

A combination of components

Component	Location	Comments

NOTE – A PROTECTIVE IMPEDANCE shall not be a single electronic device that employs electron conduction in a vacuum, gas or semiconductor.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.5.6	**TABLE: Current- or voltage-limiting device**	**Form A.13**	N/A

Component	Location	Measured		Rated		Verdict	Comments
		Working voltage [V]	Current [A]	Working voltage [V]	Current [A]		

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict
6.7	**TABLE: Insulation requirements - Block diagram of system - Form A.14**		P

Pollution degree..... : 2 | Overvoltage category .....: II

Area	Location	Insulation type (NOTE 1)	WORKING VOLTAGE			CLEARANCE (NOTE 3)	CREEPAGE DISTANCE (NOTE 3)				Test voltage	Comments (NOTE 3)
			RMS [V]	Peak [V]	Freq. [kHz]	[mm]	PWB [mm]	CTI	Other [mm]	CTI	(NOTE 2) [V]	

NOTE 1 – Type of insulation:
BI = BASIC INSULATION
DI = DOUBLE INSULATION
PI = PROTECTIVE IMPEDANCE
RI = Reinforced INSULATION
SI = Supplementary INSULATION
see also Form A.15 for further details

NOTE 2 - Types of voltage
Peak impulse test voltage (pulse)
r.m.s.
d.c.
peak

NOTE 3 - OVERVOLTAGE CATEGORIES or POLLUTION DEGREES which differ should be shown under "Comments"

Supplementary Information:
See Form A.14 for details

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.7	**TABLE: Insulation requirements - CLEARANCES and CREEPAGES**		**Form A.15**	P
6.2.2	Examination	6.5.4	Protective impedance	—
6.4.2	ENCLOSURES and protective barriers	6.5.6	Current- or voltage-limiting device	—
6.4.4	Impedance	9.6.1	BASIC INSULATION between opposite polarity	—

Area	Location (See Form A.14)	Insulation type (NOTE 1)	WORKING VOLTAGE (NOTE 2)			CLEARANCE		CREEPAGE DISTANCE		CTI	Verdict	Comments
			RMS [V]	Peak [V]	Frequency [kHz]	Required [mm]	Measured [mm]	Required [mm]	Measured [mm]			
-	Between terminals VA, VB, VC, VN	BI	260	368	60	1.5	3.5	3.0	3.5	175	P	-
-	Across fuse R6	BI	260	368	60	1.5	4.0	3.0	4.0	175	P	-

NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram NOTE 2 - to be used for definition of required insulation (see Form A.14)

Input supply voltage…….:	260	V	60	Hz

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.7	**TABLE: Insulation requirements - CLEARANCES and CREEPAGES**		**Form A.16**	N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	9.6.1	Overcurrent protection basic insulation between MAINS parts	—
8	Mechanical resistance to shock and impact	10.5.1	Integrity of CLEARANCES and CREEPAGE DISTANCES	—

Area	Location (See Form A.14)	Insulation type	Mechanical tests (NOTE)					Test at max.	Measured after test (if required)		Verdict	Comments
			Applied force	Rigidity (8.2)		Drop (8.3)		RATED ambient	CLEARANCE	CREEPAGE DISTANCE		
			[N]	Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)	Hand-held/ Plug-in	(10.5.1)	[mm]	[mm]		

NOTE – Refer to Form A.18 for dielectric strength tests following the above tests.

Supplementary information:

IEC 61010-1			
Clause	Requirement – Test	Result — Remark	Verdict

6.7.2.2.2	**TABLE: Reliability of potted components** **Form A.17 (optional)**	N/A
14.1 b)	**Components and subassemblies**	N/A

Temperature Cycling Test	
Manufacturer .....:	
Type.....:	
Construction .....:	
Potting compound .....:	
CREEPAGE DISTANCES measured .....:	
CLEARANCES measured .....:	
Thickness through insulation.....:	
Adhesive test Pass/Fail.....:	
Test temperature T °C.....:	

Cycles at U= AC 500 V				Leakage current (at AC 500 V) mA			
Number of cycles	Date			68 h / 125 °C	1 h / 25 °C	2 h / 0 °C	1 h / 25 °C
1. Cycle from		to					
2. Cycle from		to					
3. Cycle from		to					
4. Cycle from		to					
5. Cycle from		to					
6. Cycle from		to					
7. Cycle from		to					
8. Cycle from		to					
9. Cycle from		to					
10. Cycle from		to					

After Cycling Test :		
Humidity conditioning	48 h	
Requirements for dielectric strength (s. insulation diagram)	Test voltage V r.m.s.	Verdict
Basic insulation _____ V r.m.s.		
Supplementary insulation _____ V r.m.s.		
Reinforced insulation _____ V r.m.s.		

NOTE - to be used for evaluation of components containing insulation through solid insulation, when the component standard require thermal cycling test. Ref Clause 14.1 and Figure 15, option b)

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.8	**TABLE: Dielectric strength tests**	**Form A.18**	P
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS[1]		P
6.4	Primary means of protection[2]		P
6.6	Connections to external circuits		N/A
6.7	Insulation requirements[2] (see Annex K)		P
6.10.2	Fitting of non-detachable MAINS supply cords[1]		N/A
9.2 a) 2)	Eliminating or reducing the sources of ignition within the equipment		N/A
9.4 c)	Limited-energy circuit		N/A
9.6.1	Overcurrent protection basic insulation between MAINS - parts		N/A
	Test site altitude .....:	500m	—
	Test voltage correction factor (see table 10) .....:	-	—

Location or references from Forms A.1 and A.14	Clause or sub-clause	Humidity	Working voltage	Test voltage	Comments (NOTE)	Verdict
		Yes/No	[r.m.s./d.c.]	[r.m.s./peak/d.c.]		
VA, VB, VC, VN to enclosure	See above	Yes	260VAC	3000V rms	60s	P

[1] Record the fault, test or treatment applied before the dielectric strength test. [2] Humidity preconditioning required.
NOTE: Test duration may be recorded.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

6.10.2	**TABLE: Cord anchorage**					**Form A.19**	N/A
Location	Mass [kg]	Pull [N]	Verdict	Torque [Nm]	Verdict	Comment	
Dielectric strength test for 1 min. (6.8.3.1)............. :				V r.m.s.			
Supplementary information:							

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

7.	**TABLE: Protection against mechanical HAZARDS**	**Form A.20**	N/A
7.3.4	Limitation of force and pressure		—
7.3.5	Gap limitations between moving parts		—

Part / Location	Clause 7.3.4		Clause 7.3.5.1								Clause 7.3.5.2			Verdict	Comments
	Continuous	Temporary	Minimum gaps [mm]								Maximum gaps [mm]				
	Contact pressure max. 50 N /cm² @ max. 150 N	max. 250 N / 3 cm² @ max. 0,75 s	Torso 500	Head 300	Leg 180	Foot 120	Toes 50	Arm 120	Hand 100	Finger 25	Head 120	Foot 35	Finger 4		

Supplementary information:

IEC 61010-1			
Clause	Requirement – Test	Result - Remark	Verdict
7.4	**TABLE: Stability**	**Form A.20A**	N/A
	Equipment height / mass ..... :	mm / kg	—
	Equipment (Containers) loaded ..... :	[yes / no]	—
	Castors at unfavourable position ..... :	[yes / no]	—
	Doors, drawers and movable arms closed ..... :	[yes / no]	—
	Doors and drawers at unfavourable position ..... :	[yes / no]	—

Location	Tilt angle	Applied force				Comments	Verdict
	10°	250 N	20% [N]	800 N	4 times load [N]		
Front side				—			
Left side				—			
Rear side				—			
Right side				—			
Top side	—						
Working surface	—	—	—				
Ledge	—	—	—				
Castor / support foot							
Castor / support foot removed							

Supplementary information:

7.6	**TABLE: Wall mounting**	**Form A.20B**	N/A
	Equipment weight ..... :	kg	—
	Equipment mounted as specified by manufacturer .. :	[yes / no]	—
	Equipment mounted at plasterboard (drywall) ..... :	[yes / no]	—
	More than one fastener used ..... :	[yes / no]	—
	Test maintained (after 5 s to 10 s to full load) ..... :	1 min	—

Location	Applied weight		Comments	Verdict
	4 times weight [kg]	2 times weight [kg]		
Mounting brackets				

Supplementary information:

IEC 61010-1				
Clause	Requirement – Test	Result - Remark		Verdict
8.2	**TABLE: ENCLOSURE rigidity test**		**Form A.21A**	N/A
8.2.1	Static test			N/A
	Material of enclosure .....:			—
	Preparation for the test:			—
	Operated at ambient temperature .....:	°C	h	—
Location		Comments		Verdict
Supplementary information:				
8.2.2	**TABLE: Impact test**			N/A
	Material of enclosure .....:			—
	Corresponding IK-code.....:			—
	Preparation for the test:			—
	Cooled to (temperature) .....:	°C		—
Location		Comments		Verdict
Supplementary information:				

IEC 61010-1				
Clause	Requirement – Test		Result - Remark	Verdict
8.3	**TABLE: Drop test**		**Form A.21B**	N/A
8.3.1	Other equipment			N/A
Location	Raised up to		Comments	—
	[mm]	30 °		
Supplementary information:				
8.3.2	HAND-HELD EQUIPMENT and DIRECT PLUG-IN EQUIPMENT			N/A
	Material of enclosure .....:		Metal / non-metallic	—
	Preparation for the test:			—
	Cooled to (temperature) .....:		°C	—
Location			Comments	Verdict
1) Side				
2) Edge				
3) Corner				
Supplementary information:				

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

9	**TABLE: Protection against the spread of fire**			**Form A.22**	P
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9.1 a, b or c)	Protection details		Verdict
1	All internal circuits	9.1 a, c	a: See Form A.1 for details. c: See TABLE 1 for details.		P
Supplementary information:					

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

9.3.2	**TABLE: Constructional requirements**	**Form A.23**	P
14.7	Printed wiring boards		P
No test need, PCB V-0			
Material tested ..... :			—
Generic name ..... :			—
Material manufacturer..... :			—
Type..... :			—
Colour ..... :			—
Conditioning details ..... :			—

		Sample					
		1	2	3	4	5	6
Thickness of specimen	mm						
Duration of flaming after first Application	s						
Duration of flaming plus glowing After second application	s						
Specimen burns to holding clamp	Yes/No						
Cotton ignited	Yes/No						
Sample result	Pass/Fail						

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

9.4	**TABLE: Limited-energy circuit**				**Form A.24**	N/A
Item	9.4 a)	9.4 b) Current limitation (NOTE)		9.4 c)	Decision	Comments
or Location (see Form A.22)	Maximum potential in circuit voltage r.m.s./d.c. [V]	Maximum available current [A]	Overload protection after 120 s [A]	Circuit separation	Yes/No	

NOTE – Maximum values see Tables 17 and 18 of IEC 61010-1

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

9.5	**TABLE: Requirements for equipment containing or using flammable liquids**	**Form A.25**	N/A
Type of liquid	9.5 Flammable liquids		Verdict
	b) Quantity	c) Containment	
Supplementary information:			

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.	**TABLE: Temperature Measurements** **Form A.26A**	P
10.1	Surface temperature limits – NORMAL CONDITION and / or SINGLE FAULT CONDITION	P
10.2	Temperature of windings – NORMAL CONDITION and / or SINGLE FAULT CONDITION	N/A
10.3	Other temperature measurements	P

Operating conditions:	Normal operation, measuring voltage and current		
Frequency..... :	60 Hz	Test room ambient temperature (ta)... :	21.3 °C
Voltage..... :	90 V	Test duration..... :	1 h 50 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
Connector J2	23.8	42.5	85	P	-
Varistor RV1	30.0	48.7	125	P	-
Winding L3	36.1	54.8	130	P	-
Capacitor (C13)	33.1	51.8	105	P	-
U1 body	33.5	52.2	130	P	-
U2 body	34.1	52.8	130	P	-
Connector J1	25.2	43.9	120	P	-
Enclosure inside	27.5	46.2	85	P	-
Enclosure outside	25.1	43.8	85	P	-
CT wire	21.3	40.0	80	P	-
CT body	21.4	40.1	85	P	-

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.26B for details of winding temperature measurements

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.	**TABLE: Temperature Measurements** **Form A.26A**	P
10.1	Surface temperature limits – NORMAL CONDITION and / or SINGLE FAULT CONDITION	P
10.2	Temperature of windings – NORMAL CONDITION and / or SINGLE FAULT CONDITION	N/A
10.3	Other temperature measurements	P

Operating conditions:	Normal operation, measuring voltage and current		
Frequency..... :	60 Hz	Test room ambient temperature (ta)... :	21.0 °C
Voltage..... :	286 V	Test duration..... :	1 h 50 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
Connector J2	25.4	44.4	85	P	-
Varistor RV1	33.7	52.7	125	P	-
Winding L3	40.1	59.1	130	P	-
Capacitor (C13)	36.2	55.2	105	P	-
U1 body	36.2	55.2	130	P	-
U2 body	37.0	56.0	130	P	-
Connector J1	26.8	45.8	120	P	-
Enclosure inside	29.1	48.1	85	P	-
Enclosure outside	26.3	45.3	85	P	-
CT wire	21.2	40.2	80	P	-
CT body	21.2	40.2	85	P	-

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.26B for details of winding temperature measurements

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.2	**TABLE: Temperature of windings** **Form A.26B** **Resistance method Temperature Measurements**	N/A
4.4.2.7	MAINS transformers	N/A
14.2.1	Motor temperatures	N/A

Operating conditions..:			
Frequency.....:	Hz	Test room ambient temperature (ta1/ta2)..:	/ °C (initial / final)
Voltage.....:	V	Test duration.....:	h min

Part / Designation	Rcold [Ω]	Rwarm [Ω]	Current [A]	t_r [K]	t_c [°C]	t_{max} [°C]	Verdict	Comments

NOTE 1- R_{cold} = initial resistance R_{warm} = final resistance
t_r = temperature rise t_c = t_r corrected (t_c= t_r + [40 °C or max RATED ambient])
t_{max} = maximum permitted temperature
NOTE 2 - Indicate insulation class (IEC 60085) under comments (optional)
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.5.2	**TABLE: Resistance to heat of non-metallic ENCLOSURES**	**Form A.27**	N/A
	Test method used:	a)	—
	Non-operative treatment ..... :	[ ]	N/A
	Empty ENCLOSURE ..... :	[ ]	N/A
	Operative treatment ..... :	[ ]	N/A
	Temperature during tests ..... :		—

Description	Material	Comments	Verdict

Dielectric strength test (6.8) ..... :		V [r.m.s./peak/d.c.]	

NOTE – Within 10 minutes of the end of treatment suitable tests in acc. to 8.2 and 8.3 must be conducted and pass criteria of 8.1.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.5.3	**TABLE: Insulating material**	**Form A.28**	P
10.5.3 1)	Ball-pressure test		P
	Max. allowed impression diameter ..... :	2 mm	—

Part	Test temperature [°C]	Impression diameter [mm]	Verdict
Connector J2	125	0.88	P

Supplementary information:

10.5.3 2)	**Vicat softening test (ISO 306)**	**Form A.29**	N/A

Part	Vicat softening temperature [°C]	Thickness of sample [mm]	Verdict

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

8	**TABLE: Mechanical resistance to shock and impact** **Form A.30**	N/A
11	**Protection against HAZARDS from fluids and solid foreign objects**	N/A

Voltage tests can be carried out once after performing the tests of clause **8** and clause **11**. However, if voltage tests are carried out separately after each set of tests, two forms can be used.

Location (see Form A.14)	Clause 8 tests				Clause 11 tests				Working voltage [r.m.s./d.c.]	Test voltage [r.m.s./peak/d.c.]	Verdict	Comments
	Static (8.2.1) 30 N	Impact (8.2.2)	Normal (8.3.1)	Handheld Plug-in (8.3.2)	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)				

NOTE – Use r.m.s., d.c. or peak to indicate the used test voltage.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

11.7.2	**TABLE: Leakage and rupture at high pressure**	**Form A.31**	N/A

Part	Maximum permissible working pressure [MPa]	Test pressure [MPa]	Leakage Yes / No	Deformation Yes / No	Burst Yes / No	Comments

NOTE – see also Annex G with requirements for USA and Canada.

Supplementary information:

11.7.3	**TABLE: Leakage from low-pressure parts**	**Form A.32**	N/A

Part	Test pressure [MPa]	Leakage Yes / No	Comments

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

12.2.1	**TABLE: Ionizing radiation** **Form A.33**	N/A
12.2.1.2	Equipment intended to emit radiation	N/A

Locations tested	Measured values [µSv/h]	Verdict	Comments

Supplementary information:

12.2.1.3	**Equipment not intended to emit radiation** **Form A.34**		N/A
	Max. allowed effective dose rate at 100 mm……:	1 µSv/h	—

Locations tested	Measured values [µSv/h]	Verdict	Comments

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

12.5.1	**TABLE: Sound level**	**Form A.35**	N/A

Locations tested	Measured maximum sound pressure level dB(A)	Calculated maximum sound power level
At operator's normal position and at bystanders' positions		
a)		
b)		
c)		
d)		
e)		
f)		

Supplementary information:

12.5.2	**TABLE: Ultrasonic pressure**	**Form A.36**	N/A

Locations tested	Measured values		Comments
	[dB]	[kHz]	
At operator's normal position			
At 1 m from the ENCLOSURE			
a)			
b)			
c)			
d)			
e)			

NOTE – No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 μPa is under consideration for applicable frequencies between 20 kHz and 100 kHz.

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict
13.2.2	**TABLE: Batteries and battery charging** **Form A.37**		N/A
	Battery load and charging circuit diagram:		-
	Battery type..... :		—
	Battery manufacturer/model/catalogue No. ..... :		—
	Battery ratings..... :		—
	Reverse polarity instalment test		N/A

Single component failures	Verdict	
Component	Open circuit	Short circuit

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

14.3	**TABLE: Overtemperature protection devices**	**Form A.38**	N/A

Reliability test

Component	Type (NOTE)	Verdict	Comments

NOTE:
NSR = non-self-resetting (10 times)
NR = non-resetting (1 time)
SR = self-resetting (200 times)

Supplementary information:

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

4.4.2.7	**TABLE: MAINS transformer**				**Form A.39**	N/A
4.4.2.7.2	Short circuit					N/A
14.6	MAINS transformers tested outside equipment					N/A
Type ..... :	See TABLE 1.A					—
Manufacturer ..... :	See TABLE 1.A					—
Test in equipment						N/A
Test on bench						N/A
Test repeated inside equipment (see 14.6)						N/A
Optional – Insulation class (IEC 60085) of the lowest rated winding ..... :						—
Winding identification						
Type of Protector for winding (NOTE 1)						
Elapsed time						
Current, A primary						
secondary						
Winding temperature, °C primary						
(see NOTE 2) secondary						
Tissue paper / cheesecloth OK ? (Pass / Fail)						
Voltage tests (see NOTE 3)						
Primary to secondary	_____ V ____					
Primary to core	_____ V ____					
Secondary to secondary	_____ V ____					
Secondary to core	_____ V ____					
Verdict						

NOTE 1: Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2: Indicate method of measurement - TC = with thermocouple
- R = resistance method
If resistance method is used, record resistance in cold and warm condition in Form A.26B.

NOTE 3: Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown

Supplementary information:
See Form A.1

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

4.4.2.7	**TABLE: MAINS transformer**				**Form A.40**	N/A
4.4.2.7.3	Overload tests (for MAINS transformers)					N/A
14.6	MAINS transformers tested outside equipment					N/A
Type .....:	See TABLE 1.A					—
Manufacturer .....:	See TABLE 1.A					—
Test in equipment						N/A
Test on bench						N/A
Test repeated inside equipment (see 14.6)						N/A
Optional – Insulation class (IEC 60085) of the lowest rated winding .....:						—
Winding identification						
Type of Protector for winding (NOTE 1)						
Elapsed time						
Current, A primary						
secondary						
Winding temperature, °C primary						
(see NOTE 2) secondary						
Tissue paper / cheesecloth OK ? (Pass / Fail)						
Voltage tests (see NOTE 3)						
Primary to secondary	_____ V ____					
Primary to core	_____ V ____					
Secondary to secondary	_____ V ____					
Secondary to core	_____ V ____					
Verdict						

NOTE 1: Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2: Indicate method of measurement TC = with thermocouple
R = resistance method
If resistance method is used, record resistance in cold and warm condition in Form A.26B.

NOTE 3: Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown

Supplementary information:
See Form A.1

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

14.8 **TABLE: Circuits used to limit TRANSIENT OVERVOLTAGES** **Form A.41** P

Circuit / Designation	Overvoltage Category	MAINS voltage [V r.m.s.]	Test voltage [V]	t_m [°C]	t_c [°C]	t_{max} [°C]	Ignited Yes / No	Safely suppressed Yes / No	Properly functional Yes / No	Verdict	Comments
RV1	CAT II	260	2500	40.5	58.8	85	No	Yes	Yes	P	-

Test room ambient temperature: 21.7 °C

NOTE - t_m = measured temperature

t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)

t_{max} = maximum permitted temperature

Conformity is checked by applying 5 positive and 5 negative impulses with the applicable impulse withstand voltage, spaced up to 1 min apart, from a hybrid impulse generator (see IEC 61180-1).

Supplementary information:

IEC 61010-1			
Clause	Requirement – Test	Result — Remark	Verdict

Annex H	**TABLE: Qualification of conformal coating for protection against pollution**	**Form A.42**	N/A

Technical properties		
Manufacturer		—
Type		—
Meet requirements of ANSI / UL 746E	[yes / no]	
Manufacturer declaration of coating material	[yes / no]	
Operating temperature of coating	[ ] °C	
Comparative tracking index (CTI)	[ ]	
Insulation resistance	[ ] MΩ	
Dielectric strength	[ ] V	
UV resistance (if required)	[yes / no]	
Flammability rating		
Preparation of the test specimens conducted	[yes / no]	

Item	Test conditioning	Parameter	Td	Samples						Verdict	Comments
			h	1	2	3	4	5	6		
1	Cold		24								
2	Dry heat		48								
3	Rapid temp. change										
4	Damp heat		24								
5	Adhesion of coating	5 N									
	Visual inspection										
6	Humidity		48								
7	Insulation resistance	≥ 100 MΩ									
	Visual inspection										

NOTE Td = Test duration time

Supplementary information:

IEC 61010-1			
Clause	Requirement – Test	Result — Remark	Verdict

	TABLE: Additional or special tests conducted **Form A.43**		N/A
Clause and name of test	Test type and condition	Observed results	—
Supplementary information:			

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

	TABLE 1.A: List of components and circuits relied on for safety					P
Unique component reference or location	Application/function	Manufacturer / trademark (NOTE 1)	Type / model	Technical data (NOTE 2)	Standard	Mark(s) of conformity evidence of acceptance (NOTE 3 and 4)
Plastic enclosure	-	Guangdong Xingshengdi Technology Co Ltd	XD-660V(X)	V-0, 85°C	UL 94	UL E342846
PCB	-	Interchangeable	Interchangeable	V-0, 130 °C	UL 796	UL
Plastic for connector J2	-	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC3600	V-0, 85°C	UL 94	UL E162823
Connectors J1, J3, J4, J5	-	Guangdong Hongru Technology Co.,LTD.	P3025-2x1	250VAC, 5A, 120°C, V-0	UL 1977	UL E304945
Internal Wire	-	Interchangeable	Interchangeable	30Vac, 34AWG, 80°C VW-1	UL 758	UL
Varistor (RV1)	-	Guizhou Tuoyuan Sensitive Components Co., LTD	TR07D471KP	Maximum continuous voltage: 300VAC/385VDC, Nominal varistor voltage: 470V; 8/20us peak current: 1750A; 125°C	EN IEC 61051-1, IEC 61051-2, IEC 61051-2-2	TUV SUD
Resistor (R6)	-	ASIA AKITA ELECTRONIC TECHNOLOGY (SHENZHEN) CO LTD	KNP2WS20RJT/BU	10Ω, 2W	UL 1412	UL E326227
Winding (L3)	-	Interchangeable	Interchangeable	130°C	IEC/EN 61010-1	Test in equipment

IEC 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

CT enclosure	-	Guangdong Xingshengdi Technology Co Ltd	XD-660V(X)	V-0, 85°C	UL 94	UL E342846
CT wire	-	Wuxi Swell Electric Co Ltd	2464	300V, 26AWG, 80°C VW-1	UL 758	UL E484530

NOTE → 1 List all different manufacturers of the above components → 4 asterisk indicates mark assuring agreed level of surveillance
→ 2 May include electrical, mechanical values
→ 3 List licence no or method of acceptance

Attachment No. 1

IEC61010_1P ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 61010-1** **EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES** (Electrical Equipment For Measurement, Control, and Laboratory Use; Part1: General Requirements)			
Differences according to ..... : EN 61010-1:2010/A1			
Attachment Form No. ..... : EU_GD_IEC61010_1P **Attachment Originator .....** : TÜV Rheinland LGA Products GmbH **Master Attachment**..... : Date 2021-04-12			
Copyright © 2021 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	CENELEC COMMON MODIFICATIONS (EN)		--
	Procedure for voltage tests		--
6.8.3.1	**The a.c. voltage test** *Replace the first sentence by the following sentence:* The voltage tester shall be capable of maintaining the test voltage throughout the test within +/- 5 % of the specified value.		P
			--
Annex ZA (normative)	The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.		P
			--
Annex ZZ (informative)	Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered		P

Attachment No. 2

TEST REPORT
IEC 61010-2-030
Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 2-030: Particular requirements for equipment having testing or measurement circuits

Report Number. ..... :	68.240.24.0042.01
Date of issue ..... :	2025-03-07
Total number of pages ..... :	26
Name of Testing Laboratory preparing the Report ..... :	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Applicant's name ..... :	Marstek energy Co., Ltd.
Address ..... :	1-4F, BLDG#9, 1/F, BLDG#5, West Industrial Park, South of the Intersection of Ma'anshanTunnel and Zhangshe Avenue, Xiangxi High-tech Zone, 416007 Xiangxi, Hunan Province, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	IEC 61010-2-030:2017 for use in conjunction with IEC 61010-1:2010, AMD1:2016
Test procedure ..... :	Safety report
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No. ..... :	IEC61010_2_030C
Test Report Form(s) Originator .... :	TÜV SÜD Product Service GmbH
Master TRF ..... :	Dated 2020-08-28

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

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Attachment No. 2

Test item description ..... :	Three Phase Meter
Trade Mark ..... :	MARSTEK
Manufacturer ..... :	Same as Applicant
Model/Type reference ..... :	TPM-100CTW
Ratings ..... :	Input: 100-260VAC, 50/60Hz, 3W

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch	
Testing location/ address.....:		Building 12&13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District, Shenzhen, Guangdong 518052, China	
Tested by (name, function, signature).....:		Sidney Li Project Handler	
Approved by (name, function, signature)...:		Yager Bi Designated Reviewer	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature) .....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

Attachment No. 2

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

N/A

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were found to comply with the requirements of: - EN IEC 61010-2-030:2021/A11:2021	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District, Shenzhen, Guangdong 518052, China

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

N/A

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

☒ **Statement not required by the standard used for type testing**

Copy of marking plate:

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

Refer to TEST REPORT IEC 61010-1

Attachment No. 2

Test item particulars.....:	
Type of item tested.....:	Measurement
Description of equipment function .....:	Three Phase Meter
Installation/overvoltage category.....:	II
Measurement category .....:	II
Protection class .....:	Built-in component, considered in end system.
Pollution degree.....:	2
Environmental rating.....:	~~Standard~~ / Extended (specify): Indoor use Altitude: up to 2000m Tempearture: -20-40°C Humidity: 5-80% Mains supply voltage fluctuation: ±10%
Equipment mobility .....:	~~Portable / Hand-held / Floorstanding / Fixed~~ / Built in
Connection to mains supply.....:	L, N terminals
Operating conditions .....:	Continuous ~~/ Short-time / Intermittent~~
Overall size of the equipment (W x D x H).....:	65.4mm x 26.5mm x 83mm
Mass of the equipment (kg).....:	0.159
Marked degree of protection to IEC 60529.....:	IPX0
Accessories and detachable parts included in the evaluation .....:	N/A
Options.....:	N/A
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 does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2024-09-19
Date (s) of performance of tests.....:	From 2024-12-06 to 2025-02-13

Attachment No. 2

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing Testing Laboratory.

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

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

This Test Report Form is intended for the investigation of testing and measurement circuits in accordance with IEC 61010-1:2010. It can only be used together with the Part 1 TRF for the appropriate edition of IEC 61010-1.

Name and address of factory (ies) ..... :	**Hunan Planck Esstechnology Co., Ltd.** Building 12, West Industrial Park, South of intersection of Maanshan Tunnel and Zhangshe Avenue, Xiangxi High-tech Zone, 416000 Jishou City, Hunan Province, PEOPLE'S REPUBLIC OF CHINA

General product information and other remarks:

Refer to TEST REPORT IEC 61010-1

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

5.	**MARKING AND DOCUMENTATION**		**P**
5.1.5	TERMINALS, connections and operating devices		P
5.1.5.101	Measuring circuit TERMINALS		P
5.1.5.101.1	General		N/A
	a) The value of the RATED voltage to earth of measuring circuit TERMINALS is marked		N/A
	b) the value of the RATED voltage or the RATED current, as applicable, for each pair or set of measuring circuit TERMINALS that are intended to be used together are marked		N/A
	c) the pertinent MEASUREMENT CATEGORY for each individual pair or set of measuring circuit TERMINALS or symbol 14 of Table 1 of Part 1 are marked		N/A
	Measuring circuit TERMINALS are usually supplied in pairs or sets. Each pair or set of TERMINALS may have a RATED voltage or a RATED current, or both, within that set, and each individual TERMINAL may have a RATED voltage to earth.		N/A
	For some equipment, the RATED voltage between TERMINALS may be different from the RATED voltage to earth. Markings shall be clear to avoid misunderstanding		N/A
	Symbol 14 of Table 1 is marked if current measuring TERMINALS are not intended for connection to current transformers without internal protection (see 101.2).		N/A
	Markings are placed adjacent to the TERMINALS, however, if there is insufficient space, the marking may be on the RATING plate or scale plate, or the TERMINAL may be marked with symbol 14 of Table 1.		N/A
	For any set of measuring circuit TERMINALS, symbol 14 of Table 1 does not need to be marked more than once, if it is close to the TERMINALS.		N/A
5.1.5.101.2	The relevant MEASUREMENT CATEGORY is marked for measuring circuit TERMINALS. The CATEGORY markings are “CAT II”, “CAT III” or “CAT IV” as applicable.		N/A
	Marking more than one type of MEASUREMENT CATEGORY and its RATED voltage to earth is permissible		N/A
5.1.5.101.3	Measuring circuit TERMINALS RATED for connection to voltages above the level of 6.3.1 are marked with Symbol 14 of Table 1, if not RATED for measurements within MEASUREMENT CATEGORIES II, III or IV		N/A

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.5.101.4	Low voltage, permanently connected, or dedicated measuring circuit TERMINALS do not need to be marked if a), b), c) below apply		P
	a) they are intended to be permanently connected and not ACCESSIBLE (see 5.4.3 aa) and bb), or		P
	b) they are dedicated only for connection to specific TERMINALS of other equipment, or		N/A
	c) It is obvious from other indications that the RATED voltage is below the levels of 6.3.1.		N/A
5.4.1	General		P
	aa) information about each relevant MEASUREMENT CATEGORY if the measuring circuit has a RATING for MEASUREMENT CATEGORY II, III or IV (see 5.1.5.101.2).		P
	bb) for measuring circuits that do not have a RATING for MEASUREMENT CATEGORY II, III or IV, but could be misused by connection to such circuits, a warning not to use the equipment for measurements on MAINS, and a detailed RATING including TRANSIENT OVERVOLTAGES (see AA.2.4)		N/A
5.4.3	Equipment installation		P
	aa) for measuring circuit TERMINALS intended for permanent connection and that are RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the MEASUREMENT CATEGORY, RATED VOLTAGE, and RATED current, as applicable (see 5.1.5.101.2);	CAT II	P
	bb) for measuring circuit TERMINALS intended for permanent connection and that are not RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the RATED VOLTAGE, RATED current, and RATED TRANSIENT OVERVOLTAGES as applicable (see 5.1.5.101.4).		N/A

6	**Protection against electric shock**		**P**
6.1.2	Exceptions: aa) locking or screw-held type measuring TERMINALS, including TERMINALS which do not require the use of a TOOL.		N/A
6.5.2.3	Protective conductor terminal		N/A
	h) 2) the PROTECTIVE BONDING is not be interrupted by any switching or interrupting device. Devices used for indirect bonding in test and measurement circuits (see 6.5.2.101) are permitted to be part of the PROTECTIVE BONDING.		N/A

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict
6.5.2.101	Indirect bonding for testing and measuring circuits		
	Indirect bonding establishes a connection between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if these become HAZARDUS LIVE as a result of fault. Devices to establish indirect bonding are:		N/A
	a) voltage limiting devices which become conductive when the voltage across them exceeds the relevant levels of 6.3.2 a), with overcurrent protection to prevent breakdown of the device		N/A
	The duration versus the current shall not exceed the levels of Figure 101.		N/A
	The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit of Figure A.1	(See appended Table 6.5.2.101)	N/A
	b) voltage-sensitive tripping devices which interrupt all poles of the MAINS supply or the hazardous LIVE voltage source, and connect the ACCESSIBLE conductive parts to the PROTECTIVE CONDUCTOR TERMINAL whenever the voltage across them reaches the relevant levels of 6.3.2 a).		N/A
	The tripping duration versus the current shall not exceed the levels of Figure 101		N/A
	The current between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL is measured with the circuit of Figure A.1.	(See appended Table 6.5.2.101)	N/A
	Voltage limiting devices or voltage-sensitive tripping devices as defined in a) and b), shall have at least the voltage and current RATINGS of the measuring TERMINALS.		N/A
6.6	Connections to external circuits		N/A
6.6.101	Conductive parts of each unmated measuring circuit TERMINAL which could become HAZARDOUS LIVE when the highest RATED voltage is applied to other measuring circuit TERMINALS on the equipment shall be separated by at least:	See appended Table 6.6.101	N/A
	a) for TERMINALS with voltage RATING up to 1 000 V a.c. or 1 500 V d.c., the applicable CLEARANCE and CREEPAGE DISTANCE of Table 101 from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position		N/A

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict
	b) for TERMINALS with voltage RATING exceeding 1 000 V a.c. or 1 500 V d.c., 2,8 mm for the CLEARANCE and CREEPAGE DISTANCE from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position.		N/A
	Additionally, TERMINALS with voltage RATING exceeding 1 000 V a.c. or 1 500 V d.c. shall withstand the voltage test of 6.8 with a test voltage equal to the RATED voltage of the TERMINAL multiplied by 1,25 applied between the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position and the other measuring circuit TERMINALS.		N/A
	For WET LOCATIONS, there are no CLEARANCE and CREEPAGE DISTANCE requirements for voltages between 16 V a.c. r.m.s. and 30 V a.c. r.m.s., or between 35 V d.c. and 60 V d.c., but conductive parts of unmated measuring circuit TERMINAL shall not be ACCESSIBLE.		N/A
6.6.102	Components, sensors, and devices intended to be connected to specialized measuring circuit TERMINALS are not both ACCESSIBLE and HAZARDOUS LIVE, in either NORMAL CONDITION or SINGLE-FAULT CONDITION, even when the highest RATED voltage is applied to any other measuring circuit TERMINAL	(See appended Table 6.6.102)	N/A
	a) highest RATED a.c. voltage at any RATED MAINS frequency;		N/A
	b) highest RATED d.c. voltage;		N/A
	c) highest RATED a.c. voltage at the related maximum RATED measurement frequency.		N/A
6.7.1.3	CREEPAGE DISTANCES		N/A
	For HAND-HELD EQUIPMENT not powered from the MAINS or the measuring circuit, CREEPAGE DISTANCES are allowed to be according to material group I for all insulating materials.		N/A
6.7.1.5	Requirements for insulation according to type of circuit		P
	a) 6.7.2 mains circuits of overvoltage category II up to nominal supply voltage of 300 V		P
	b) 6.7.3 secondary circuits separated from circuits defined in a) only by means of a transformer		N/A
	c) K.1 mains circuits of overvoltage category III and IV or overvoltage category II over 300 V		N/A
	d) K.2 secondary circuits separated from circuits defined in c) only by means of a transformer		N/A

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IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict
	e) K.3 circuits having one or more of:		N/A
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) Working voltage with a frequency above 30 kHz		N/A
	6) circuit is a measuring circuit where MEASUREMENT CATEGORIES do not apply;		N/A
	f) in Clause K.101 for measuring circuits of MEASUREMENT CATEGORIES II, III and IV.		P
14	**Components and subassemblies**		P
14.101	Circuits used to limit TRANSIENT OVERVOLTAGE in measuring circuits are used to measure MAINS		N/A
	If control of TRANSIENT OVERVOLTAGE is employed in a measuring circuit used to measure MAINS, the overvoltage limiting component or circuit has adequate strength to limit TRANSIENT OVERVOLTAGES	(See appended Table 14.101)	N/A
14.102	Probe assemblies and accessories		N/A
	Probe assemblies and accessories within the scope of IEC 61010-031, and current sensors within the scope of IEC 61010-2-032 shall meet the requirements thereof.		N/A
101	**Measuring circuits**		**P**
101.1	The equipment provides protection of HAZARD resulting from NORMAL USE and REASONABLY FORSEEABLE MISUSE of measuring circuits as specified below:		P
	a) If a HAZARD could result, a current measuring circuit does not interrupt the circuit being measured during range changing, or during the use of current transformers without internal protection (see 101.2)		N/A
	b) An electrical quantity that is within specification for any TERMINAL does not cause a HAZARD when it is applied to that TERMINAL or any other compatible TERMINAL, with the range and function settings set in any possible manner (see 101.3)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) Any interconnection between the equipment and other devices or accessories intended to be used with the equipment shall not cause a HAZARD even if the documentation or markings prohibit the interconnection while the equipment is used for measurement purposes (see 6.6).		P
	d) For measuring circuits that include one or more FUNCTIONAL EARTH TERMINALS, a RISK assessment (see Clauses 16 and 17) addresses the HAZARDS that may result if the equipment is operated with a disconnected PROTECTIVE CONDUCTOR TERMINAL and if the operator unintentionally connects a FUNCTIONAL EARTH TERMINAL to any RATED voltage for any other TERMINAL.		N/A
	e) A TEMPORARY OVERVOLTAGE or a TRANSIENT OVERVOLTAGE applied on the measuring circuits TERMINALS in voltage measurement function shall not cause a HAZARD		P
	f) Other HAZARDS that could result from REASONABLY FORESEEABLE MISUSE is addressed by RISK assessment (see Clauses 16 and 17).		N/A
101.2	Current measuring circuits		N/A
	Current measuring circuits are so designed that, when range changing takes place, there is no interruption which could cause a HAZARD.	(See appended Table 101.2)	N/A
	Current measuring circuits intended for connection to current transformers without internal protection are adequately protected to prevent a HAZARD arising from interruption of these circuits during operation.	(See appended Table 101.2)	N/A
101.3	Protection against mismatches of inputs and ranges		N/A
101.3.1	In NORMAL CONDITION and in cases of REASONABLY FORESEEABLE MISUSE, no HAZARD arises when the highest RATED voltage or current of a measuring circuit TERMINAL is applied to that TERMINAL or any other compatible TERMINAL, with any combination of function and range settings		N/A
	The equipment provides protection against these HAZARDS; one of the following techniques is used.		N/A
	TERMINALS that are clearly not of similar types and that will not retain the connectors of the probe or accessory do not need to be tested. TERMINALS that can only be accessed by use of a TOOL do not need to be tested		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Use of a certified overcurrent protection device to interrupt short-circuit currents before a HAZARD arises; requirements of Clause 101.3.2 apply, or		N/A
	b) Use an uncertified current limitation device, an impedance, or a combination of both to prevent the HAZARD from arising; requirements of 101.3.3 apply		N/A
101.3.2	Protection by a certified overcurrent protection device	(See appended Table 101.3.2)	N/A
	Overcurrent protection device certified by an independent laboratory meet all of the specified requirements		N/A
	a) The a.c. and d.c. RATED voltages of the overcurrent protection device is at least as high as, respectively, the highest a.c. and d.c. RATED voltages of any measuring circuit TERMINAL on the equipment.		N/A
	b) The RATED time-current characteristic (speed) of the overcurrent protection device is such that no HAZARD will result from any possible combination of RATED input voltages, TERMINALS, and range selection		N/A
	c) The a.c. and d.c. RATED breaking capacities of the overcurrent protection device exceeds the possible a.c. and d.c. short-circuit currents.		N/A
	The possible a.c. and d.c. short-circuit currents shall be calculated as the highest RATED voltages for any TERMINAL divided by the impedance of the overcurrent-protected measuring circuit, taking the impedance of the test leads specified in 101.3.4 into account.		N/A
	For MEASUREMENT CATEGORIES II and III, the possible a.c. short-circuit current does not need to exceed the applicable value of Table AA.1.		N/A
	Additionally, spacings surrounding the overcurrent protection device in the equipment and following the protection device in the measuring circuit is sufficiently large to prevent arcing after the protection device opens.		N/A
101.3.3	Protection by uncertified current limitation devices or by impedances	(See appended Table 101.3.3)	N/A
	Devices used for current limitation are capable of safely withstanding, dissipating, or interrupting the energy that will result from the application of the maximum RATED voltage of any compatible TERMINAL in NORMAL CONDITION and in the case of REASONABLY FORESEEABLE MISUSE.		N/A
	An impedance used for limitation of current is one or more of the following:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) An appropriate single component which is constructed, selected, and tested so that safety and reliability for protection against relevant HAZARDS is assured.		N/A
	1) the component RATED for the max voltage that may be present in NORMAL CONDITION or during the REASONABLY FORESEEABLE MISUSE event;		N/A
	2) if a resistor, be RATED for twice the power or energy dissipation that may result in NORMAL CONDITION or from the REASONABLY FORESEEABLE MISUSE event;		N/A
	3) meets the applicable CLEARANCE and CREEPAGE distance requirements of Annex K for BASIC INSULATION between its terminations of the combination of components.		N/A
	b) A combination of components		N/A
	1) which can withstand the maximum voltage that may be present in NORMAL CONDITION or during the REASONABLY FORESEEABLE MISUSE event,		N/A
	2) be able to dissipate the power or energy that may result in NORMAL CONDITION or from the REASONABLY FORESEEABLE MISUSE event,		N/A
	3) meet the applicable CLEARANCE and CREEPAGE distance requirements of Annex K for BASIC INSULATION between the terminations of each component.		N/A
101.3.4	Test leads for the tests of 101.3.2 and 101.3.3 shall		N/A
	be performed with all test leads that are included with or supplied by the manufacturer for use with the equipment,		N/A
	and if the manufacturer hasn't specified the test leads, the tests shall be performed with test leads that meet the following specifications:		N/A
	a) length = 1 m;		N/A
	b) cross section of the conductor = 1,5 mm², stranded copper wire;		N/A
	c) equipment connector compatible with the measuring circuit TERMINALS;		N/A
	d) connection to the test voltage source into suitable screw TERMINALS or thimble connectors (twist-on wire connectors) or equivalent means of providing a low impedance connection;		N/A
	e) arranged as straight as possible.		N/A
	If the manufacturer-supplied test leads are permanently connected to the equipment, then the attached test leads supplied by the manufacturer were used without modification		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
101.4	Protection against MAINS overvoltages	CAT II only	N/A
	To ensure protection against arc flash or fire, measuring circuits RATED for measuring MAINS voltages shall have minimum CLEARANCE and CREEPAGE DISTANCE equivalent to BASIC INSULATION between MAINS-connected conductive parts of opposite polarity.		N/A
	The measuring circuit TERMINALS of a voltage measuring circuit that is RATED for MEASUREMENT CATEGORIES III or IV shall withstand the applicable TRANSIENT OVERVOLTAGE of Table K.106 with the voltage measurement function selectors set for the proper function and range, without damage which could cause a HAZARD.		N/A
101.5	Over-range indication		N/A
	If a HAZARD could arise from an OPERATOR'S reliance on the value (for example, voltage) displayed by the equipment, the display shall give an unambiguous indication whenever the value is above the maximum positive value or below the minimum negative value of the range to which the equipment is set.		N/A
Annex K.3	**Insulation in circuits not addressed in 6.7, K.1 or K.2, and in measuring circuits where MEASUREMENTS CATEGORIES do not apply**		N/A
K.3.1	General		N/A
	These circuits have one or more of the following characteristics:		N/A
	a) the maximum possible TRANSIENT OVERVOLTAGE is limited by the supply source or within the equipment (see Clause K.4.) to a known level below the level assumed for the MAINS CIRCUIT;		N/A
	b) the maximum possible TRANSIENT OVERVOLTAGE is above the level assumed for the MAINS CIRCUIT;		N/A
	c) the WORKING VOLTAGE is the sum of voltages from more than one circuit, or is a mixed voltage;		N/A
	d) the WORKING VOLTAGE includes a recurring peak voltage that may include a periodic non-sinusoidal waveform or a non-periodic waveform that occurs with some regularity;		N/A
	e) the WORKING VOLTAGE has a frequency above 30 kHz;		N/A
	f) the circuit is a measuring circuit where MEASUREMENT CATEGORIES do not apply.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	In cases a) to c) and f), CLEARANCES for BASIC INSULATION and SUPPLEMENTARY INSULATION are determined according to K.3.2.		N/A
	In cases d) and e) CLEARANCES are determined according to K.3.3.		N/A
	In all cases K.3.4 addresses CREEPAGE DISTANCE and K.3.5 solid insulation.		N/A
K.101	**Insulation requirements for measuring circuits of MEASUREMENT CATEGORIES II, III, IV**		P
K.101.1	General		P
K.101.2	CLEARANCES		P
	For equipment intended to be powered from the circuit being measured, CLEARANCES of the MAINS CIRCUIT are designed according to the requirements of the RATED MEASUREMENT CATEGORIES		P
	Overvoltage limiting devices may be used to reduce the transient Overvoltages to a level consistent with a lower MEASUREMENT CATEGORIES (see K.102)		N/A
	Additional marking requirements in 5.1.5.2 and 5.1.5.101		P
	CLEARANCES for measuring circuits of MEASUREMENT CATEGORIES II, III, IV meet Table K.101		P
	Equipment rated to operate at an altitude greater than 2000 m, correction factor of Table K.1 of 61010-1 applied		N/A
	Voltage tests of 6.8.3.1 or 6.8.3.3 of 61010-1		P
K.101.3	CREEPAGE DISTANCES		P
	The requirements of K.2.3 of 61010-1 applied		P
K.101.4	Solid insulation		P
K.101.4.1	General		P
	Solid insulation withstands the electrical and mechanical stresses that may occur in NORMAL USE in all RATED environmental conditions (see 1.4) during the intended life of the equipment		P
	The manufacturer should take the expected life of the equipment into account when selecting insulating materials.		P
	Solid insulation also meets the following requirements as applicable		P
	a) solid insulation used as an ENCLOSURE or PROTECTIVE BARRIER, the requirements of Clause 8		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) moulded and potted parts, the requirements of K.101.4.2		N/A
	c) insulating layers of printed wiring boards, the requirements of K.101.4.3		N/A
	d) thin-film insulations, the requirements of K.101.4.4		N/A
K.101.4.2	Moulded and potted parts		N/A
	Conductors located between same two layers moulded together are separated by at least the applicable minimum distance of Table K.9 of 61010-1		N/A
K.101.4.3	Insulating layers of printed wiring boards		N/A
	For BASIC INSULATION, SUPPLEMENTARY INSULATION and REINFORCED INSULATION, conductors located between the same two layers shall be separated by at least the applicable minimum distance of Table K.9.		N/A
	REINFORCED INSULATION have adequate electric strength; one of the following methods are used:		N/A
	a) thickness at least the applicable value of Table K.9 of 61010-1		N/A
	b) insulation is assembled from at least two separate layers, each RATED for test voltage of Table K.102 to K.104 for BASIC INSULATION		N/A
	c) insulation is assembled from at least two separate layers, where the combination is RATED for test voltage of Table K.102 to K.104 for REINFORCED INSULATION		N/A
K.101.4.4	Thin-film insulation		N/A
	Conductors between same layers are separated by at least the applicable CLEARANCES and CREEPAGE DISTANCE of K.101.2 and K.101.3		N/A
	REINFORECD INSULATION have adequate electric strength; one of the following methods are used:		N/A
	a) thickness at least the applicable value of Table K.9 of 61010-1		N/A
	b) insulation consists of at least two separate layers, each RATED for test voltage of Table K.102 to Table K.104 for BASIC INSULATION		N/A
	c) insulation consists of at least three separate layers, where the combination of two layers passed voltage tests of Table K.102 to K.104 for REINFORCED INSULATION		N/A
	a.c. Voltage tests of 6.8.3.1 of 61010-1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

K.102	**Reduction of TRANSIEN OVERVOLTAGES by the use of overvoltage limiting devices**		**N/A**
	If the overvoltage limiting device or circuit is intended to reduce TRANSIENT OVERVOLTAGES, a RISK ASSESSMENT (see Clause 17) is performed taking into account both of the followings		N/A
	a) Even under SINGLE FAULT CONDITIONS, the circuit shall reduce TRANSIENT OVERVOLTAGES to a lower voltage value which depends on the design		N/A
	SINGLE FAULT CONDITION includes a short and open circuit of MOV (metal oxide varistor)		N/A
	a) the circuit operates as intended even after withstanding repeated TRANSIENT OVERVOLTAGES		N/A

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

6.5.2.101	**TABLE: Indirect bonding for test and measuring circuits**		N/A
a) Voltage limiting device			
ACCESSIBLE part under test	Voltage attained (V)	Time for voltage to drop to allowable levels (s)	ACCESSIBLE part under test
b) Voltage-sensitive tripping device			
ACCESSIBLE part under test	Voltage applied (V)	Time for device to trip (s)	ACCESSIBLE part under test
Supplementary Information:			

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

6.6.101	**TABLE: CLEARANCES and CREEPAGE distances for measuring circuit terminals with HAZADUS LIVE conductive parts**				N/A
Location/ Terminal/Rated Voltage (ac or dc)	Required		Measured		Location/ Terminal CLEARANCE mm
	CREEPAGE DISTANCE mm	CLEARANCE mm	CREEPAGE DISTANCE mm	CREEPAGE DISTANCE mm	
Supplementary information:					

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

6.6.102 (6.3.1)	**TABLE: Values in NORMAL CONDITION**				N/A
Accessible parts	Voltage r.m.s./peak/d.c. (V)	Current (mA)		Capacitance	Comments
		Test circuit A1/A2/A3	r.m.s. or peak or d.c.	µC or mJ	
Supplementary information:					

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

6.6.102 (6.3.2)	**TABLE: Values in SINGLE FAULT CONDITION**							N/A
Accessible parts	Subclause/ Fault No.	Voltage r.m.s./ peak/d.c (V).	Transient		Current; (mA)		Capacitance (μF)	Comments
			(V)	(s)	Test circuit A1/A2/A3	r.m.s. or peak or d.c.		

NOTE - Required values are determined by calculation for Reinforce Insulation. Transients are not taken into account.

Supplementary information:

Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.

101.5	**TABLE: Over range indication test**			N/A
Measuring Terminal	Applied Voltage (V)	Contents of Display	Verdict	Comments

Supplementary information:

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

14.101	**TABLE: Transient overvoltage limiting devices**								N/A
Component / Designation	Overvoltage Category	MAINS voltage V rms	Test voltage V	t_m °C	t_c °C	t_{max} °C	Rupture Yes / No	Circuit breaker tripped	Comments

Test room ambient temperature ….: - °C

NOTE - t_m = measured temperature

t_c = t_m corrected (t_m–t_a+ 40 **°C** or max. RATED ambient)

t_{max} = maximum permitted temperature

Conformity is checked by applying 5 positive and 5 negative impulses with the applicable impulse withstand voltage, spaced up to 1 min apart, from a hybrid impulse generator (see IEC 61180-1).

Supplementary information:

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

101.2	**TABLE: Current measuring circuits - Current transformers**			N/A
Type/Model	RATED current (A)	Test current (A)	Interrupt Yes / No	Result / Comments

NOTE - These tests are performed with all types and models of current transformers without internal protection, and which are specified by the manufacturer for use with the equipment

Supplementary information:

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

101.2	**TABLE: Current measuring circuits - Range changing switches**		N/A
Type / Model	Switch maximum rated current (A)	Cycling test Result	Comments
Supplementary Information:			

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Clause	Requirement + Test	Result - Remark	Verdict

101.3.2	**TABLE: Certified overcurrent protection device test**					N/A
Type / Model / Terminal	Max. rated Voltage (V)	Test Voltage (V)	Test leads		Verdict	Comments
			Mfr.	Std.		

NOTE 1: Test voltage = 2 times max. rated Voltage for 1 min.
NOTE 2: Mfr – Manufacturer supplied leads
Std. – Leads as described in 101.3.4

Supplementary Information:

Attachment No. 2

IEC 61010-2-030			
Clause	Requirement + Test	Result - Remark	Verdict

101.3.3 **TABLE: Uncertified overcurrent protection device test** N/A

Type / Model / Terminal	Max. rated Voltage (V)	Test Voltage (V)	Test leads		Verdict	Comments
			Mfr.	Std.		

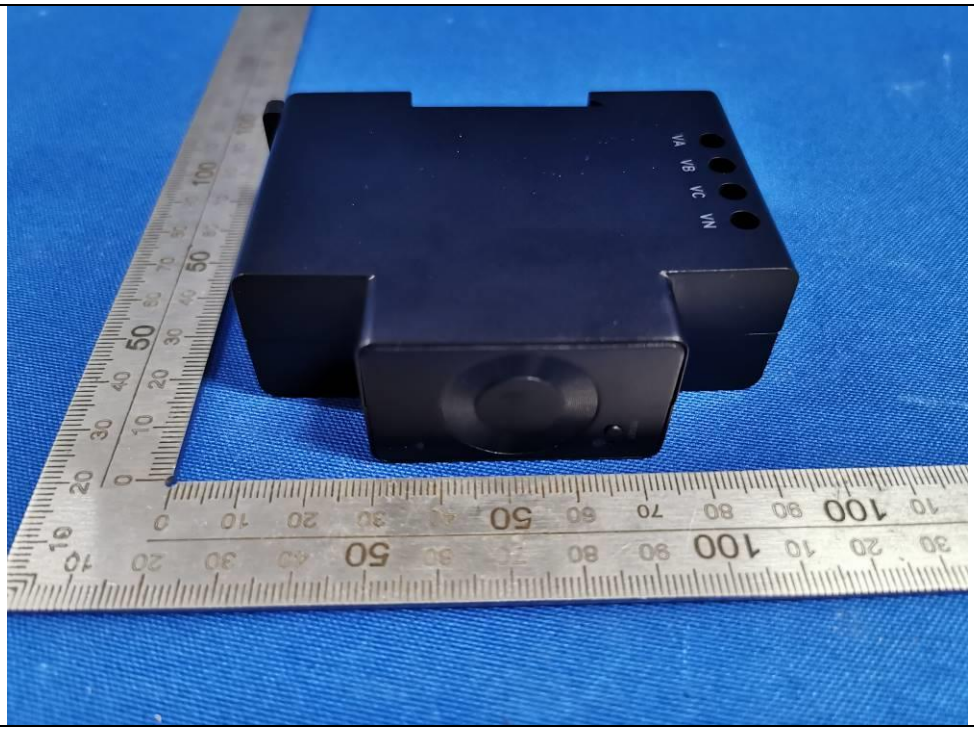
NOTE 1 - Test was conducted 3 times.
NOTE 2 - Any damage to a device used for current limitation was ignored when other parts of the equipment were not affected during the test.
NOTE 3 - Mfr – Manufacturer supplied leads
Std. – Leads as described in 101.3.4
NOTE 4 - Note current limit devices manufacture, type and ratings.

Supplementary Information:

Attachment No.3

Details of: Overall view 1

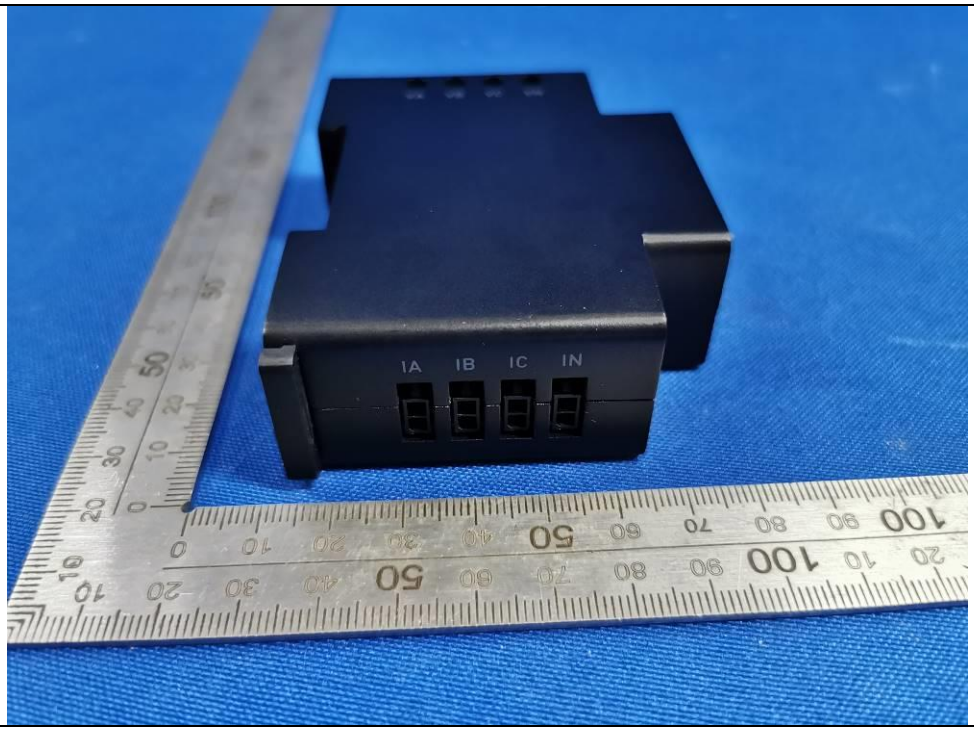
Details of: Overall view 2



Attachment No.3

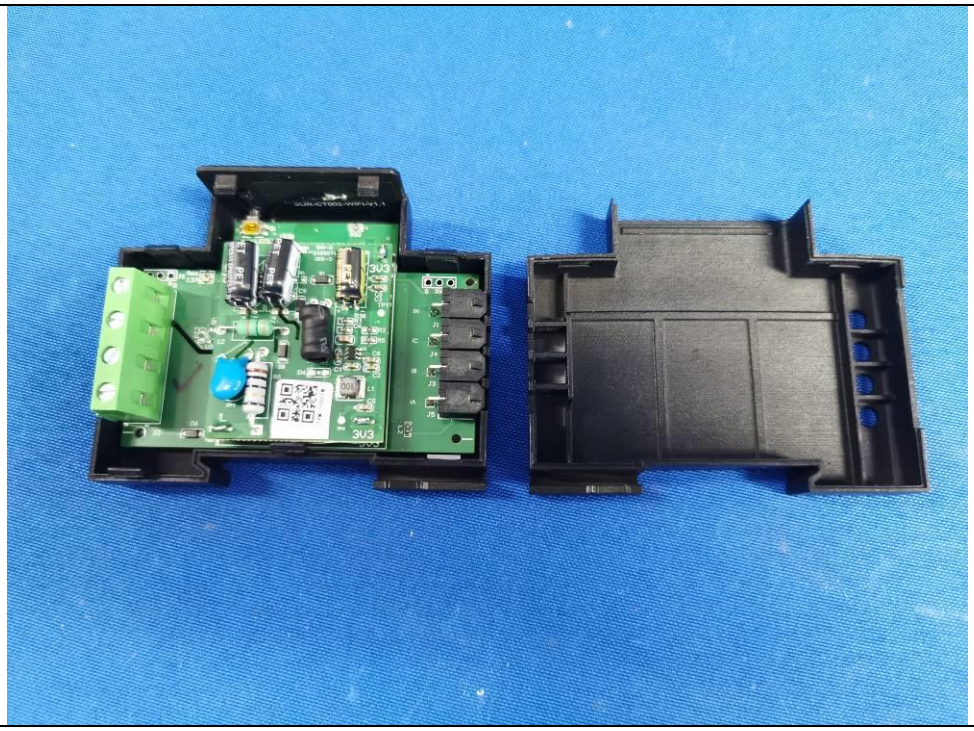
Details of: Overall view 3

Details of: Overall view 4



Attachment No.3

Details of: Internal view 1



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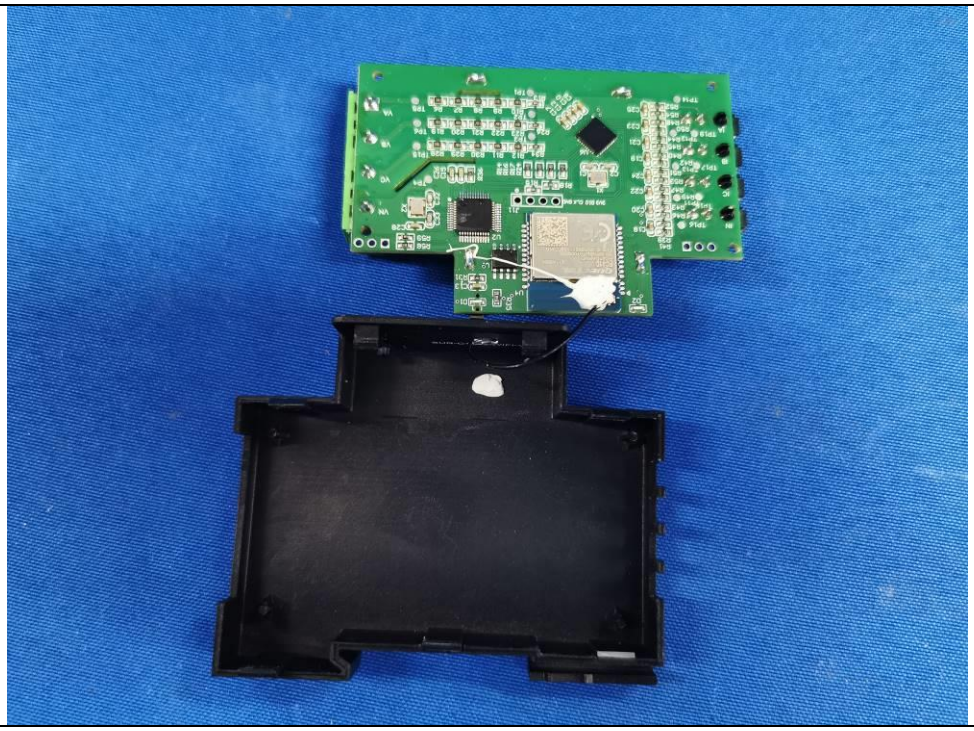
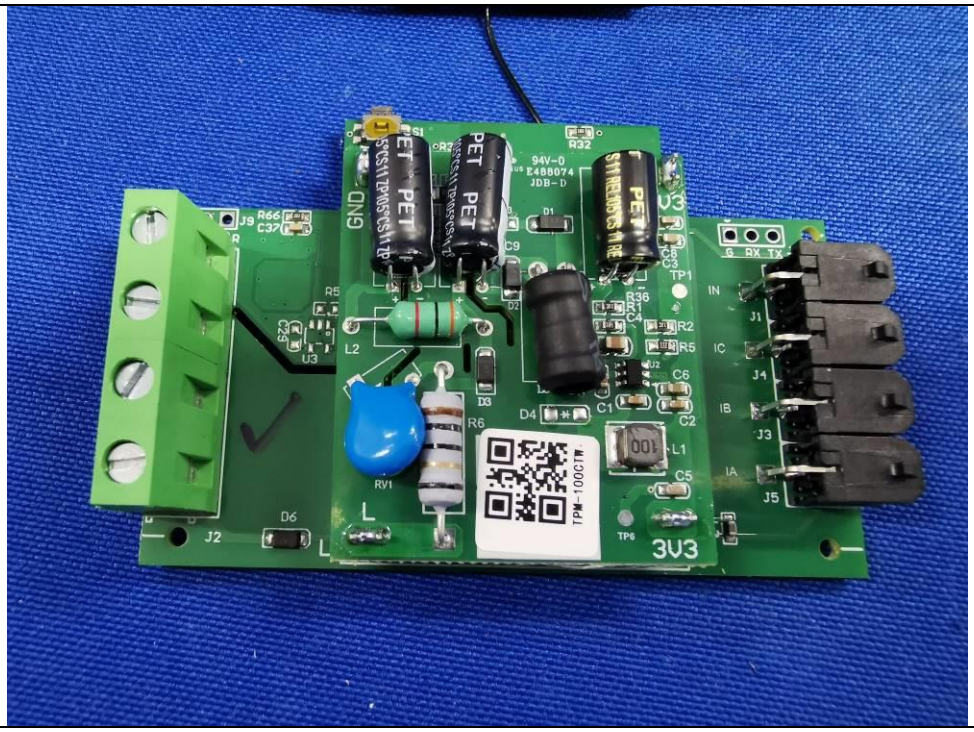
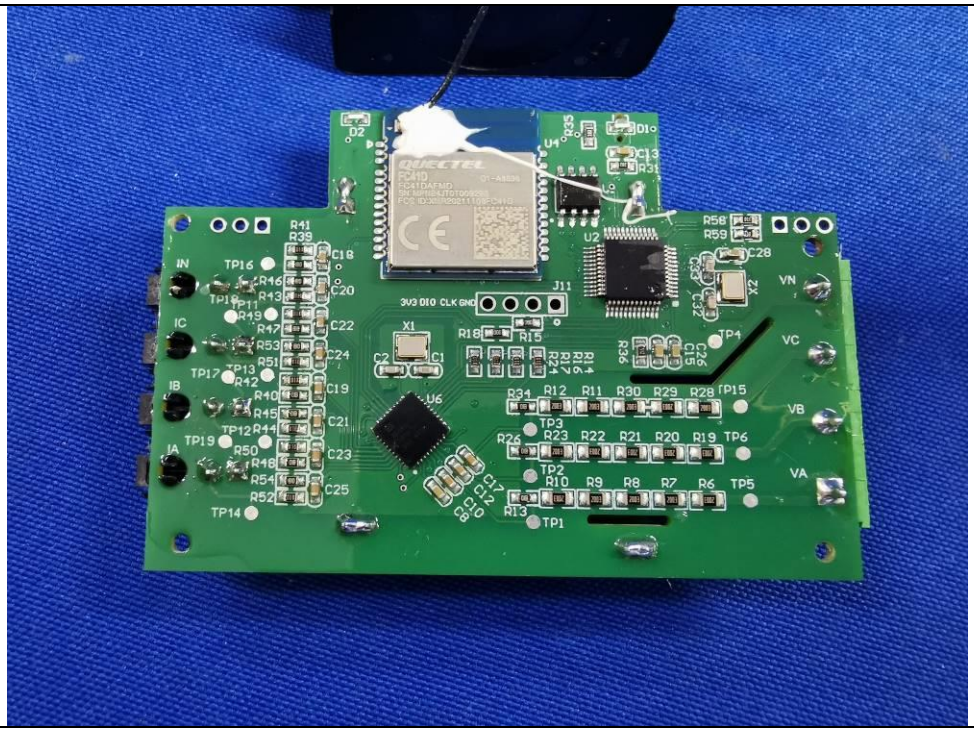


Attachment No.3

Details of: Internal view 3



Details of: Internal view 4



Attachment No.3

Details of: Current transformer (CT) view

---End---