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

Report Number. .....:	SUES240400056401
Date of issue.....:	2024-09-20
Total number of pages .....:	100 pages
Name of Testing Laboratory preparing the Report.....:	SGS-CSTC Standards Technical Services Co., Ltd. Suzhou Branch
Applicant's name.....:	Acrel Co., Ltd.
Address .....:	No.253, Yulv Road, Jiading, Shanghai, China
Test specification:	
Standard .....:	IEC 61010-1:2010, AMD1:2016
Test procedure .....:	SGS-CSTC
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.
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Test item description ..... :	Active Power Filter
Trade Mark ..... :	Acrel
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	ANAPF, ANSVG, ANSVG-G-A
Ratings ..... :	AC 380 V 3~, 200A, 50 Hz; Class III

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

☒	**Testing Laboratory:**	SGS-CSTC Standards Technical Services Co., Ltd. Suzhou Branch	
Testing location/ address ..... :		No.10, Weiye Rd, Kunshan Development Zone, Suzhou, Jiangsu, China	
Tested by (name, function, signature) ..... :		Ade Wu PE	
Approved by (name, function, signature) .. :		Dan Xie 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.
Attachment 1	Photo documentation	23
Attachment 2	EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES	1
Attachment 3	Technical documentation	10
Attachment 4	Equipment List	1

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

Summary of testing:

The sample(s) tested complies with the requirements of IEC 61010-1:2010, AMD1:2016; EN 61010-1:2010 + A1:2019.

Unless otherwise specified, the EUT with model ANAPF was selected as representative model for full testing.

Max normal load: output loaded 200A and continue operation.

Tma = 45°C (declared by manufacturer)

K-type thermocouple used for temperature measurement.

Clause	Comment
See “tests performed”	All applicable tests as described in the compliance checklist were performed at SGS-CSTC Standards Technical Services Co., Ltd. Suzhou Branch No.10, Weiye Rd, Kunshan Development Zone, Suzhou, Jiangsu, China

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:**
4.4 Testing in single fault conditions 5.1.3 Mains supply 5.3 Durability of markings 6.2 Determination of accessible parts 6.3 Limit values for accessible parts 6.4 Primary means of protection 6.5.3 Supplementary and reinforced insulation 6.6 Connections to external circuits 6.7 Insulation requirements 6.8 Procedure for voltage tests 6.9 Constructional requirements for protection against electric shock 7.2 Sharp edges 8.2 Enclosure rigidity test 9 Protection against the spread of fire 10 Equipment temperature limits and resistance to heat 11.2 Cleaning 14 Components and subassemblies	SGS-CSTC Standards Technical Services Co., Ltd. Suzhou Branch No.10, Weiye Rd, Kunshan Development Zone, Suzhou, Jiangsu, China

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

1. EU Group Differences (EN 61010-1:2010 + A1:2019)

☒ **The product fulfils the above requirements.**

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:

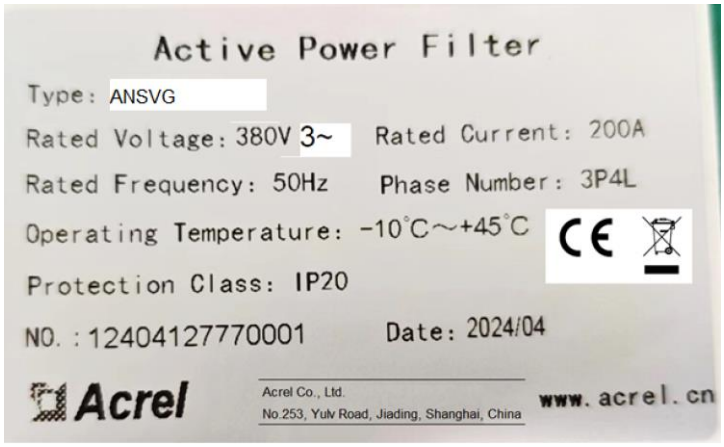
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

☒ **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 National Certification Body that own these marks.

Marking for ANSVG



Remark:

1) The Height of CE and UKCA logo shall not be less than 5 mm; Height of WEEE logo shall not be less than 7 mm;

2) As declared by the applicant, the importer (and manufacturer, if it is different)'s name, registered trade name or registered trade mark and the postal address will be marked on the products before being placed on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

3) The marking plates for other models are of the same pattern except for model name and Rated current.

Test item particulars:	
Type of item ..... :	Control equipment.
Description of equipment function ..... :	The Active Power Filter /static var generator has comprehensive power quality management capabilities. SVG can compensate reactive power and low harmonics within 13 times; APF can filter out odd harmonics within 2-50 times at the same time, the filtering capacity can be up to 97%, and the complete compensation time for step change harmonics is less than 20ms. APF/SVG can be operated in parallel at the same time. The efficiency of the whole machine is greater than 97.5%. It is fully applicable to various situations in industrial and civil fields. It is the best solution for nonlinear load harmonic control and reactive power compensation.
Connection to MAINS supply ..... :	Detachable cord set
Overvoltage category..... :	II
POLLUTION DEGREE..... :	2
Means of protection ..... :	Class I (PE connected)
Environmental conditions..... :	Extended (Specify): -10 to 50 °C; Less than 95% Rh, Altitude:2000m
For use in wet locations..... :	No
Equipment mobility..... :	Built-in or rack mounted or wall mounted
Operating conditions ..... :	Continuous
Overall size of equipment (W x D x H)..... :	Max:680 mm(w) × 200 mm(d) × 580 mm(h)
Mass of equipment (kg)..... :	45kg max (bare machine)
Marked degree of protection to IEC 60529..... :	N/A
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..... :	2024-07-01
Date (s) of performance of tests ..... :	2024-07-01 to 2024-07-20
General remarks:	

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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.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the general product information section.	
Name and address of factory (ies)..... :	Jiangsu Acrel Electrical Manufacturing. Co., Ltd. No.31, Hongtu Road, Nanzha, Jiangyin, Jiangsu, China

General product information and other remarks:

Functions	The equipment under test is a class I Active Power Filter, the active filter/static var generator has comprehensive power quality management capabilities. SVG can compensate reactive power and low harmonics within 13 times; APF can filter out odd harmonics within 2-50 times at the same time, the filtering capacity can be up to 97%, and the complete compensation time for step change harmonics is less than 20ms. APF/SVG can be operated in parallel at the same time. The efficiency of the whole machine is greater than 97.5%. It is fully applicable to various situations in industrial and civil fields. It is the best solution for nonlinear load harmonic control and reactive power compensation.
Material of enclosure	Metal
Other features	The appliance is for indoor use only, the appliances can only be installed in an enclosure or cabinet to prevent accidental contact or exposure to the electrical circuits and components. The appliance only can be used by trained personnel.

Description of model differences:

All models are identical model name, appearance.

Description of special features:

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		P
4.4.2.3	PROTECTIVE CONDUCTOR	(see Form A.6)	P
4.4.2.4	Equipment or parts for short-term or intermittent operation		N/A
4.4.2.5	Motors		—
	– stopped while fully energized		P
	– prevented from starting		P
	– one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors		N/A
4.4.2.7	MAINS transformers	Transformer fault simulated.	P
4.4.2.7.2	Short circuit	(see Form A.39)	P
4.4.2.7.3	Overload	(see Form A.39)	P
4.4.2.8	Outputs		P
4.4.2.9	Equipment for more than one supply	380V 3~	P
4.4.2.10	Cooling	(see Form A.26A)	—
	– air holes closed	Air holes blocked	P
	– fans stopped	Cooling fan stopped	P
	– coolant stopped		N/A
	– loss of cooling liquid		N/A
4.4.2.11	Heating devices	No heating devices used	—
	– timer overridden		N/A
	– temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks	Unable to open the enclosure without using tools.	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

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.1	General		P
	Required equipment markings		—
	– Visible from the exterior; or	Rating label is marked on apparatus enclosure.	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	No such parts.	N/A
	Letter symbols (IEC 60027) used	Letter symbols as specified in IEC 60027 for voltage, current, power and frequency used.	P
	Graphic symbols of Table 1 used	Symbol 2, 6, 12, 14 of Table 1 used.	P
5.1.2	Identification		P
	Equipment is identified by:		—
	a) Manufacturer's or supplier's name or trademark	Trade-mark was provided on the marking label.	P
	b) Model number, name or other means	Model number was provided on the marking label.	P
	Manufacturing location identified	Only one manufacturing location.	P
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.....:	See copy of marking plate	—
	2) d.c. with symbol 1.....:		—
	b) RATED supply voltage(s) or range .....:	AC: 380V 3~	—
	c) Max. RATED power (W or VA) or input current .:	AC 200A	—
	The marked value not less than 90 % of the maximum value	(see Form A.2)	P
	If more than one voltage range:	Only 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

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Clause	Requirement + Test	Result - Remark	Verdict
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:	No such socket-outlets used.	—
	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:		—
	The maximum RATED current or power; or		N/A
	.....Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		P
	OPERATOR replaceable fuse marking (see also 5.4.5) ..... :	Marked near 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	Equipment is marked with necessary information, see following subclause	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/AP
	b) protective conductor terminals:	Symbol 6 used	—
	Symbol 6 is placed close to or on the TERMINAL; or		P
	Part of appliance inlet	No Inlet used.	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

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Clause	Requirement + Test	Result - Remark	Verdict
	RATINGS marked; or		N/A
	Symbol 14 used		N/A
5.1.6	Switches and circuit-breakers	Switch not used as disconnect device	N/A
	If disconnecting device, off position clearly marked	Appropriate disconnect device shall be provided as part of the building installation.	N/A
	If push-button used as power supply switch:		—
	– 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)		N/A
	Only partially protected (symbol 11 not used)	Class I equipment, symbol 11 not used.	P
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	See enclosure.	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		N/A
	Additional symbols such as symbol 12, 13 or 17 used to indicate the nature of HAZARD		P
	Statement to place equipment in a safe state before access by using a tool to HAZARDOUS parts is permitted		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1	General	Sufficient information provided in the user manual.	P
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY		P
	Safety documentation for service personnel authorized by the manufacturer	Specified in user manual.	P
	Documentation necessary for safe operation is provided in printed media or	Printed user manual provided.	P
	in electronic media if available at any time		N/A
	Documentation includes:	Sufficient information provided in the user manual, see below for details	—
	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	Specified in user manual.	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		N/A
	h) Instructions for lifting and carrying	In the user manual	P
	Warning statements and a clear explanation of warning symbols:		—
	– provided in the documentation; or	Warning statements and clear explanation of warning symbols provided in the user manual.	P
	– information is marked on the equipment		N/A
5.4.2	Equipment RATINGS		P
	Documentation includes:	Sufficient information provided in the user manual, see below for details	—
	a) Supply voltage or voltage range.....:	380V 3~	—
	Frequency or frequency range.....:	50Hz	—
	Power or current rating.....:	200A	—
	b) Description of all input and output connections in accordance to 6.6.1 a)	Sufficient information provided in the user manual	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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):	Sufficient information provided in the user manual, see below for details	—
	1) indoor or outdoor use,	Indoor used.	P
	2) altitude,	2000m	P
	3) temperature,	-10°C to 50°C	P
	4) relative humidity,	<95%	P
	5) MAINS supply voltage fluctuations,	+10%, -10%	P
	6) OVERVOLTAGE CATEGORY,	II	P
	7) WET LOCATION, if applicable,		N/A
	8) POLLUTION DEGREE of the intended environment	Pollution degree 2.	P
	e) Degree of ingress protection (IEC 60529)		N/A
	f) If impact rating less than 5 J:		—
	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:	Sufficient information provided in the user manual, see below for details	—
	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		P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructions for use include:	Sufficient information provided in the user manual, see below for details	—
	a) Identification and description of operating controls		P
	b) Positioning for disconnection	This device relies on an external circuit breaker for disconnection.	P
	c) Instructions for interconnection to accessories or other equipment		P
	d) Specification of intermittent operation limits	Continuous operation	N/A
	e) Explanation of symbols used		P
	f) Replacement of consumable materials	No consumable materials.	N/A
	g) Cleaning and decontamination		P
	h) Listing of any poisonous or injurious gases and quantities	No poisonous or injurious gases	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	Sufficient information provided in the user manual, see below for details	—
5.4.5	Equipment maintenance and service		P
	Instructions for RESPONSIBLE BODY include:	See follow	—
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:	Sufficient detail to permit safe maintenance, inspection and testing of the equipment, and to ensure continued safety of the equipment after the maintenance inspection and test procedure	—
	Instruction against the use of detachable MAINS supply cord with inadequate RATING		P
	Specific battery type of user replaceable batteries		N/A
	Any manufacturer specified parts		P
	RATING and characteristics of fuses		P
	Instructions include following subjects permitting safe servicing and continued safety:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Product specific RISKS may affect service personnel		P
	b) Protective measures for these RISKS		P
	c) Verification of the safe state after repair		P
5.4.6	Integration into systems or effects resulting from special conditions		P
	Aspects described in documentation		P
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		P
	ACCESSIBLE parts not HAZARDOUS LIVE		P
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:		—
	ACCESSIBLE parts and earth		P
	two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		P
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
6.2	**Determination of ACCESSIBLE parts**	(see Form A.4)	P
6.2.1	General		P
	Unless obviously determination of ACCESSIBLE parts as specified in 6.2.2 to 6.2.4		P
6.2.2	Examination		P
	– with jointed test finger (as specified B.2)		P
	– with rigid test finger (as specified B.1) and a force of 10 N		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.3	Openings above parts that are HAZARDOUS LIVE	No openings above parts that are HAZARDOUS LIVE	P
	– test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls		N/A
	– test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.3	**Limit values for ACCESSIBLE parts**		P
6.3.1	Levels in NORMAL CONDITION	(see Form A.5)	P
	a) Voltage limits less than 30 V r.m.s. and 42,4 V peak or 60 V d.c.		P
	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		P
	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)	P
	a) Voltage limits less than 50 V r.m.s. and 70 V peak or 120 V d.c.		P
	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:		—
	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

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Clause	Requirement + Test	Result - Remark	Verdict
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)		P
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		N/A
	– 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)	P
	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)	P
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		P
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7	(see Form A.15)	P
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)		P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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)	P
6.5.2.1	General		P
	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		—
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or	Metal enclosure bonded to the PE.	P
	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	Protective bonding consists of directly connected structural parts and bonding conductor. Also, the protective bond is to the input connector mounted on the PCB.	P
	b) Soldered connections:		—
	Independently secured against loosening	PROTECTIVE BONDING was securely hooked in AC inlet before soldering and additionally fixed by a heat shrink sleeve.	P
	Not used for other purposes		P
	c) Screw connections are secured	Spring washer used to against loosening for the PROTECTIVE BONDING connected to the metal chassis.	P
	d) PROTECTIVE BONDING not interrupted; or		P
	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;		P
	Impedance meets 6.5.2.4		P
	h) Protective conductors bare or insulated, if insulated, green/yellow	Green / yellow insulated protective used.	P
	Exceptions:		—
	1) earthing braids;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		P
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3		P
6.5.2.3	PROTECTIVE CONDUCTOR TERMINAL		—
	a) Contact surfaces are metal		P
	b) Appliance inlet used		P
	c) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		P
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		—
	Is near terminals of circuit for which protective earthing is necessary		P
	External if other terminals external		P
	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		P
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment	(see Form A.9)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		—
	– less than 0,1 Ohm; or		P
	– 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	See clause 6.7	P
6.5.4	PROTECTIVE IMPEDANCE	(see 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

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.6	Current- or voltage-limiting devices	(see Form A.13)	N/A
	Device complies with all of:		—
	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	Signal port separated from primary parts by DI/RI.	P
	short circuit of separation does not cause a HAZARD		P
	Instructions or markings for each terminal include:	Provided in user 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		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
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	N/A
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	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		P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		P
	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
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		P
	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		P
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		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.2.1		P
	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)	P
	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		P
6.7.3.1	General		P
	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:		—
	– REINFORCED INSULATION		N/A
	– DOUBLE INSULATION		P
	– screen connected to the PROTECTIVE CONDUCTOR TERMINAL		N/A
6.7.3.2	CLEARANCES	(see Forms A.14 and A.15)	P
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or		P
	twice the values of Table 6 for REINFORCED INSULATION; or		P
	b) pass the voltage tests of 6.8 with values of Table 6;	(see Form A.18)	P
	with following adjustments:		—
	1) values for reinforced insulation are 1,6 times the values for basic insulation		P
	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		P
6.7.3.3	CREEPAGE DISTANCES	(see Forms A.14 and A.15)	P
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		P
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		P
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.3.4	Solid insulation		P
6.7.3.4.1	General		P
	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)	P
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		P
	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	Insulation film of transformer considered.	P
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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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)	P
	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
	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	No such screws.	N/A
	c) accidental loosening	Screw with lock washer used.	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		P
	Green-and-yellow insulation shall not be used except:		—
	a) protective earth conductors;	Green-and-yellow insulation conductor used.	P
	b) PROTECTIVE BONDING conductors;		P
	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	Not provided.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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		—
	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		N/A
	MAINS supply plugs, connectors etc., conform with relevant specifications		N/A
	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)	N/A
	Accessory MAINS socket outlets:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	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**	This device relies on an external circuit breaker for disconnection.	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:		—
	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 ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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**	No 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**		P
7.3.1	General		P
	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5	DC fan inside equipment and is not accessible by operator.	P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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**		P
	Equipment not secured to building structure is physical stable		P
	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		P
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg	floor-standing equipment	P
	c) downward force test for floor-standing equipment		P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
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**		P
	Mounting brackets withstand four times weight	(see Form A.20B)	P
	One fastner removed and test repeated with two times weight	(see Form A.20B)	N/A
7.7	**Expelled parts**		P
	Equipment contains or limits the energy		N/A
	Protection not removable without the aid of a tool		P
8	**RESISTANCE TO MECHANICAL STRESSES**		P
8.1	**General**		P
	Equipment does not cause a HAZARD when subjected to mechanical stresses in NORMAL USE		P
	Normal protection level is 5 J		P
	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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT		P
	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		P
	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		P
	– insulation pass the voltage tests of 6.8	(see Form A.30)	P
	i) No leaks of corrosive and harmful substances		P
	ii) ENCLOSURE shows no cracks resulting in a HAZARD		P
	iii) CLEARANCES not less than their permitted values		P
	iv) Insulation of internal wiring remains undamaged		P
	v) PROTECTIVE BARRIERS not damaged or loosened		N/A
	vi) No moving parts exposed, except permitted by 7.3		P
	vii) No damage which could cause spread of fire		P
8.2	**ENCLOSURE rigidity test**		P
8.2.1	Static test	(see Form A.21A)	P
	– 30 N with 12 mm rod applied to each part of ENCLOSURE		P
	– in case of doubt test conducted at maximum RATED ambient temperature		P
8.2.2	Impact test		P
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged		P
	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)	P
8.3.1	Other than HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		P
	Tests conducted with a drop height or angle of..... :	30°	—
8.3.2	HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	Non-metallic materials have flammability classification V-1 or better	(see TABLE 1.A or Form A.22)	N/A
	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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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	Not permanently connected equipment.	N/A
	Overcurrent protection device:		—
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.6.3	Other equipment		P
	Protection within the equipment		P
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	50 °C	P
	– for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C		P
	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**		P
	Limits not exceeded in:	(see Form A.26A)	—
	NORMAL CONDITION		P
	SINGLE FAULT CONDITION		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
	e) Terminals carrying a current more than 0,5 A	Approved components used.	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)	P
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
10.5.3	Insulating material		P
	a) Parts supporting parts connected to MAINS supply	Appliance coupler and PCB were approved components.	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		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
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**		P
	Equipment provides protection		N/A
12.2	**Equipment producing ionizing radiation**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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.....:	Not appliable.	—
	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
	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	Indicating LED	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**		N/A
	Power density does not exceed 10 W/m^2.....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
12.5	**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
	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**	Approved coin battery used.	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

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Clause	Requirement + Test	Result - Remark	Verdict
	Apparatus incorporates operator protection (see also 7.7)		N/A
	Pressure release device:		—
	Discharge without danger		N/A
	Cannot be obstructed		N/A
13.2.2	Batteries and battery charging	(see Form A.37)	P
	If explosion or fire HAZARD could occur:	Approved coin battery used.	—
	Protection incorporated in the equipment; or		P
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		—
	No HAZARD; or		P
	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
13.2.3	Implosion of cathode ray tubes		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**		P
14.2.1	Motor temperatures		P
	Does not present a HAZARD when stopped or prevented from starting; or	(see Forms A.1 and A.26B)	P
	Protected by over-temperature or thermal protection device conform with 14.3		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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**		N/A
14.7	**Printed wiring boards**		P
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or		P
	Test shows conformity with V-1 of IEC 60695-11-10 or better	(see Form A.23)	N/A
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	**Circuits used to limit TRANSIENT OVERVOLTAGES**		N/A
	Test conducted between each pair of MAINS SUPPLY TERMINALS	Approval varistor used.	N/A
	No ignition or overheating of other materials :		—
	– no ignition		N/A
	– no heat to other parts above the self-ignition points		N/A
	Safely suppressing and properly functional after applied tests		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	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		N/A
	TOLERABLE RISK achieved by iterative documented process covering the following:		—
	a) RISK analysis		N/A
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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**		P
	Manufacturer ´s declaration	Considered during production.	P
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
	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)	N/A

IEC 61010-1			
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
4.4.2.7	1	T1 in Power board (Pin6 to Pin8)s-c	10min	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0 Unit shut down immediately. No damage, no hazard. Recoverable.	P
4.4.2.7	2	T1 in Power board (Pin6 to Pin8)o-l	3hours	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0,001 EUT normally operating when Transformer T1 secondary pin 6-8 output loaded with 6,1A, and when loaded with 6,2A, Unit shut down immediately. No damage, no hazard. Recoverable. Max measured temperature: T1 winding: 125,9°C T1 core: 118,3°C Metal enclosure (Top): 64,6°C Metal enclosure (Side): 58,6°C Ambient: 50,0°C	P
4.4.2.7	3	T7 in Power board (Pin7 to Pin9)s-c	10min	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0 Unit shut down immediately. No damage, no hazard. Recoverable.	P
4.4.2.7	4	T7 in Power board (Pin7 to Pin9)o-l	3hours	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0,001 EUT normally operating when Transformer T1 secondary pin 6-8 output loaded with 6,1A, and when loaded with 6,2A, Unit shut down immediately. No damage, no hazard. Recoverable. Max measured temperature: T7 winding: 132,9°C T7 core: 123,3°C	P

IEC 61010-1			
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
				Metal enclosure (Top): 64,7°C Metal enclosure (Side): 59,7°C Ambient: 50,0°C	
4.4.2	5	C1s-c	10mins	Test voltage: 418V 3~/50Hz; Input current (A): 200A EUT normally operating. No damage. No hazards.	P
4.4.2	6	Q1 pin1-2s-c	10mins	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0 Unit shut down immediately. No damage, no hazard.	P
4.4.2	7	Q1 pin3-2s-c	10mins	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0 Unit shut down immediately. No damage, no hazard.	P
4.4.2	8	Q1 pin1-3s-c	10mins	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0 Unit shut down immediately. No damage, no hazard.	P
4.4.2.7	9	Output + to - o-l	10mins	Test voltage: 418V 3~/50Hz; Input current (A): 200A EUT normally operating. There is no power output at the port. No damage. No hazards.	P
4.4.2.10	10	Opening Air-holes with filters closed	3h	Test voltage: 418V 3~/50Hz; Input current (A): 200A→0,001 Unit shut down when Air-holes with filters closed with 5mins. No damage, no hazard. Recoverable. No damage, no hazard. Recoverable. Max measured temperature: T7 winding: 103,9°C T1 winding: 101,3°C	P

IEC 61010-1			
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
				Fan: 87,0°C Metal enclosure (Top): 65,3°C Metal enclosure (Side): 63,9°C Ambient: 50,0°C	
4.4.2.10	11	Fan (left) Locked	2h	Test voltage: 418V 3~/50Hz; Input current (A): 200A Unit normal operation. No damage, no hazard. Recoverable. No damage, no hazard. Recoverable. Max measured temperature: T7 winding: 99,8°C T1 winding: 97,0°C Fan: 89,6°C Metal enclosure (Top): 64,7°C Metal enclosure (Side): 61,5°C Ambient: 50,0°C	P
4.4.2.4	12	Thermal controller s-c	2h	Test voltage: 418V 3~/50Hz; Input current (A): 200A Unit normal operation. No damage, no hazard. Recoverable. No damage, no hazard. Recoverable. Max measured temperature: T7 winding: 98,2°C T1 winding: 90,3°C Fan: 82,3°C Metal enclosure (Top): 63,2°C Metal enclosure (Side): 57,7°C Ambient: 50,0°C	P

IEC 61010-1			
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
4.4.2.1	13	RTC Battery over discharge: U39 pin1-12 SC	20min	EUT normal operation, no damage, no hazards. Over discharge current is 81,0mA.	P
4.4.2.1	14	RTC Battery over charge: U39 pin13-1 SC	20min	EUT normal operation, no damage, no hazards. Battery discharge current is 0,02mA.	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: SC=Short circuit, OC=Open circuit.					

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

5.1.3c)	**TABLE: MAINS supply**		**Form A.2**	P
	Marked rating..... :	380	V	—
	Phase ..... :	3~		—
	Frequency ..... :	50/60	Hz	—
	Current ..... :	200	A	—
	Power ..... :	-	W	—
	Power ..... :	-	VA	—

Test No.	Voltage [V]	Frequency [Hz]	Current			Power						Comments
			L1[A]	L2[A]	L3[A]	L1 [kW]	L2 [kW]	L3 [kW]	L1 [kVA]	L2 [kVA]	L3 [kVA]	
1	342V	50	200,66	196,32	200,19	1,46	1,40	1,31	39,57	38,72	39,45	50Hz, DELTA Connection, max. normal load
2	342V	60	200,48	196,13	199,97	1,49	1,44	1,32	43,91	42,96	43,77	60Hz, DELTA Connection, max. normal load
3	380V	50	202,49	198,18	201,67	1,42	1,38	1,27	39,90	39,09	39,74	50Hz, DELTA Connection, max. normal load
4	380V	60	202,38	198,39	201,59	1,43	1,39	1,27	44,34	44,13	43,46	60Hz, DELTA Connection, max. normal load
5	418V	50	200,29	195,95	199,78	1,51	1,47	1,33	48,32	47,28	48,17	50Hz, DELTA Connection, max. normal load
6	418V	60	202,16	198,61	201,43	1,43	1,40	1,25	48,79	47,92	48,57	60Hz, DELTA Connection, max. normal load

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)	1)
MAINS supply (5.1.3)	1)
Fuses (5.1.4)	1)
Terminals and operating devices (5.1.5.2)	1)
Switches and circuit breakers (5.1.6)	1)
Double/reinforced equipment (5.1.7)	N/A
Field wiring Terminal boxes (5.1.8)	N/A
Warning marking (5.2)	1)
Battery charging (13.2.2)	N/A

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
1)	B	Pass	Pass	Pass	

Supplementary information:

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

6.2	**TABLE: List of ACCESSIBLE parts**		**Form A.4**	P
6.1.2	Exceptions			—
6.2	Determination of ACCESSIBLE parts			—
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)	
1	Metal enclosure	V	No exception.	
2	Secondary output terminal	V, R, J	N/A	

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 (see Form A.4)	Voltage			Current				Capacitance		~~10 s~~ / 5 s test (NOTE)			Comments
	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	
Metal enclosure	-	-	-	A1	0,125	0,176	-	-	-	-	-	-	Limit value: 3,5 mA r.m.s., 5mA peak @264 VAC, 60 Hz
Secondary output terminal	-	-	-	A1	0,07	0,009	-	-	-	-	-	-	Limit value: 0,5 mA r.m.s., 0,707mA peak @264 VAC, 60 Hz

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**	P
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)	
Metal enclosure	1-14	-	-	-	-	-	A1	0,125	0,176	-	-	Limit value: 3,5 mA r.m.s., 5mA peak @264 VAC, 60 Hz
Secondary output terminal	1-14	-	-	-	-	-	A1	0,07	0,009	-	-	Limit value: 0,5 mA r.m.s., 0,707mA peak @264 VAC, 60 Hz
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**	P

Conductor location	CROSS-SECTIONAL AREA [mm²]	Verdict
Bonding conductor	2,5	P

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**	P
ACCESSIBLE part under test		Test current [A]	Voltage attained after 1 min [V]	Calculated resistance (Maximum 0,1 or 0,2 Ω) [Ω] (NOTE 1)	Verdict
Earth pin of AC inlet to furthest enclosure		25	0,25	0,01	P

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.

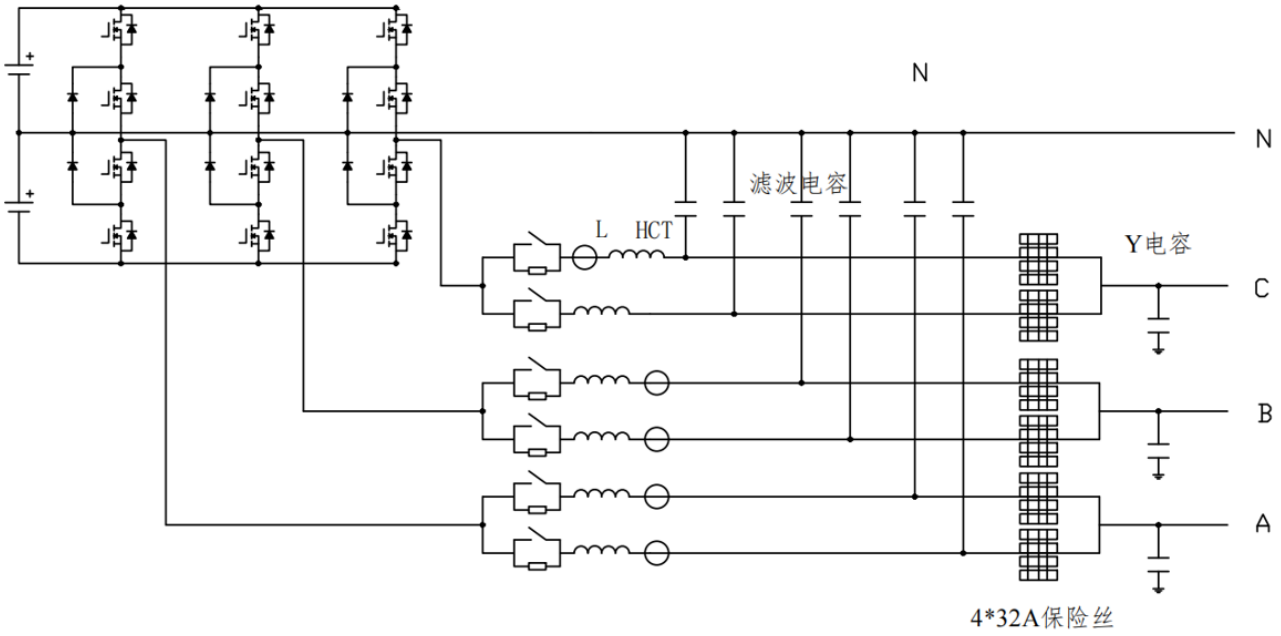
Supplementary information:

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 (NOTE 2)	Comments (NOTE 3)
			RMS [V]	Peak [V]	Freq. [kHz]	[mm]	PWB [mm]	CTI	Other [mm]	CTI	[V]	
A	Line to earth	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
B	Primary to accessible part	DI	220	340	60Hz	3,0	-	-	6,0	-	5200V dc	-
C	Primary to Secondary (driver board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
D	Primary to Secondary (sampling board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
E	Sampling resistor (sampling board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
F	Optocoupler U2 (sampling board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
G	Optocoupler U3(sampling board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-

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

6.7	TABLE: Insulation requirements - Block diagram of system -										Form A.14	P
H	U1 terminal board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
I	L to N before fuse (Internal power board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	-
J	Two terminal of Fuse (Internal power board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	BI
K	Primary to secondary (Internal power board)	BI	220	340	60Hz	1,5	-	-	1,5	-	2500 V dc	BI
L	Transformer secondary windings to core (Internal power board)	BI	220	340	60Hz	1,5	-	-	3,0	-	2500 V dc	BI
M	Transformer secondary windings to primary windings (Internal power board)	BI	220	340	60Hz	1,5	-	-	3,0	-	2500 V dc	BI
N	Control board	BI	220	340	60Hz	1,5	-	-	3,0	-	2500 V dc	BI

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:
The primary to secondary touchable parts consists of two layers of basic insulation. The first layer of isolation is the driver board, sampling board, terminal board, and power board, while the second layer of isolation is the control board.
Approved AC fan

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]			
A	Line to earth	BI	220	340	60Hz	1,5	>2,0	3,0	>3,9	-	P	-
B	Primary to accessible part	DI	220	340	60Hz	3,0	8,8	6,0	8,8	-	P	-
C	Primary to Secondary (driver board)	BI	220	340	60Hz	1,5	3,5	1,5	3,5	-	P	-
D	Primary to Secondary (sampling board)	BI	220	340	60Hz	1,5	6,0	1,5	6,0	-	P	-
E	Sampling resistor (sampling board)	BI	220	340	60Hz	1,5	>2,0	1,5	>2,0	-	P	-
F	Optocoupler U2(sampling board)	BI	220	340	60Hz	1,5	3,14	1,5	3,14	-	P	-
G	Optocoupler U3(sampling board)	BI	220	340	60Hz	1,5	3,14	1,5	3,14	-	P	-
H	U1 (terminal board)	BI	220	340	60Hz	1,5	2,88	1,5	2,88	-	P	-
I	L to N before fuse (Internal power board)	BI	220	340	60Hz	1,5	5,3	1,5	6,4	-	P	-
J	Two terminal of Fuse (Internal power board)	BI	220	340	60Hz	1,5	19.0	1,5	19.0	-	P	-
K	Primary to secondary (Internal power board)	BI	220	340	60Hz	1,5	6,0	1,5	6,0	-	P	-

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]			
L	Transformer secondary windings to core (Internal power board)	BI	220	340	60Hz	1,5	3,0	3,0	3,0	-	P	-
M	Transformer secondary windings to primary windings (Internal power board)	BI	220	340	60Hz	1,5	3,0	3,0	3,0	-	P	-
N	Control board	BI	220	340	60Hz	1,5	3,0	3,0	3,0	-	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…….:	220	V	60	Hz

Supplementary information:
Approved AC fan

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 /	1 h /	2 h /	1 h /
				125 °C	25 °C	0 °C	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					

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		P
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		P
	Test site altitude .....:	0 m	—
	Test voltage correction factor (see table 10).....:	1,16 for BI 1,22 for RI	—

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.]	[r.m.s.]		
L to metal enclosure	See above	Yes	220	2500Vpk	60S	P
Primary to accessible part	See above	Yes	220	5200Vpk	60S	P
Transformer Pri. winding to Sec. winding	See above	Yes	220	2500Vpk	60S	P
Insulating tape of all transformer (1 layer)	See above	Yes	220	2500Vpk	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**		P
	Equipment height / mass .....:				200	mm	45	kg		—
	Equipment (Containers) loaded.....:				[yes]					—
	Castors at unfavourable position.....:				N/A					—
	Doors, drawers and movable arms closed.....:				[yes]					—
	Doors and drawers at unfavourable position.....:				[yes]					—

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

Supplementary information:

7.6	**TABLE: Wall mounting**			**Form A.20B**		P
	Equipment weight .....:			45	kg	—
	Equipment mounted as specified by manufacturer .:			yes		—
	Equipment mounted at plasterboard (drywall) .....:			yes		—
	More than one fastener used .....:			yes		—
	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]		
EUT	180	—	—	P
—	—	—	—	—

Supplementary information:

IEC 61010-1							
Clause	Requirement – Test	Result - Remark					Verdict
8.2	**TABLE: ENCLOSURE rigidity test**					**Form A.21A**	P
8.2.1	Static test						P
	Material of enclosure ..... :	Metal					—
	Preparation for the test:						—
	Operated at ambient temperature ..... :	45	°C	-	h		—
Location		Comments					Verdict
1) enclosure		Intact					P
-							
-							
Supplementary information:							
8.2.2	**TABLE: Impact test**						P
	Material of enclosure ..... :	Metal					—
	Corresponding IK-code ..... :	N/A					—
	Preparation for the test:	N/A					—
	Cooled to (temperature)..... :	-	°C				—
Location		Comments					Verdict
1) Top		Intact					P
2) Left		Intact					P
3) Right		Intact					P
Supplementary information: All the test models have the same result.							

IEC 61010-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.3	**TABLE: Drop test**	**Form A.21B**	P
8.3.1	Other equipment		P

Location	Raised up to		Comments	—
	[mm]	30 °		
Front side	25	—	—	P
Rear side	25	—	—	P
Left side	25	—	—	P
Right side	25	—	—	P

Supplementary information:

8.3.2	HAND-HELD EQUIPMENT and DIRECT PLUG-IN EQUIPMENT		N/A
	Material of enclosure ..... :		—
	Preparation for the test:		—
	Cooled to (temperature)..... :	°C	—

Location	Comments	Verdict

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 circuits inside of EUT	9.1 c	Metal enclosure and V-1 PCB provided		P
2	AC fan	9.1 a	Locked fan test		P
Supplementary information: Open equipment and can only be installed in an enclosure or cabinet to prevent accidental contact or exposure to the electrical circuits and components.					

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

9.3.2	**TABLE: Constructional requirements** **Form A.23**	N/A
14.7	Printed wiring boards	N/A

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

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 condition.		
Frequency .....:	- Hz	Test room ambient temperature (ta) .. :	22,8 °C
Voltage.....:	418 V 3~	Test duration..... :	1 h 40 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
				P	-
				P	-
				P	-
				P	-
				P	-
				P	-
				P	-
				P	-
				P	-

NOTE 1 - tm = measured temperature
tc = tm corrected (tm–ta+ 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:
Max. rated ambient=45 °C

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 condition.		
Frequency .....:	- Hz	Test room ambient temperature (ta) .. :	24,9 °C
Voltage.....:	418 V 3~	Test duration..... :	1 h 30 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
200A Fuse (Left side)	54,7	74,8	130	P	-
200A Fuse (Right side)	51,3	71,4	130	P	-
Big Inductance (Left side)	60,7	80,8	110	P	-
Big Inductance (Right side)	65,5	85,6	110	P	-
Large electrolytic capacitance (Left side)	34	54,1	105	P	-
Large electrolytic capacitance (Right side)	34,2	54,3	105	P	-
AC Fan (Left side)	61,4	81,5	Ref.	P	-
AC Fan (Right side)	73,4	93,5	Ref.	P	-
Heatsink	40,2	60,3	Ref.	P	-
Primary wire	40,3	60,4	80	P	-
K4 body	66,2	86,3	130	P	-
RTC	65,2	85,3	100	P	-
PCB near U10	50,1	70,2	130	P	-
PCB near C1	67,3	87,4	130	P	-
TX2 coil	64,4	84,5	110	P	-
PCB near U3	59,8	79,9	130	P	-
PCB near U2	57,2	77,3	130	P	-
T7 coil	77,2	97,3	110	P	-
T7 core	70,9	91	Ref.	P	-
T1coil	74,6	94,7	110	P	-
T 1core	70,4	90,5	Ref.	P	-
PCB near C3	55,3	75,4	130	P	-
PCB near C13	66,3	86,4	130	P	-
L2 coil	78,1	98,2	110	P	-
T3 coil	73,3	93,4	110	P	-
C143 body	56,7	76,8	105	P	-
TX1 coil	65,4	85,5	110	P	-

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 condition.		
Frequency .....:	- Hz	Test room ambient temperature (ta) .. :	24,9 °C
Voltage.....:	418 V 3~	Test duration..... :	1 h 30 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
PCB near R19	58,2	78,3	130	P	-
Terminal blocks	48,2	68,3	80	P	-
Internal Wire	44,1	64,2	80	P	-
PCB near U6	61,8	81,9	130	P	-
PCB near U5	65,3	85,4	130	P	-
Top metal enclosure	39,2	59,3	85	P	-
Side metal enclosure	33,6	53,7	85	P	-

NOTE 1 - tm = measured temperature
tc = tm corrected (tm–ta+ 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:
Max. rated ambient=45 °C
1) t_{max} has shift to 45°C

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 condition.		
Frequency .....:	- Hz	Test room ambient temperature (ta) .. :	24,7 °C
Voltage.....:	342 V 3~	Test duration..... :	1 h 30 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
200A Fuse (Left side)	57,1	77,4	130	P	-
200A Fuse (Right side)	52,4	72,7	130	P	-
Big Inductance (Left side)	63,4	83,7	110	P	-
Big Inductance (Right side)	76,2	96,5	110	P	-
Large electrolytic capacitance (Left side)	32,4	52,7	105	P	-
Large electrolytic capacitance (Right side)	32,0	52,3	105	P	-
AC Fan (Left side)	60,7	81,0	Ref.	P	-
AC Fan (Right side)	60,5	80,8	Ref.	P	-
Heatsink	31,9	52,2	Ref.	P	-
Primary wire	41,5	61,8	80	P	-
K4 body	68,5	88,8	130	P	-
RTC	65,6	85,9	100	P	-
PCB near U10	50,2	70,5	130	P	-
PCB near C1	67,1	87,4	130	P	-
TX2 coil	64,7	85,0	110	P	-
PCB near U3	60,5	80,8	130	P	-
PCB near U2	57,3	77,6	130	P	-
T7 coil	76,9	97,2	110	P	-
T7 core	71,1	91,4	Ref.	P	-
T1coil	73,8	94,1	110	P	-
T 1core	70,2	90,5	Ref.	P	-
PCB near C3	54,6	74,9	130	P	-
PCB near C13	66,0	86,3	130	P	-
L2 coil	77,6	97,9	110	P	-
T3 coil	73,1	93,4	110	P	-
C143 body	57,2	77,5	105	P	-

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 condition.		
Frequency .....:	- Hz	Test room ambient temperature (ta) .. :	24,7 °C
Voltage.....:	342 V 3~	Test duration..... :	1 h 30 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
TX1 coil	64,9	85,2	110	P	-
PCB near R19	60,9	81,2	130	P	-
Terminal blocks	49,5	69,8	80	P	-
Internal Wire	44,2	64,5	80	P	-
PCB near U6	62,8	83,1	130	P	-
PCB near U5	65,7	86,0	130	P	-
Top metal enclosure	40,1	60,4	85	P	-
Side metal enclosure	33,1	53,4	85	P	-

NOTE 1 - tm = measured temperature
tc = tm corrected (tm–ta+ 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:
Max. rated ambient=45 °C
1) t_{max} has shift to 45°C

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:		—
	Non-operative treatment.....:	[ ]	
	Empty ENCLOSURE.....:	[ ]	
	Operative treatment .....:	[ ]	N/A
	Temperature during tests .....:		—

Description	Material	Comments	Verdict
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

Dielectric strength test (6.8) .....:		V	[r.m.s..]	P

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:
Dielectric strength test is applied to PDU enclosure and L/N input.

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
Input current supports part	125	1,3	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**	P
11	**Protection against HAZARDS from fluids and solid foreign objects**	P

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.]	Test voltage [r.m.s.]	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)				
A	Pass	Pass	Pass	N/A	Pass	N/A	N/A	N/A	240V	2500V	P	--
B	Pass	Pass	Pass	N/A	Pass	N/A	N/A	N/A	240V	5200V	P	--

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

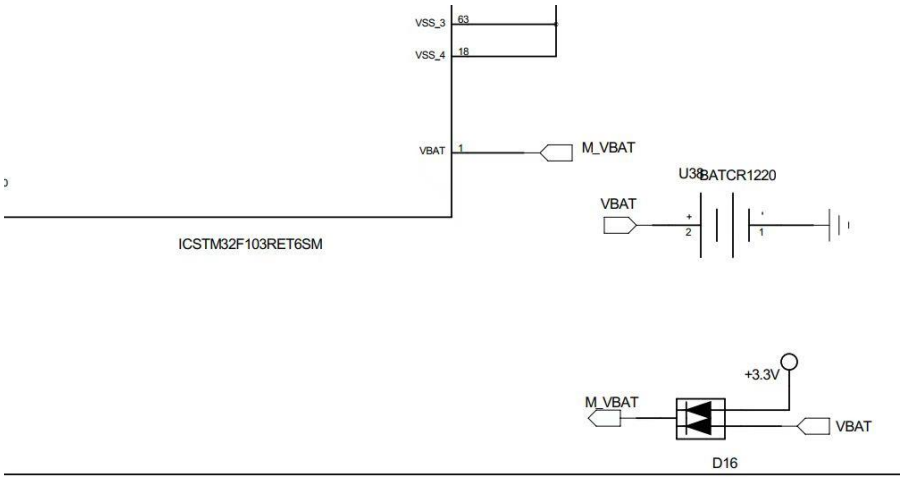
Locations tested	Measured values		Comments
	[dB]	[kHz]	
At operator's normal position			
At 1 m from the ENCLOSURE			
a)			
b)			
c)			
d)			
e)			

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**		P
	Battery load and charging circuit diagram:		P



	Battery type.....:	CR1220	—
	Battery manufacturer/model/catalogue No. .....:	SHENZHEN PKCELL BATTERY CO.,LTD	—
	Battery ratings.....:	3VDC, 40mAh	—
	Reverse polarity instalment test	No	N/A

Single component failures	Verdict	
Component	Open circuit	Short circuit
RTC Battery over discharge: U38 pin1-12 SC	N/A	P
RTC Battery over charge: U38 pin13-1 SC	N/A	P

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 .....:						—
Manufacturer .....:						—
Test in equipment						
Test on bench						
Test repeated inside equipment (see 14.6)						
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:

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 ..... :		—
Manufacturer..... :		—
Test in equipment		
Test on bench		
Test repeated inside equipment (see 14.6)		
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:

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

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

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)
Metal enclosure	Enclosure	Interchangeable	Interchangeable	Steel, Min 2mm thick	IEC/EN/UL/CSA 61010-1	Test with equipment
RTC Battery (U7)	Power	SHENZHEN PKCELL BATTERY CO., LTD	CR1220	40mAh, 3,0Vdc, Max Abnormal Changing Current 2,0mA	UL 1642: 2012	TUVus 60388366 001
PCB	Support components	WUJIANG TONGLING ELECTRONIC CO LTD	TL-2	V-0, Thick 1,2mm 130°C	UL 796 UL 94	UL E306350
Alternative	Support components	Interchangeable	Interchangeable	130 °C, V-0	UL 796, UL 94	UL
DC Fan	Fan	KAIMEI ELECTRONIC CORP	JF1238B1TMPR	12VDC,1.33A,15.96W, 163.86CFM	IEC/EN/UL/CSA 61010-1	Test with equipment
Internal wires	Electrical Connector	Shenzhen Kingmaking Cables	H05VV-F	300V/500V, Min. 10A	EN 50525-2-11 (VDE 0285-525-2-11): 2012-01; EN 50525-2-11: 2011	VDE 40042910
IGBT (Q1,Q2,Q3,Q4,Q5,Q6 Q7,Q8,Q9,Q10)	Electrical control	Infineon	IKW75N65EH5	650Vac, 75A	UL1557 EN 61010-1:2010 + A1:2019	UL E314539 + Test with equipment

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)
Heat shrink tube	Insulated part	Shenzhen Woer Heat-Shrinkable Material Co., Ltd	RSFR-x	600V, 125℃ Min 0,35 mm²	UL 94, UL 746	UL E203950
Heat shrink sleeve	Initial and ground specifications	Foshan Dongying Hot Shrink Material Co Ltd	YDQS2	600V, 130°C, V-1 or better min 0,4mm thick	UL 94	UL E487049
Wire assemblies	Initial and ground specifications	DONGGUAN WENCHANG ELECTRONIC CO LTD	1569	300V, 105°C, Min 0,25 mm²	UL 758	UL E214500
Driver chip (U4,U5,U6,U7)	Electrical control	Infineon	1EDI60N12AF	Min 3,3-15V; 40V, 6A;	UL 1557 EN 61010-1:2010 + A1:2019	UL E314539
Transformer (on the driver board and main control board) (TXT1, TXT2) (TXT1)	Insulated	Yibin Hengchuang Electronics Co., Ltd	TXTPC40-29uH	Class B	IEC 6100-1	Tested with appliance
-Three-layer insulated wire	Insulated	HUIZHOU JINMAXIANCAI CO LTD	TIW-B	Min 130°C	UL 2353	UL E516017

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)
-Enameled wire	Insulated	DONGGUAN CITY CHANGJIEMETALS & PLASTICPRODUCTS CO LTD	CJ-TT-L	105°C, 300V	UL94 UL745	UL E338209
-Bobbin	Insulated	DONGGUAN EATTO ELECTRONIC MATERIAL CO LTD	E-500	Epoxy Molding Compound Min V-0 130℃ MIn 0,75mm	UL94 UL746	UL E218090
Electrolytic capacitors (C1,C2,C3,C4)	capacitor	Hunan Aihua Group Co., Ltd	CE82F400VCD263	Min. 400 V, Min. 105 C	IEC/EN 62368-1	Test with appliance
X capacitance (C143,C144)	Electrical Connector	Shantou High-New TechnologyDev. Zone Songtian Enterprise Co., Ltd.	CE	Rated 10μF Min 400VAC X1 type 125°C	DIN EN 60384-14 (VDE 0565-1-1):2014-04; EN 60384-14:2013-08 DIN EN 60384-14/A1 (VDE 0565-1-1/A1):2017-04; EN 60384-14:2013/A1:2016	VDE 40025748

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)	
Y capacitance (C30)	Electrical Connector	Shantou High-New TechnologyDev. Zone Songtian Enterprise Co., Ltd.	CE	Rated 4700 μ F Min 250VAC Y1 type 125°C	DIN EN 60384-14 (VDE 0565-1-1):2014-04; EN 60384-14:2013-08 DIN EN 60384-14/A1 (VDE 0565-1-1/A1):2017-04; EN 60384-14:2013/A1:2016	VDE 40025748	
Inductance (L2, L3)	Electrical Connector	Yibin Hengchuang Electronics Co., Ltd	TXTER25-1.017mH	Min 135°C	IEC/EN 62368-1	Test with appliance	
-Insulating varnish	Electrical Connector	DONG GUAN YIDA INDUSTRIAL CO LTD	UEW/180	180°C	UL 2353	UL E335405	
-casing	Electrical Connector	DONGGUAN CITY CHANGJIEMETALS & PLASTICPRODUCTS CO LTD	CJ-TT-L	105°C, 300V	UL94 UL745	UL E338209	
-Insulating tape	Electrical Connector	JINGJIANG JINGYI ADHESIVE PRODUCT CO LTD	JL6	180°C	UL 510	UL E246950	
-skeleton	Electrical Connector	CHANG CHUN PLASTICS CO LTD	T383JF	V-0 150℃	UL 746	UL E59481	

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)	
Optocoupler (U28)	Electrical Connector	2Pai Semiconductor Co., Limited	Pai121U31	Max operation temp 125℃	DIN EN IEC 60747-17 (VDE 0884-17):2021-10; EN IEC 60747-17:2020+AC:2021	VED 40053041	
Inductance (L2, L3)	Electrical Connector	Yibin Hengchuang Electronics Co., Ltd	TXTER25-1.017mH	Min 135°C	IEC/EN 62368-1	Test with appliance	
-Insulating varnish	Electrical Connector	DONG GUAN YIDA INDUSTRIAL CO LTD	UEW/180	180℃	UL 2353	UL E335405	
-casing	Electrical Connector	DONGGUAN CITY CHANGJIEMETALS & PLASTICPRODUCTS CO LTD	CJ-TT-L	105°C, 300V	UL94 UL745	UL E338209	
-Insulating tape	Electrical Connector	JINGJIANG JINGYI ADHESIVE PRODUCT CO LTD	JL6	180°C	UL 510	UL E246950	
-Glue	Electrical Connector	DONGGUAN EATTO ELECTRONIC MATERIAL CO LTD	E-500	Epoxy Molding Compound Min V-0 130°C MIn 0,75mm	UL94 UL746	UL E218090	

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)	
Fuse (F1,F2)	Overcurrent protection	Littelfuse	462	250VDC 2A	DIN EN 60127-1 (VDE 0820-1) DIN EN 60127-2 (VDE 0820-2) IEC 60127-1	VDE 40022235	
Big Fuse (J10,J11,J12,J13,J14,J15)	Overcurrent protection	MERSEN ZHEJIANG CO.. LTD, MIRO	RGS4A	690V AC, 200A	IEC 60269-4:2009, IEC 60269-1:2006	IEC60269_4C	
Optocoupler (U6,U27)	U6 on the main control board	2Pai Semiconductor Co., Limited	Pai131U31	Max operation temp 125℃	DIN EN IEC 60747-17 (VDE 0884-17):2021-10; EN IEC 60747-17:2020+AC:2021	VED 40053041	
Terminal board							
Capacitance (C2,C3,C5) (C7,C5,C2,)	Electrical Connector	Xiamen Faratronic Co.，Ltd	C6A	Min 250V, 6A Min 0,22μF	EN 61071:2007 IEC 61071:2007 IEC 61881-1:2010 EN 61881-1:2011	TUV R50266136	
Sensor (U1,U2,U3)	Electrical Connector	Qingxian Zeming Langxi Electronic Devices Co., Ltd	ZMCT101D	16.5X18.5X19.8mm 1A ClassB	UL 60730	UL E363385 + Test with appliance	

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)
Varistor (MOV1)	Electrical Connector	Junyao Electronics	471KD14	300V 105℃	Annex Q of IEC/EN 60950-1 IEC/EN 61051-1 IEC/EN 61051-2 IEC/EN 61051-2-2	VDE40050493
Heat shrink tubing	Insulated part	Shenzhen Woer Heat-Shrinkable Material Co., Ltd	RSFR-x	600V, 125℃	UL224	UL E203950
Electrolytic capacitors (C1,C2,C3,C4)	Electrical Connector	Hunan Aihua Group Co., Ltd	CE82F400VCD263	Min. 400 V, Min. 105 C	IEC/EN 62368-1	Test with appliance

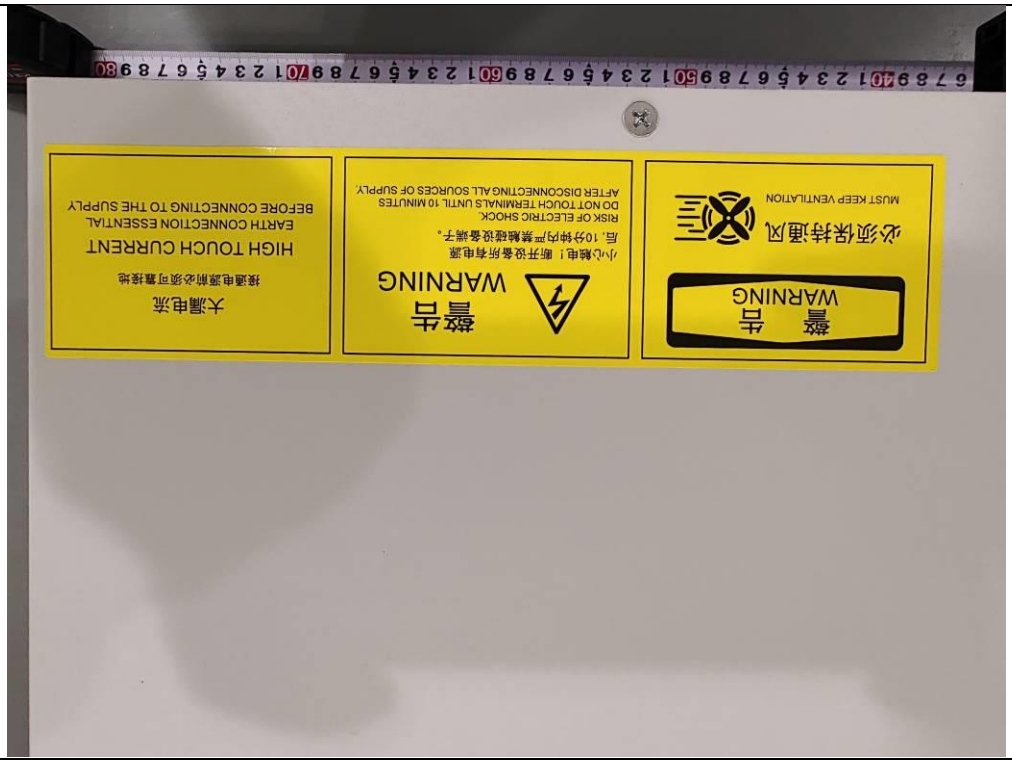
NOTE → 1 List all different manufacturers of the above components
→ 2 May include electrical, mechanical values
→ 3 List licence no or method of acceptance
→ 4 asterisk indicates mark assuring agreed level of surveillance

---End of Report---

Details of: General view

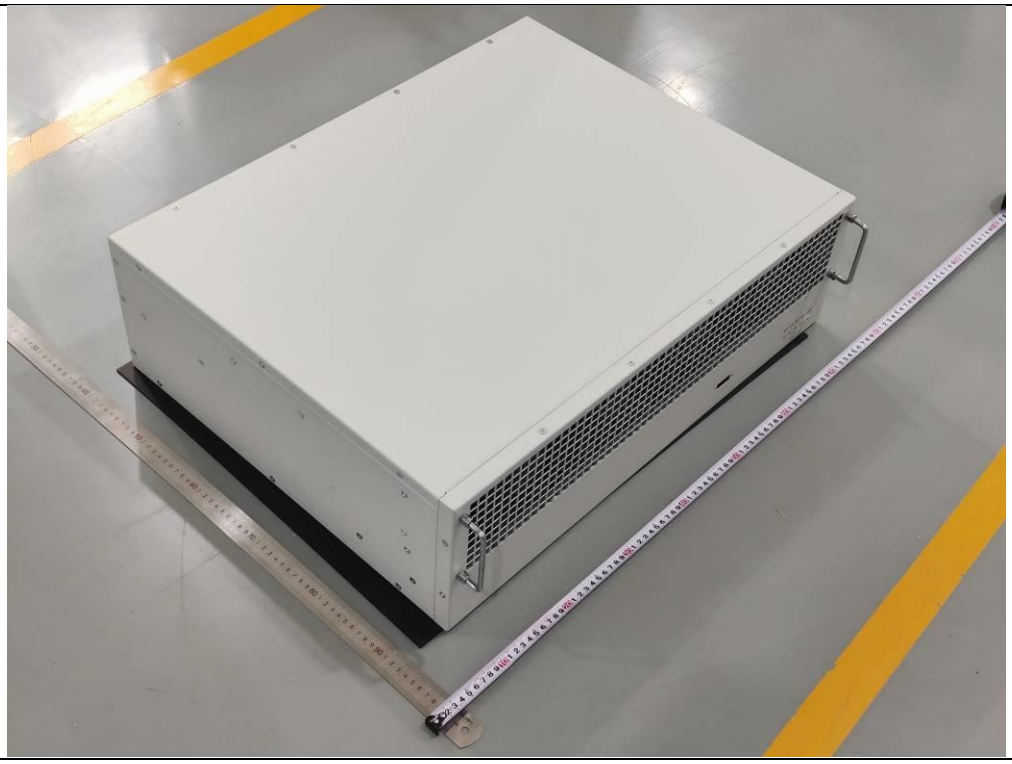
Details of: General view

Details of: Module safety identification

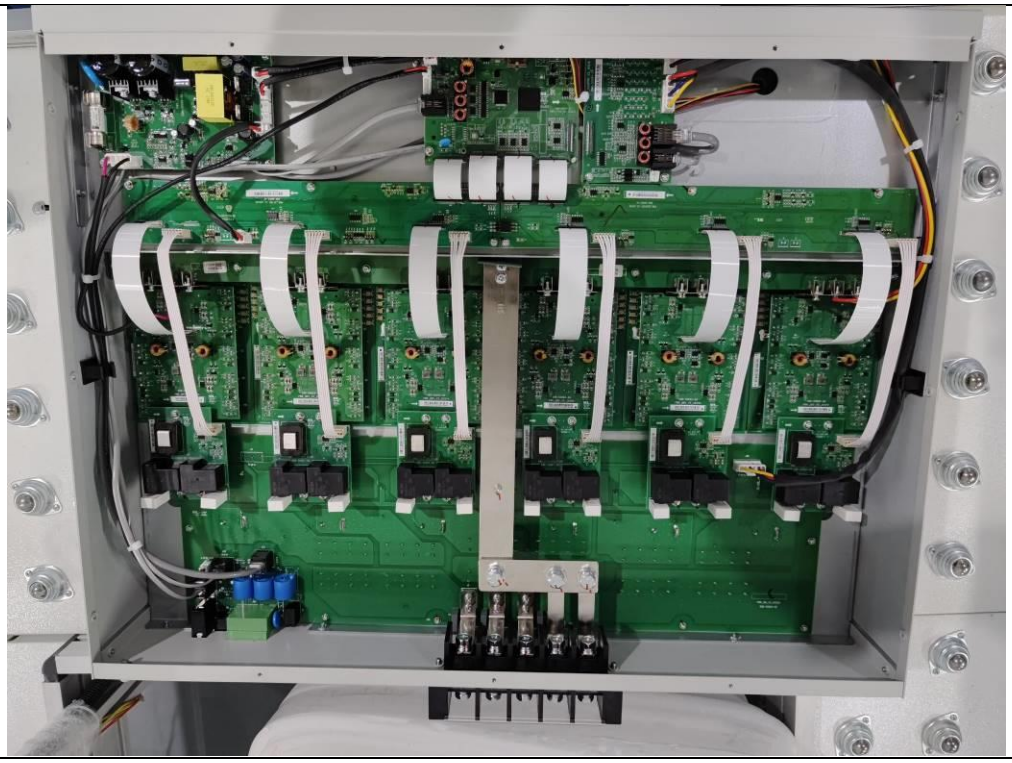


Details of: Module safety identification

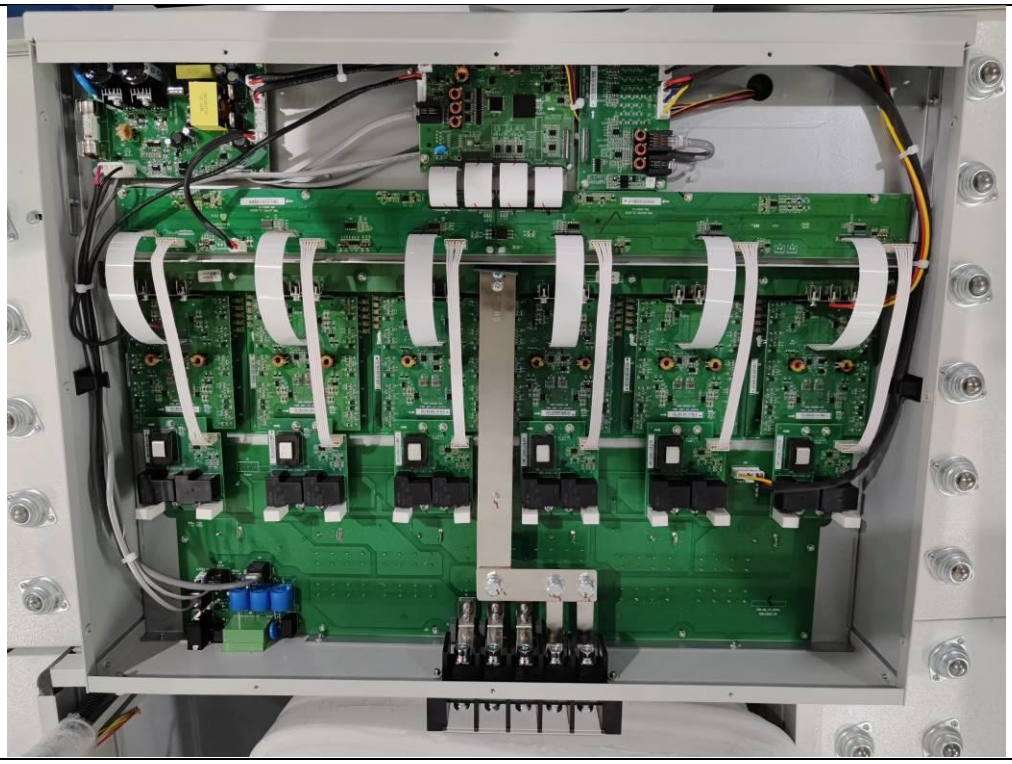
Details of: General view



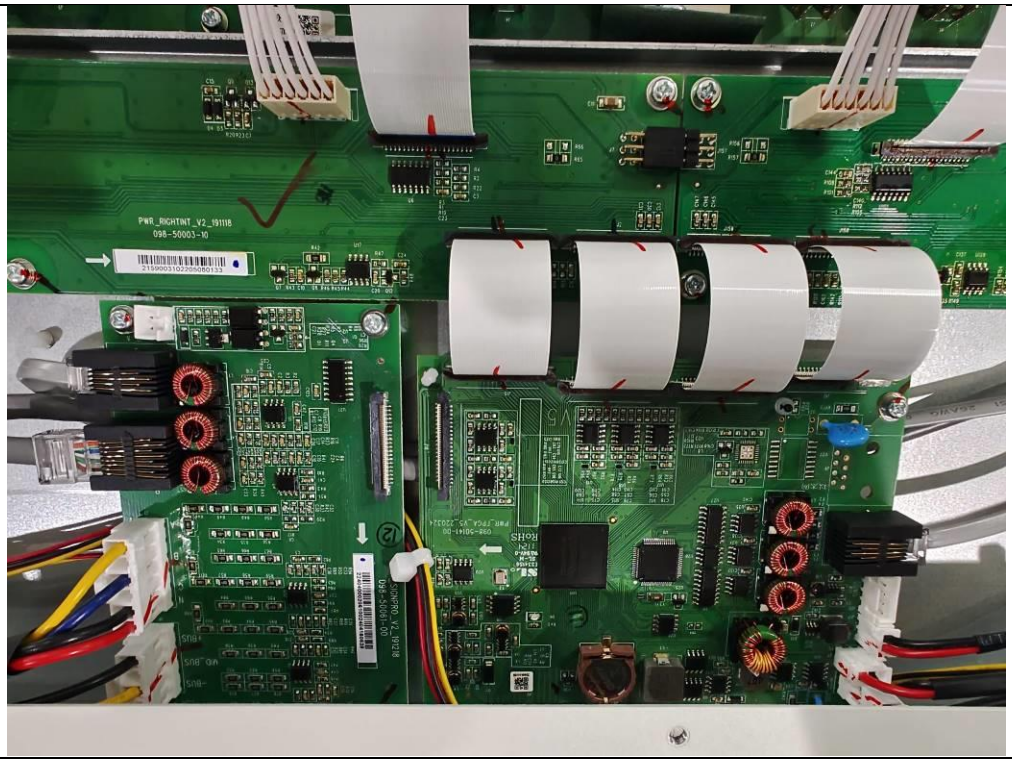
Details of: Internal module view



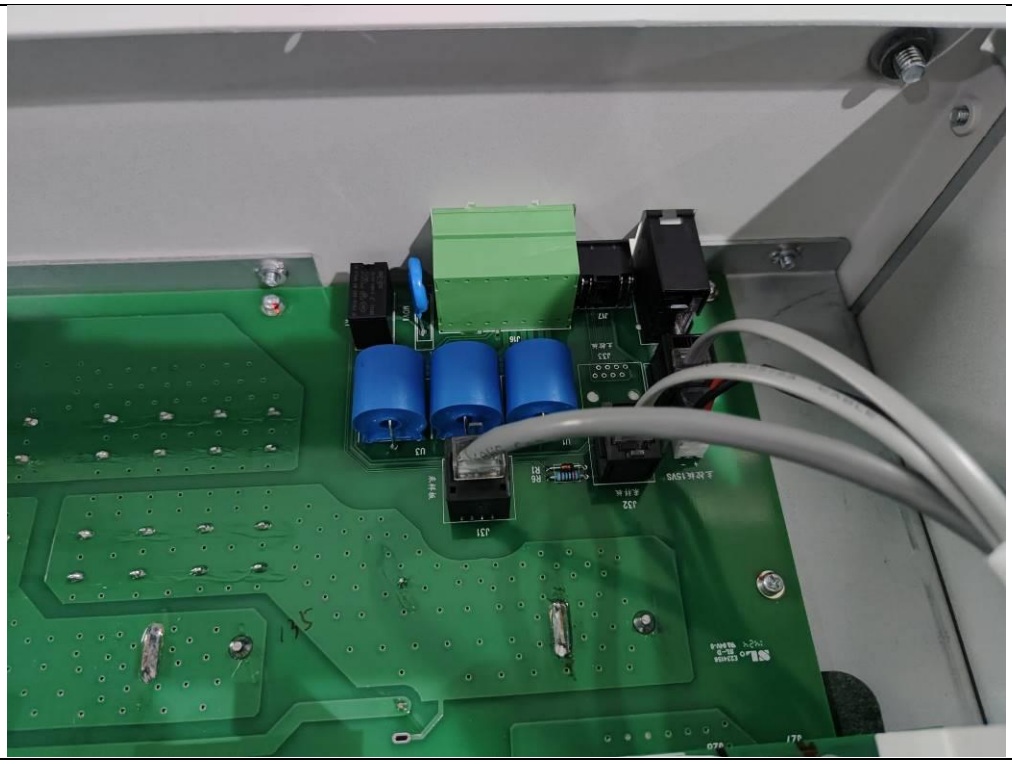
Details of: Internal module view



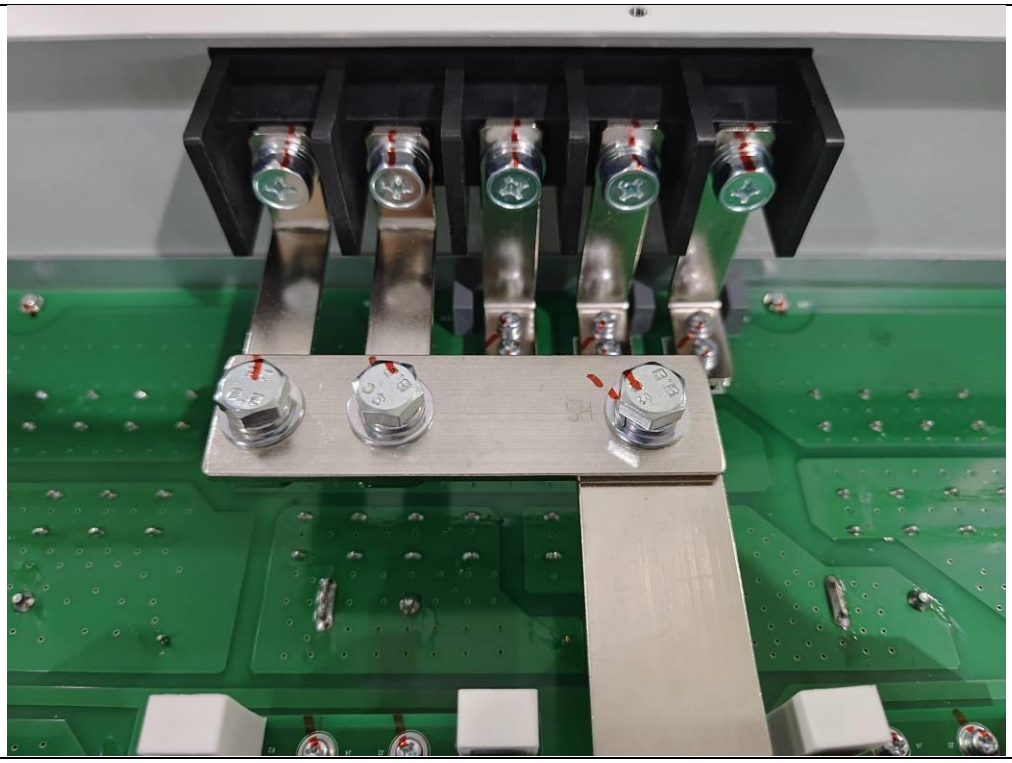
Details of: Control board and signal board view



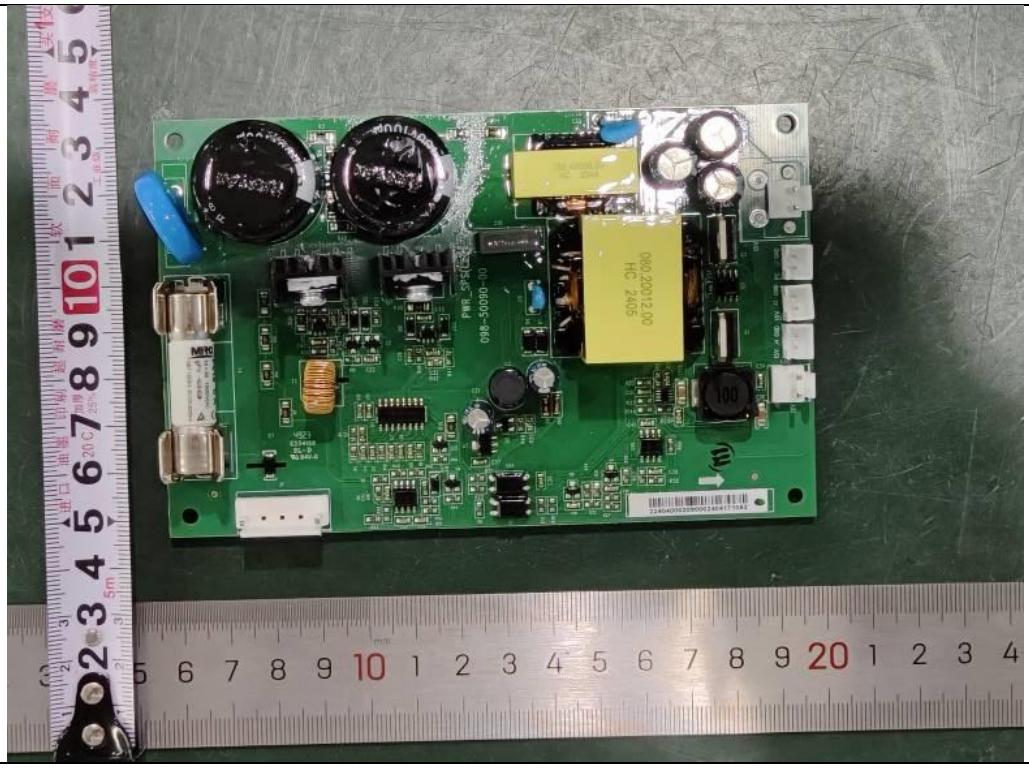
Details of: hall sensor view



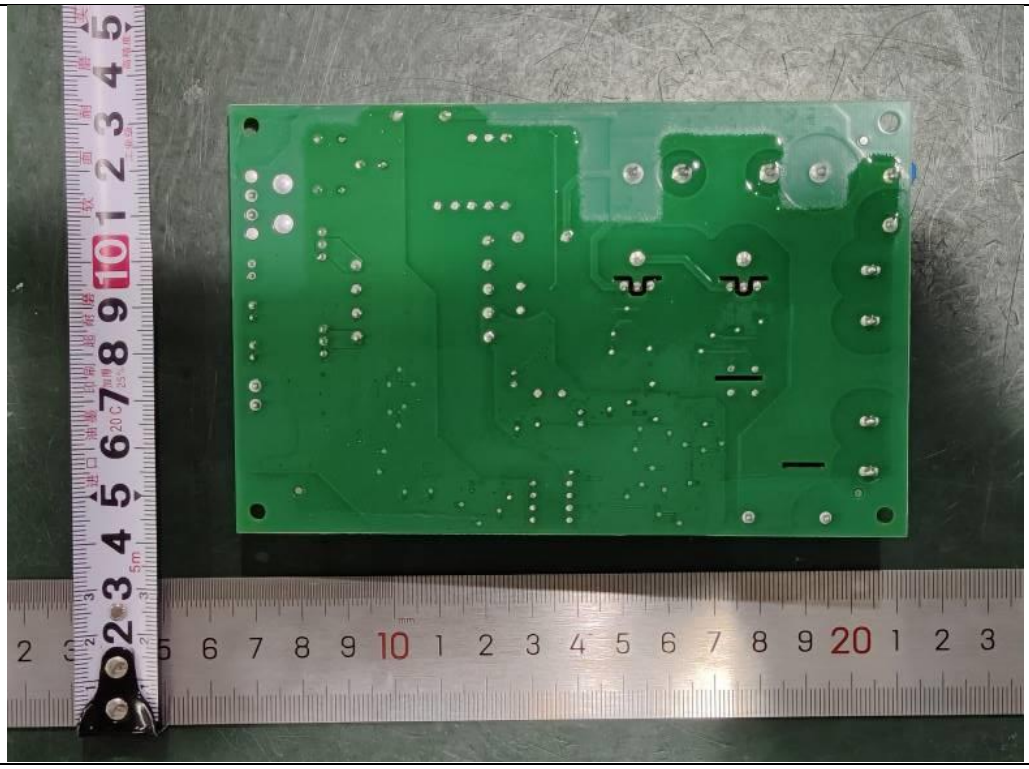
Details of: Busbar view



Details of: Power panel view



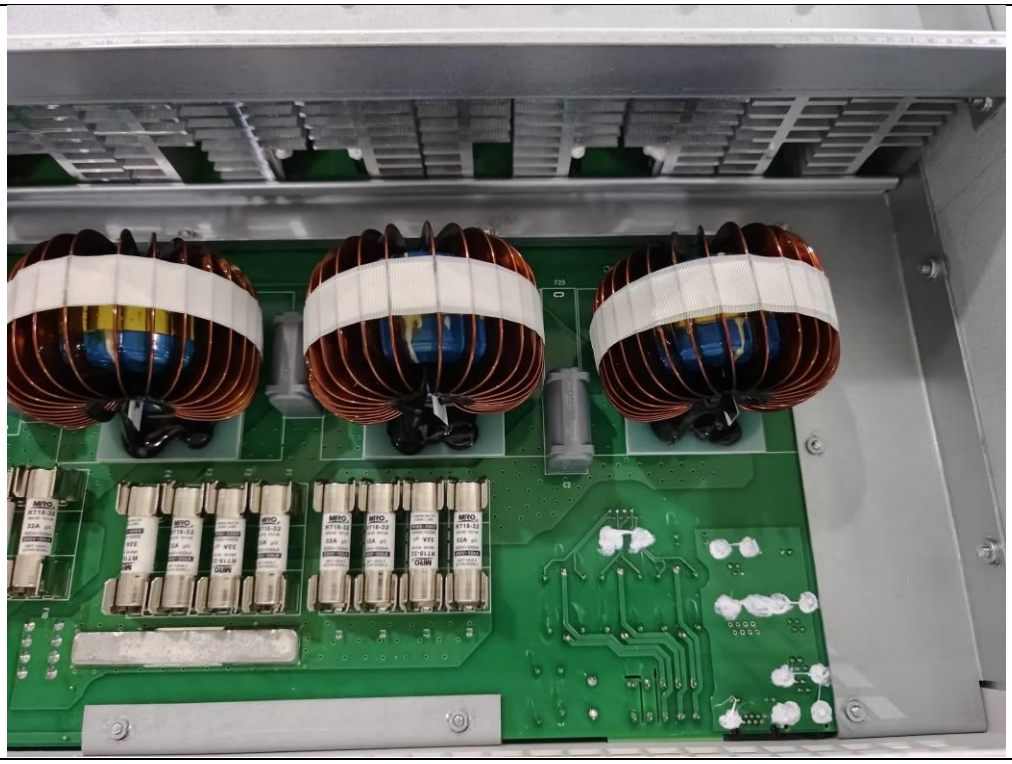
Details of: Back of power board



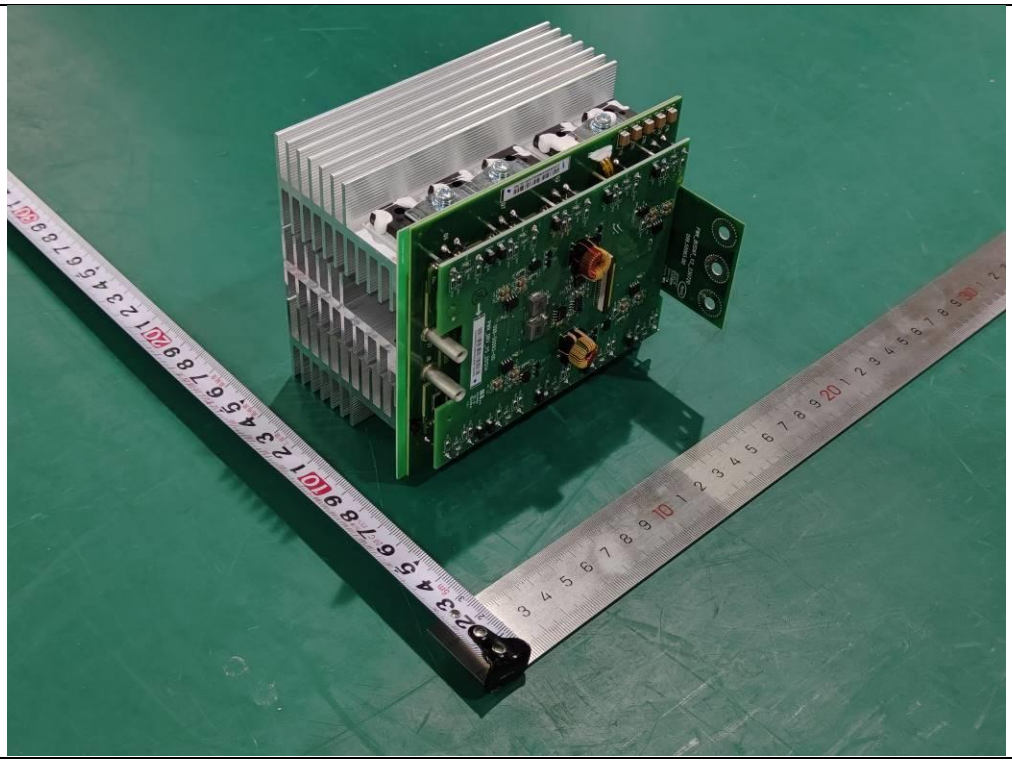
Details of: Module power layer

Details of: Capacitors and heat dissipation

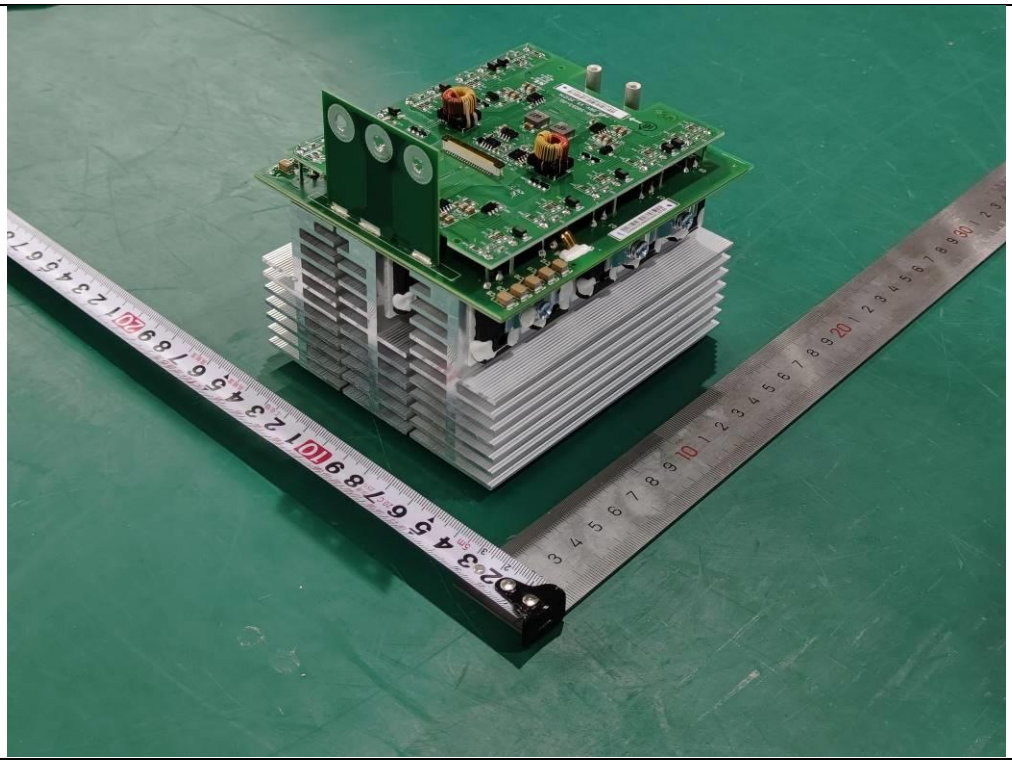
Details of: Inductance and air outlet



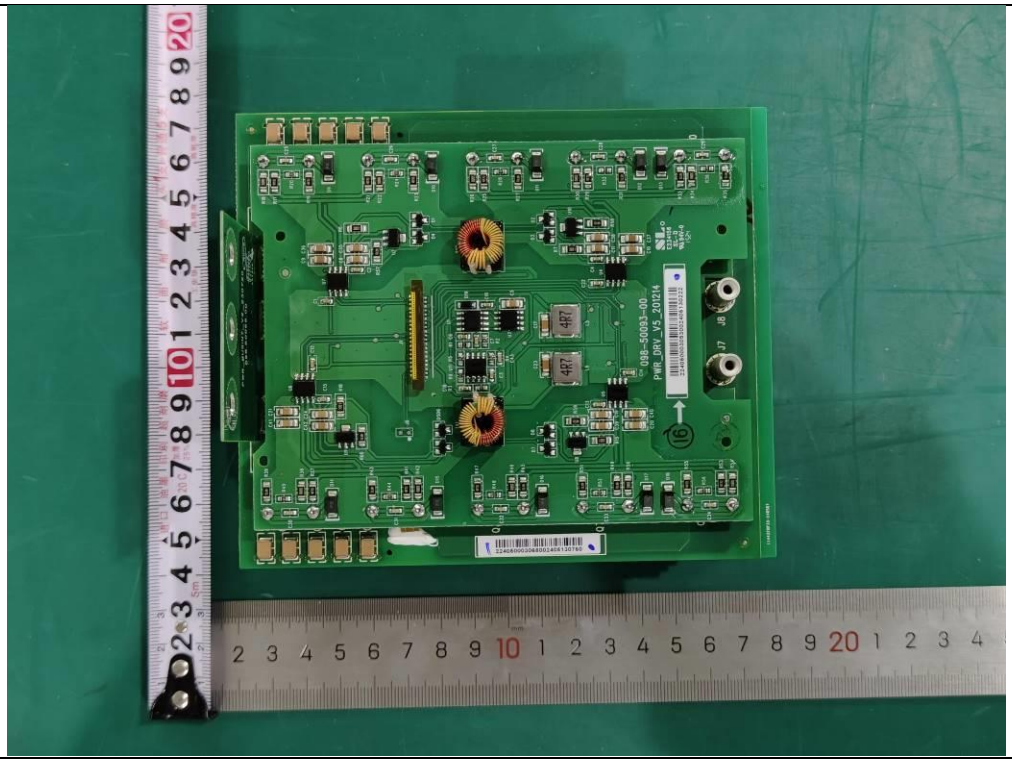
Details of: IGBT View



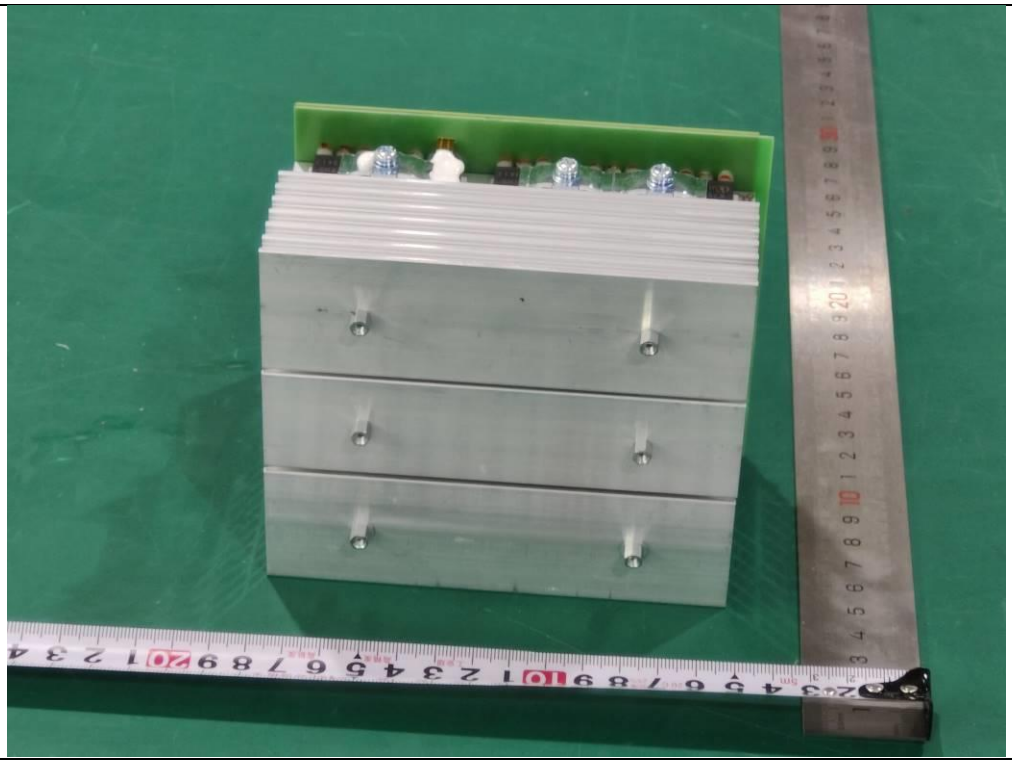
Details of: IGBT module View



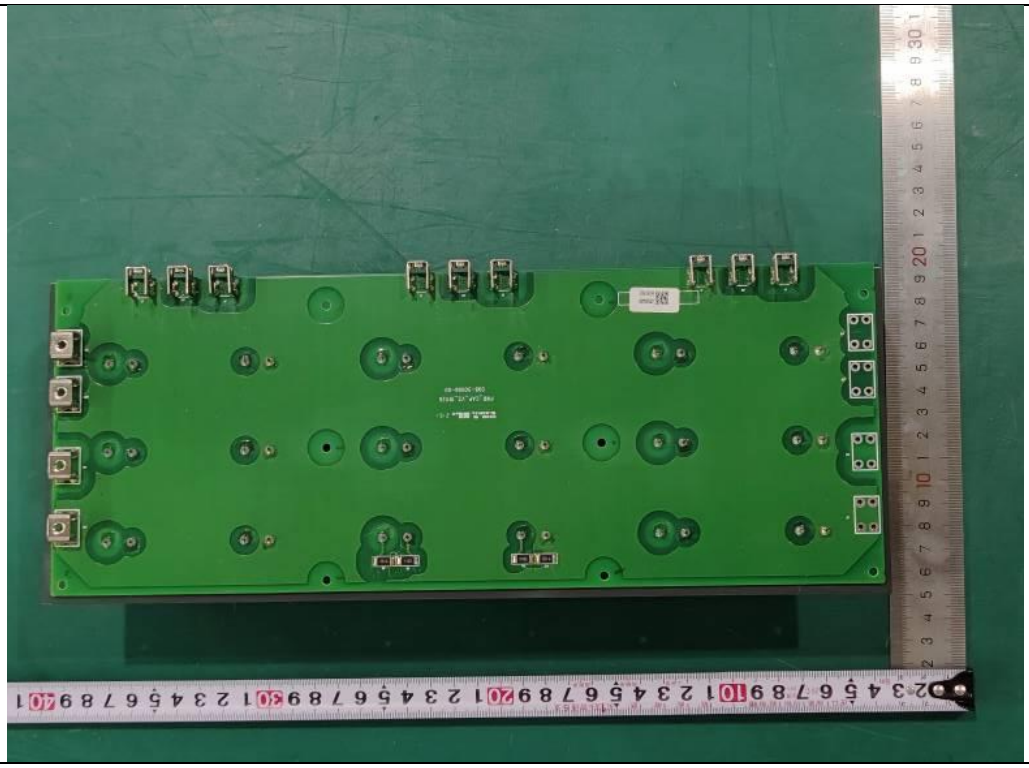
Details of: IGBT driver View



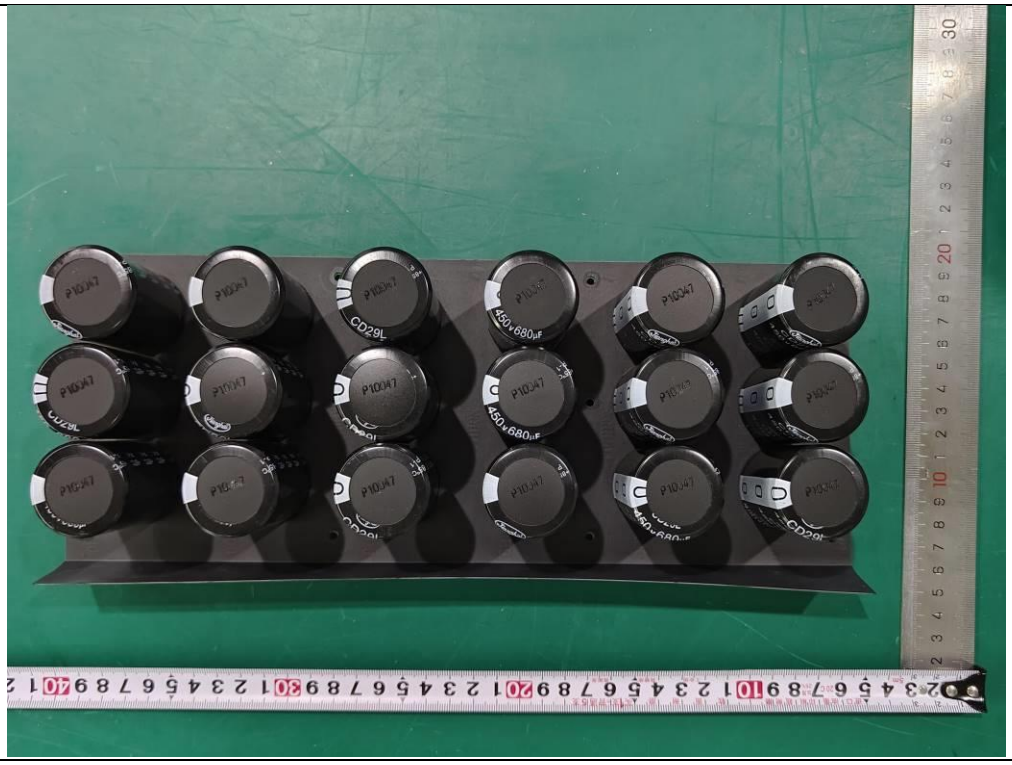
Details of: Heatsink View



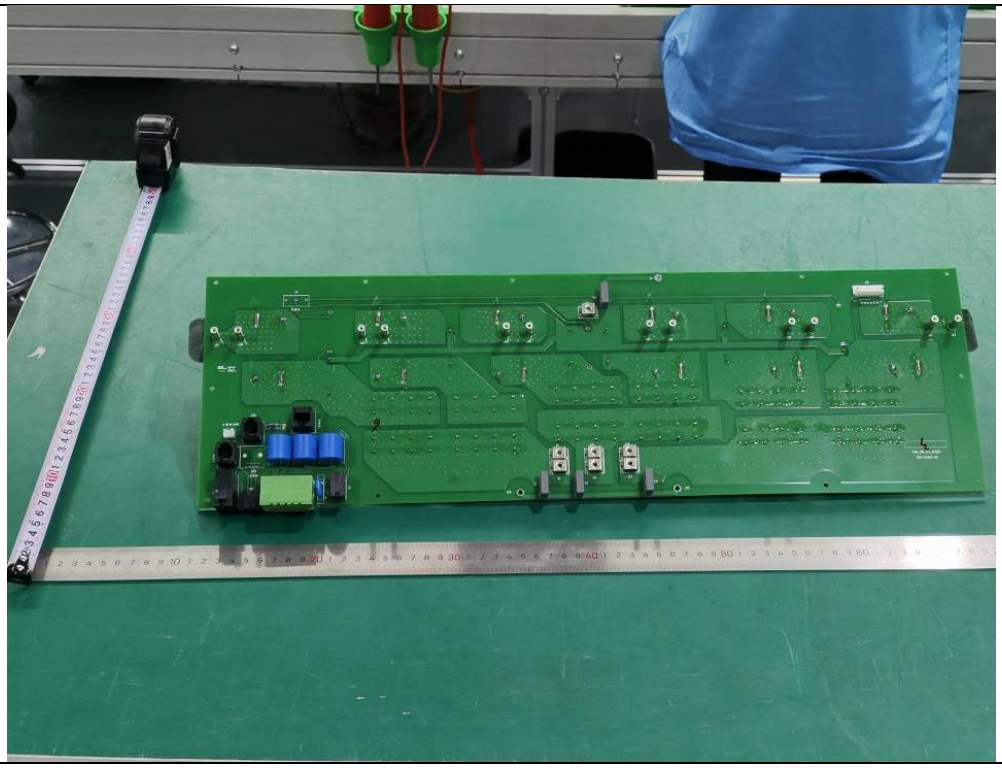
Details of: Back of capacitor board View



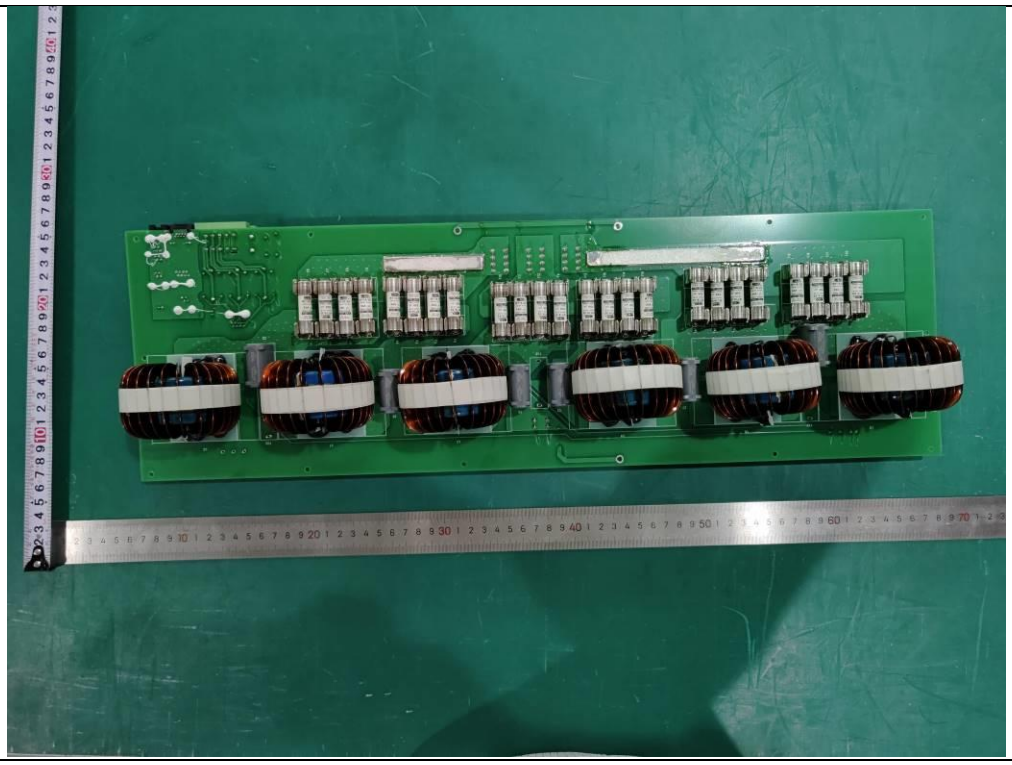
Details of: Capacitive plate View



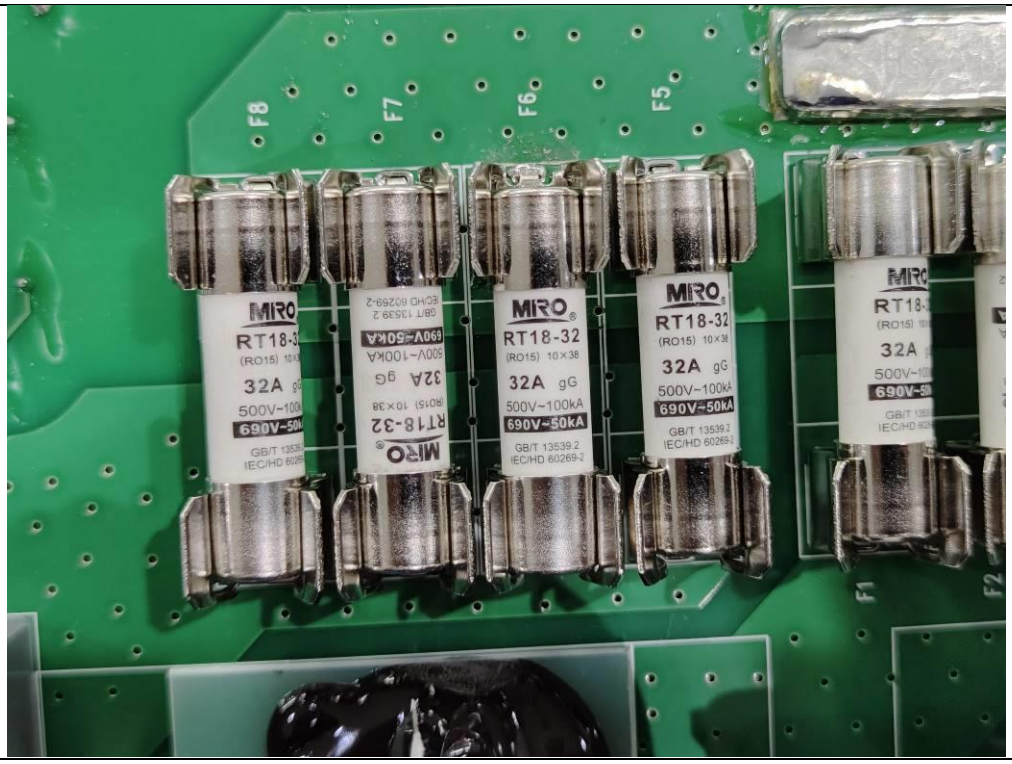
Details of: Back of inductance board



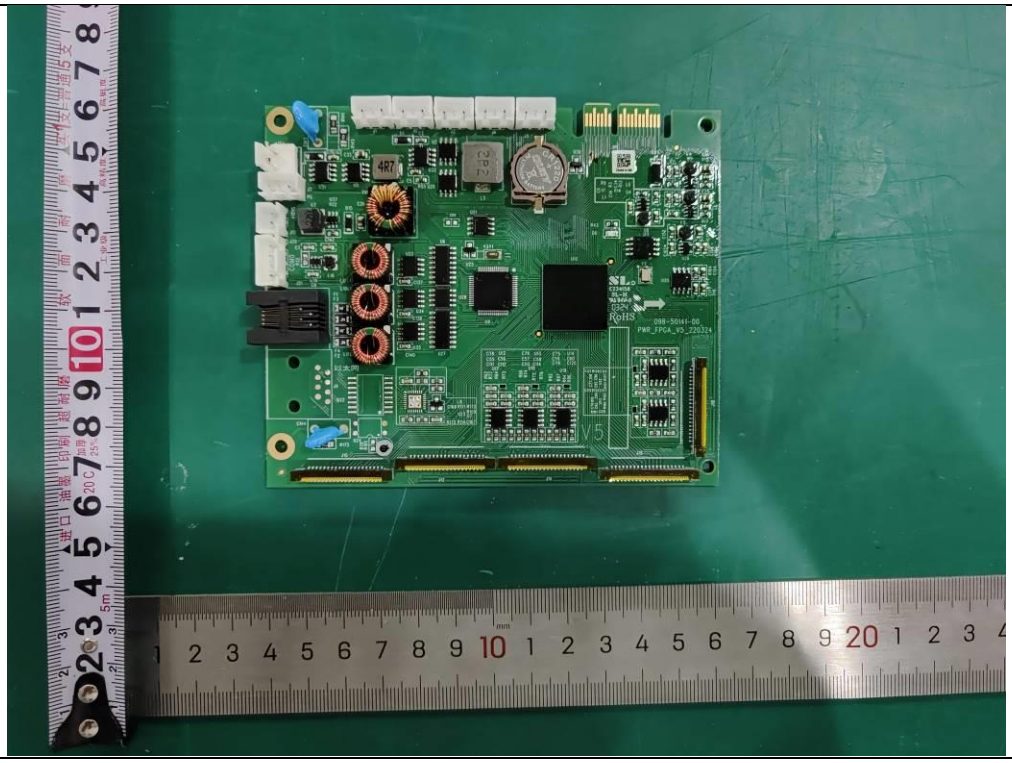
Details of: Inductive board View



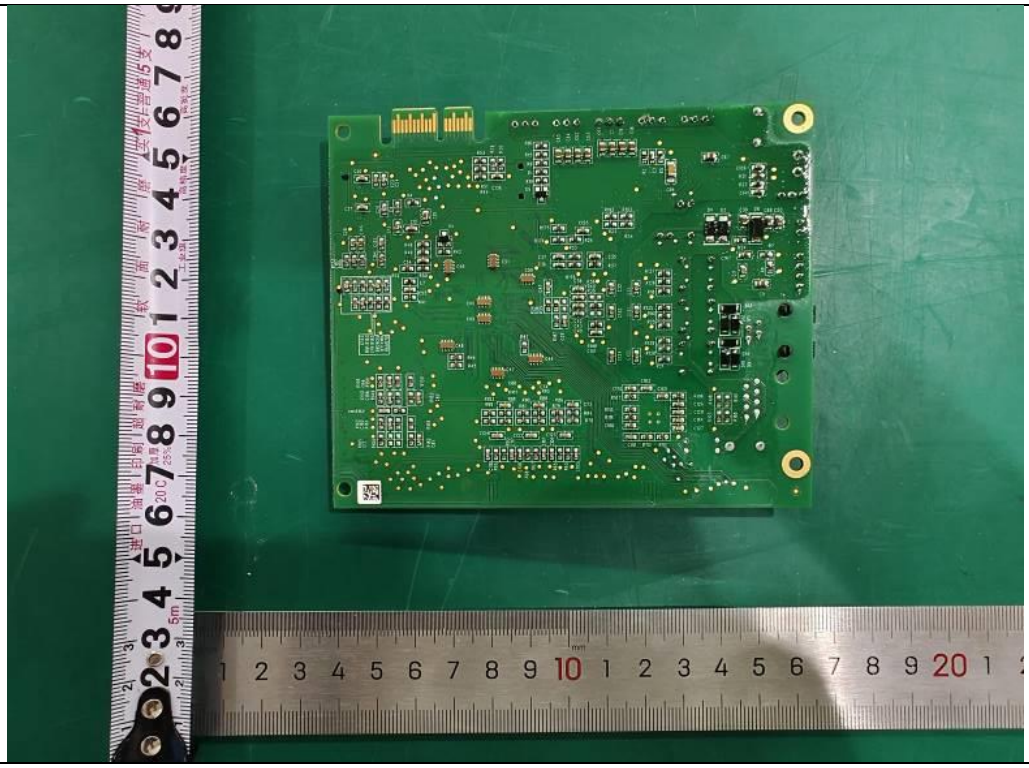
Details of: Quick fuse View



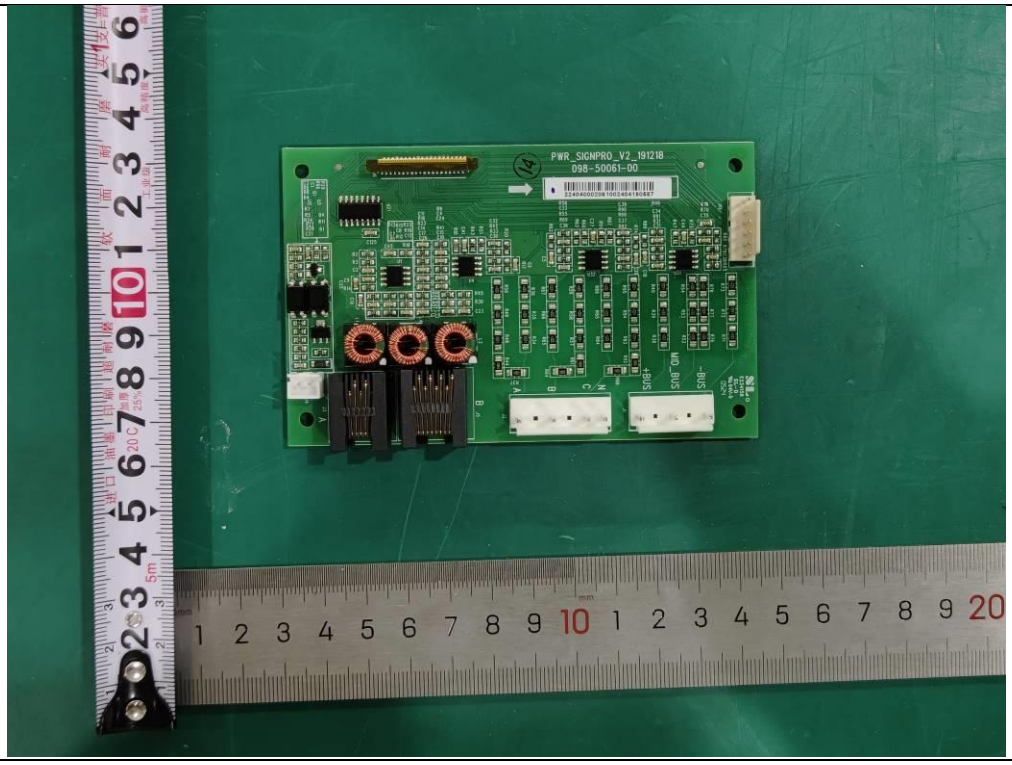
Details of: Main control board



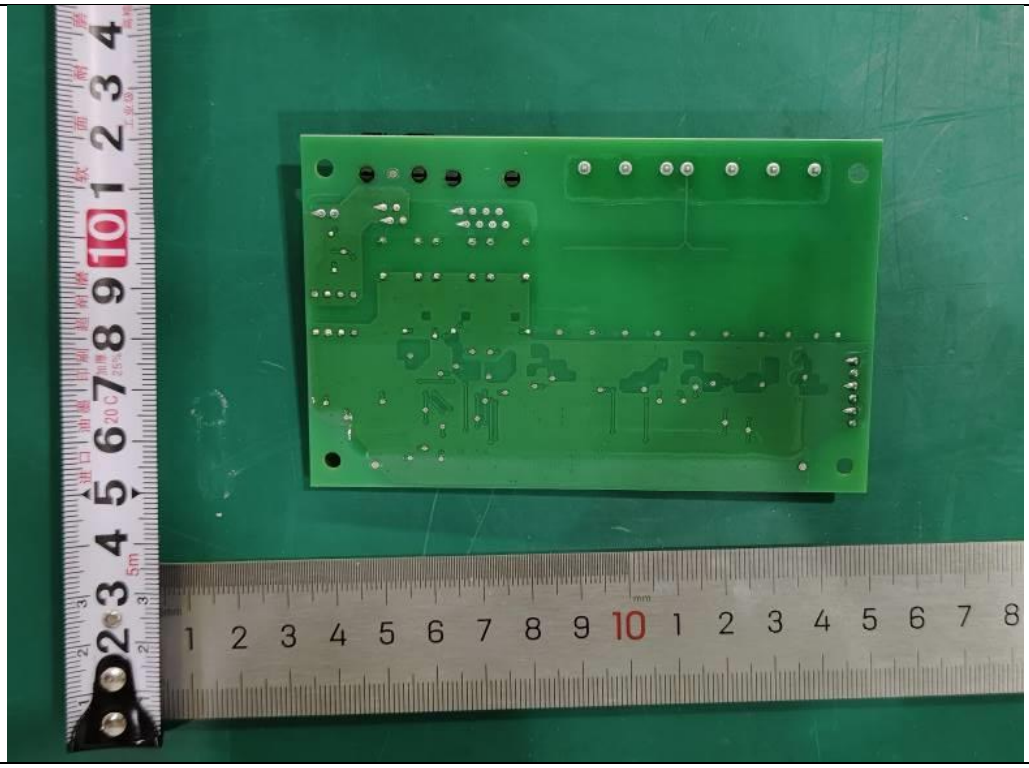
Details of: Back of the main control board



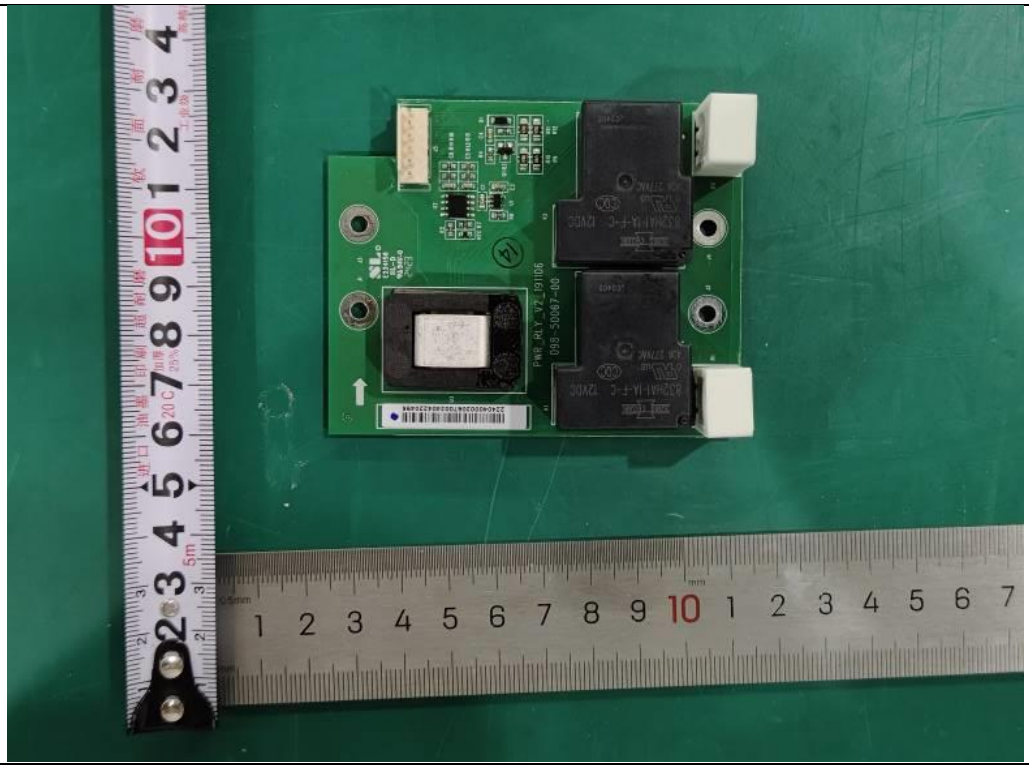
Details of: Signal board View



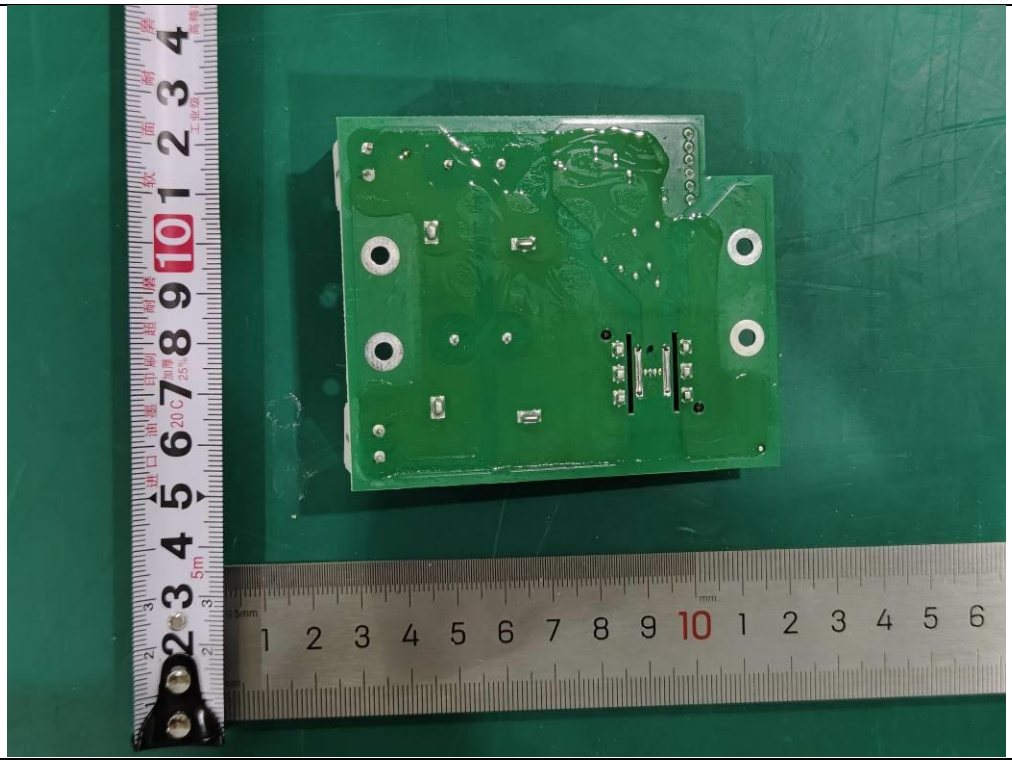
Details of: Back of signal board View



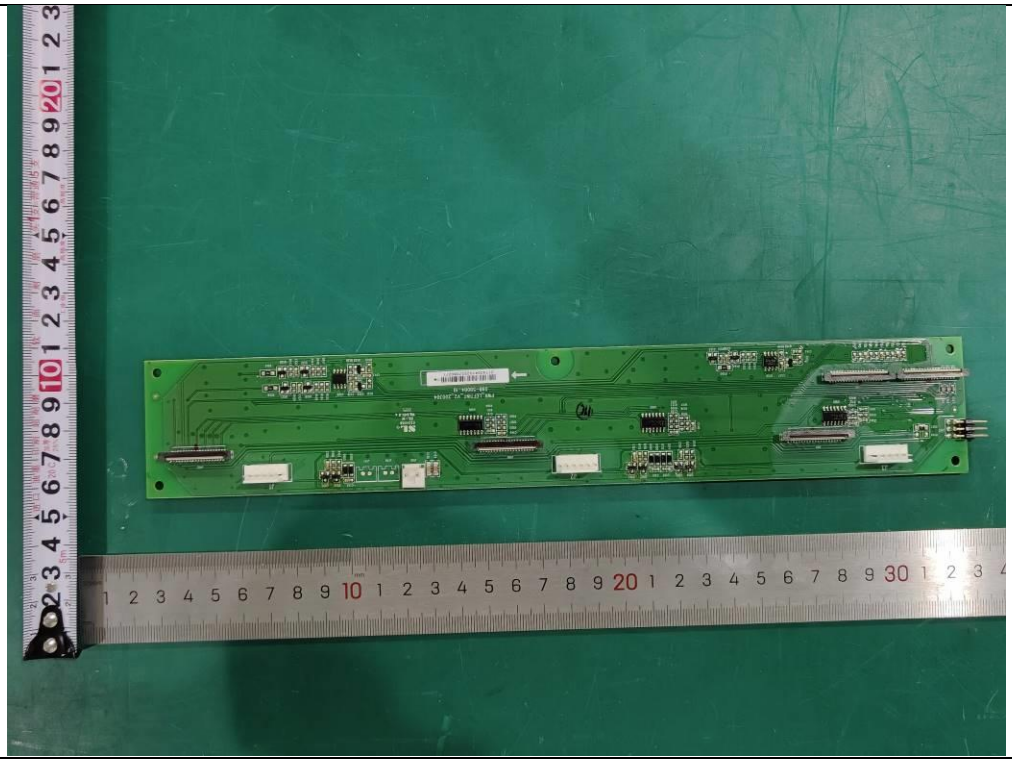
Details of: RELAY board View



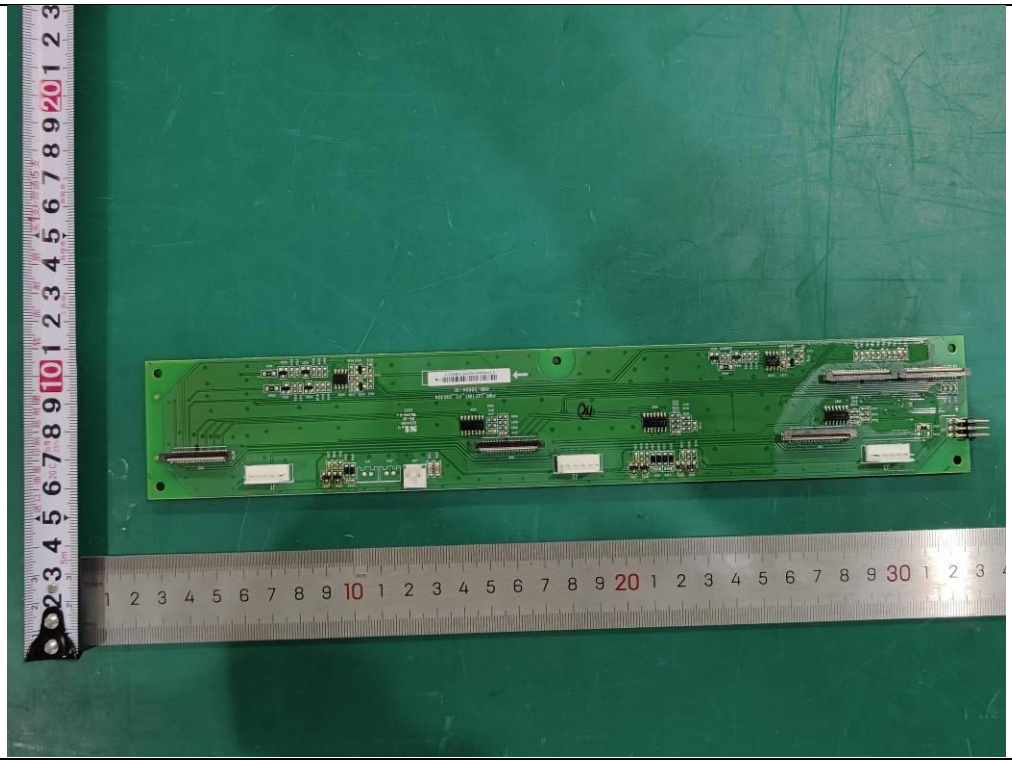
Details of: Back of relay board



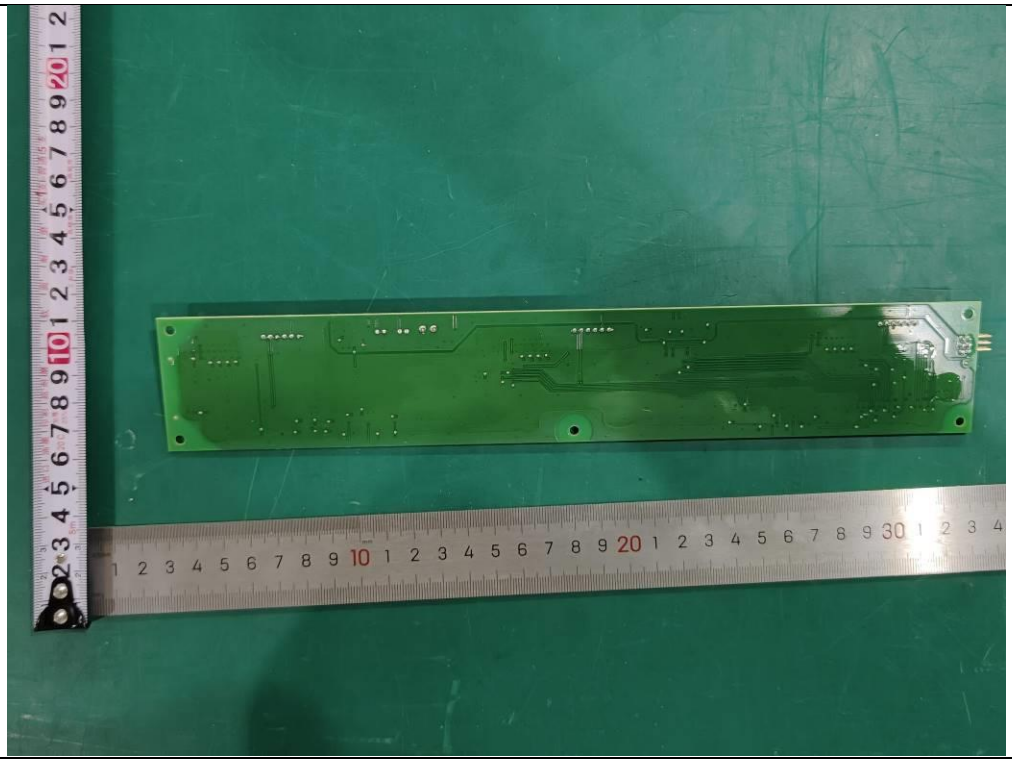
Details of: Long strip board View



Details of: Long strip board View



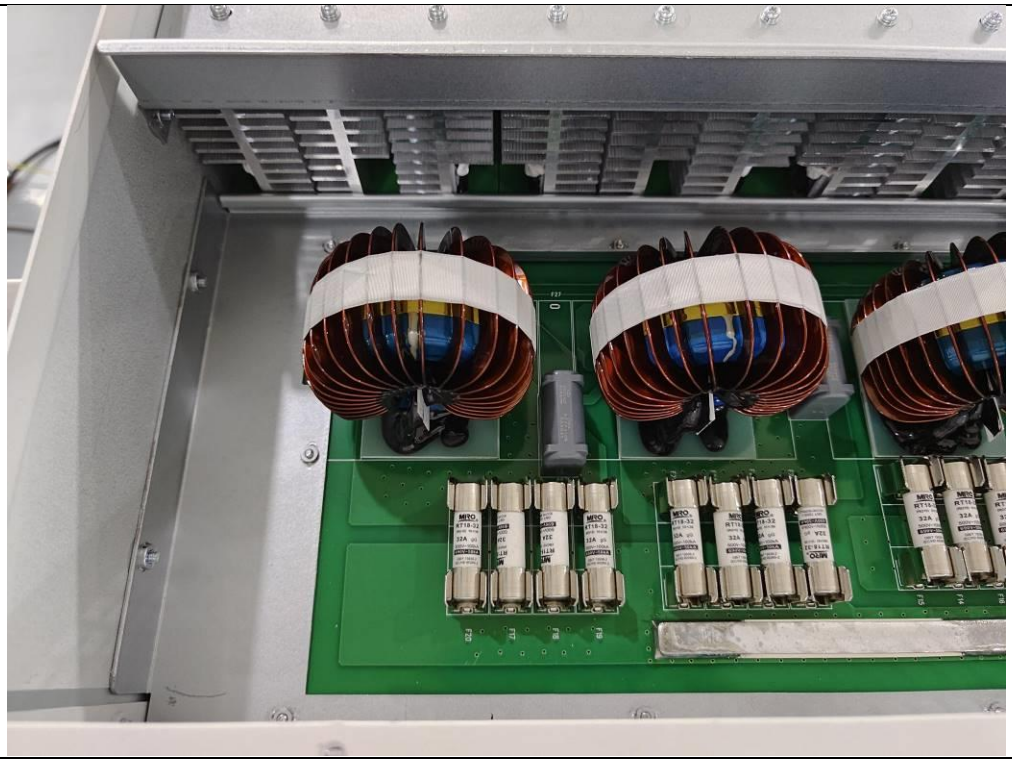
Details of: Back of the long strip board View



Details of: Cooling fan module View

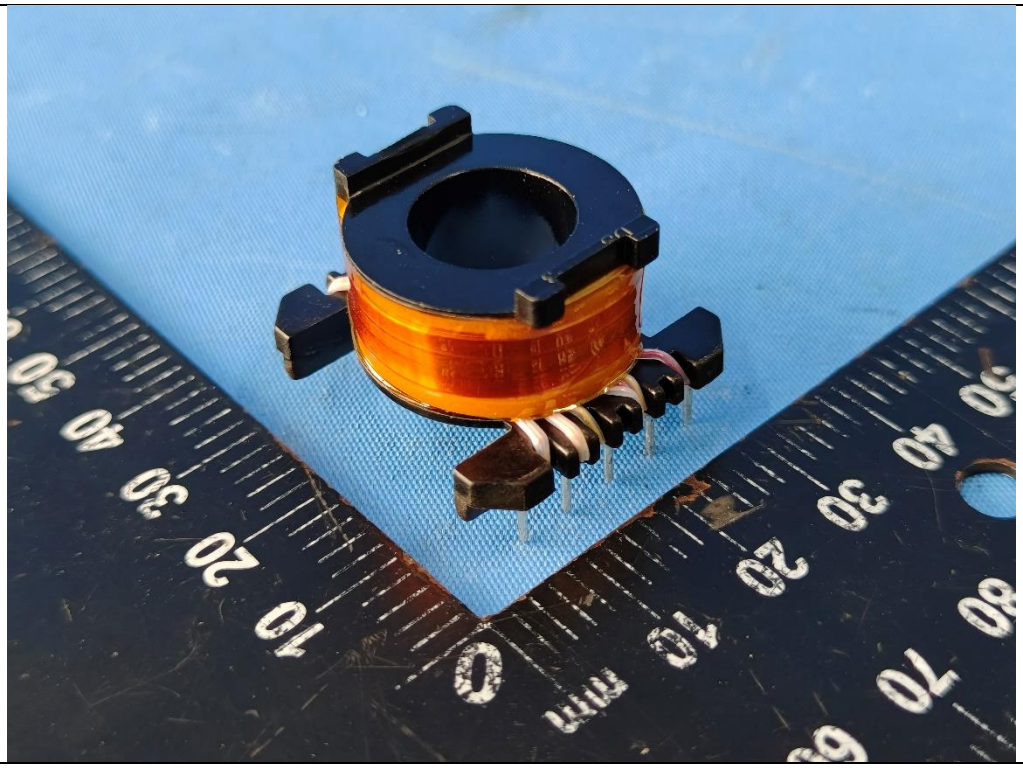
Details of: Cooling fan View

Details of: Inductance and air outlet

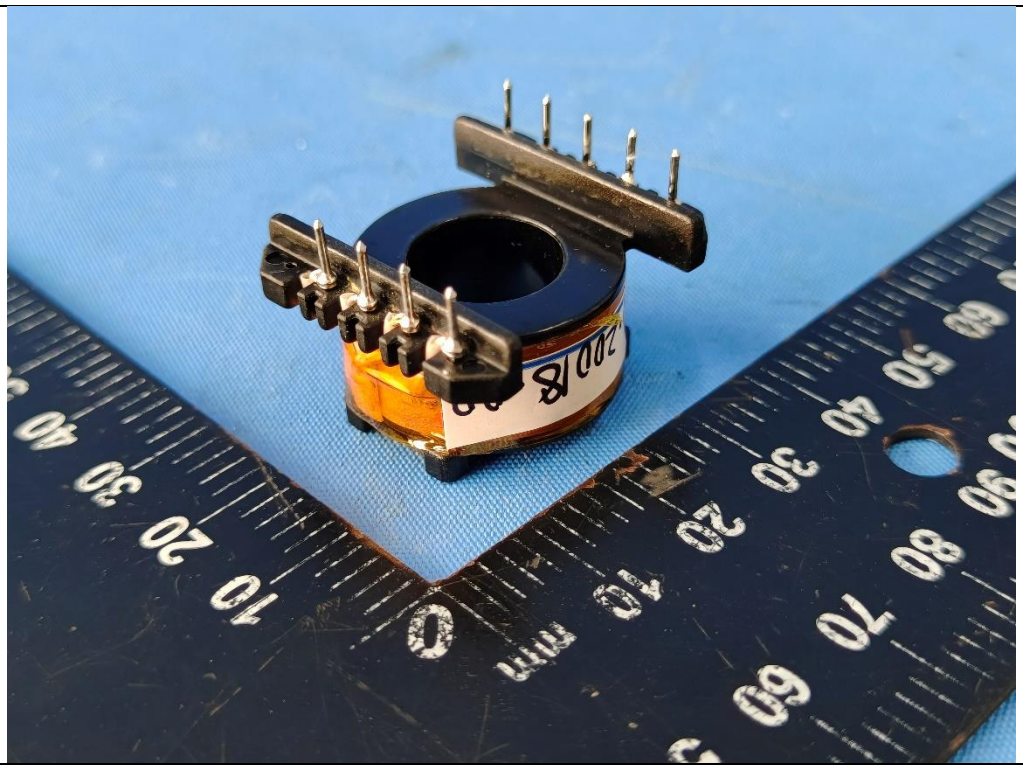


Details of: Ground Screw

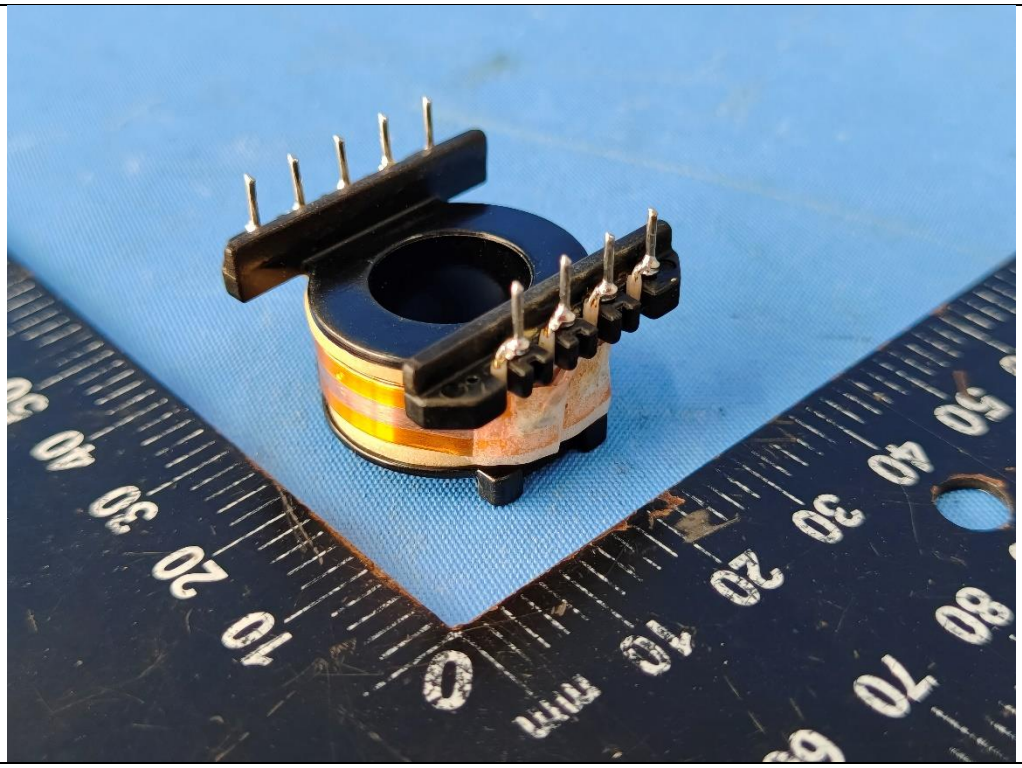
Details of: Transformer View



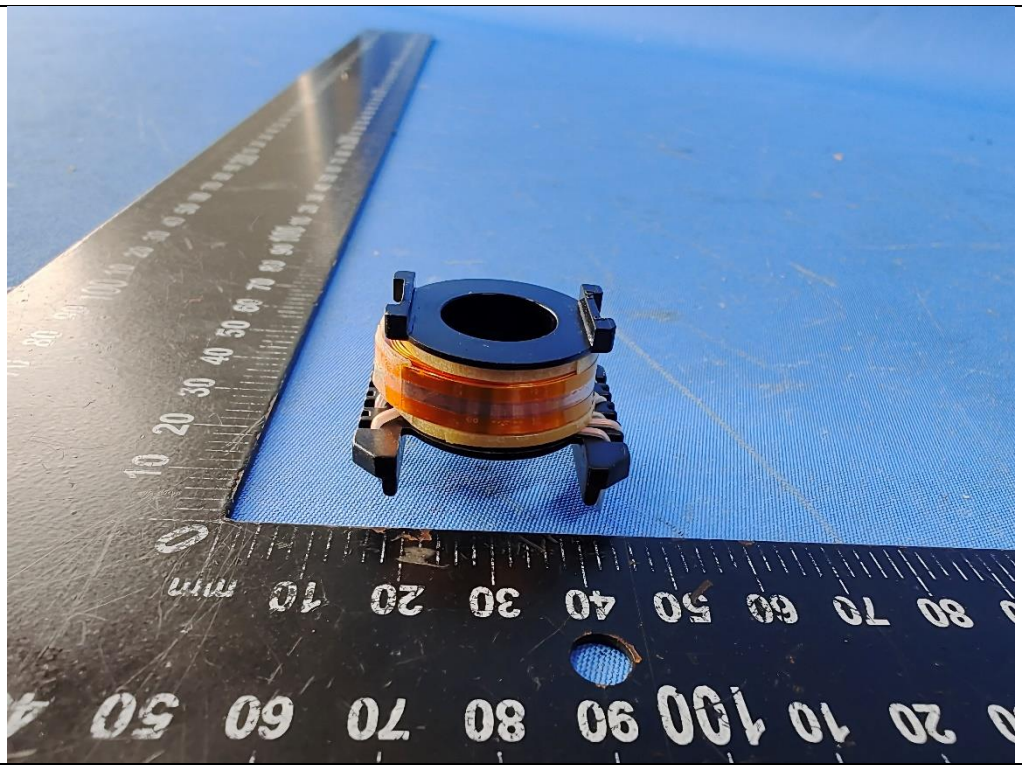
Details of: Transformer View



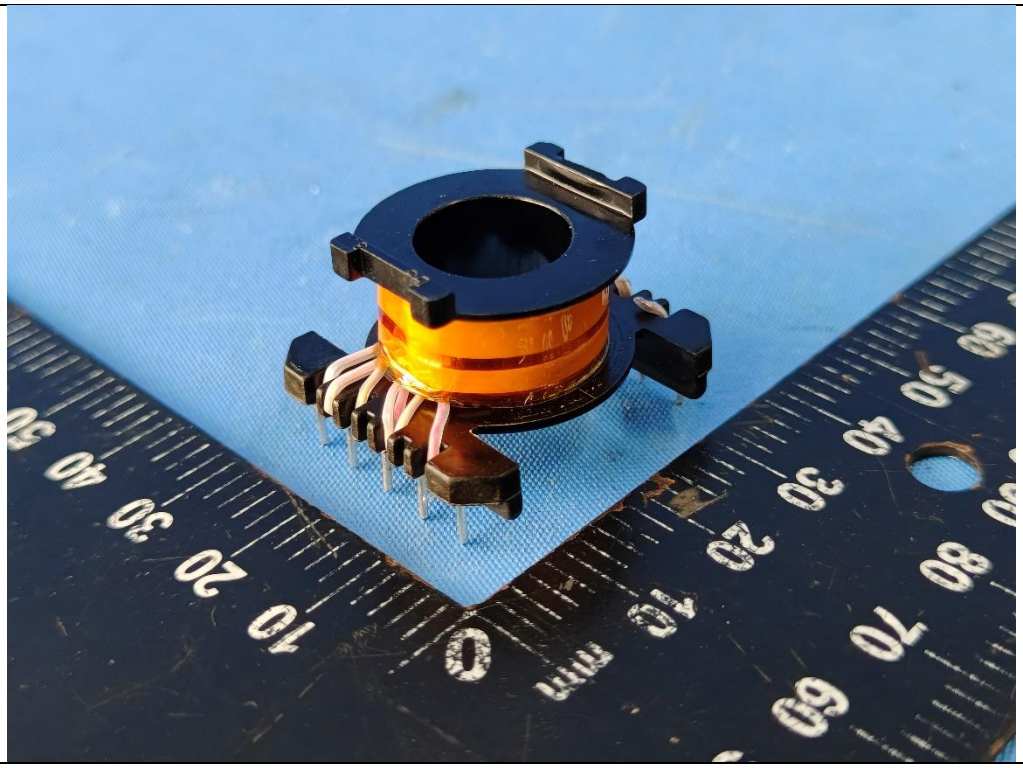
Details of: Transformer View



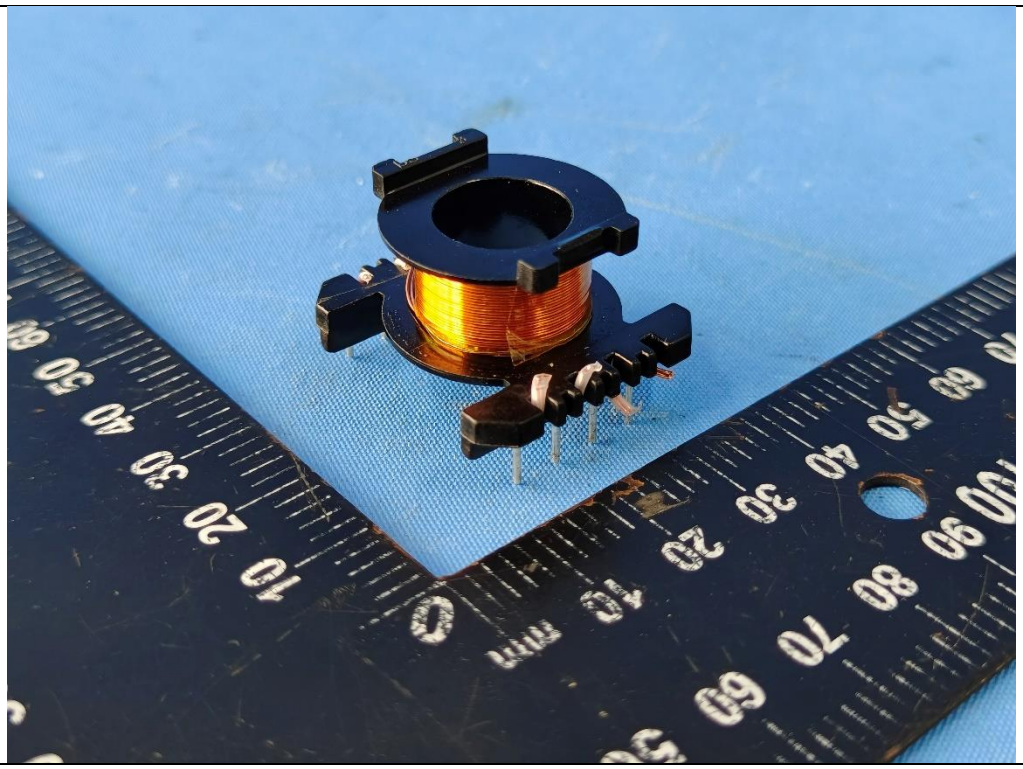
Details of: Transformer View



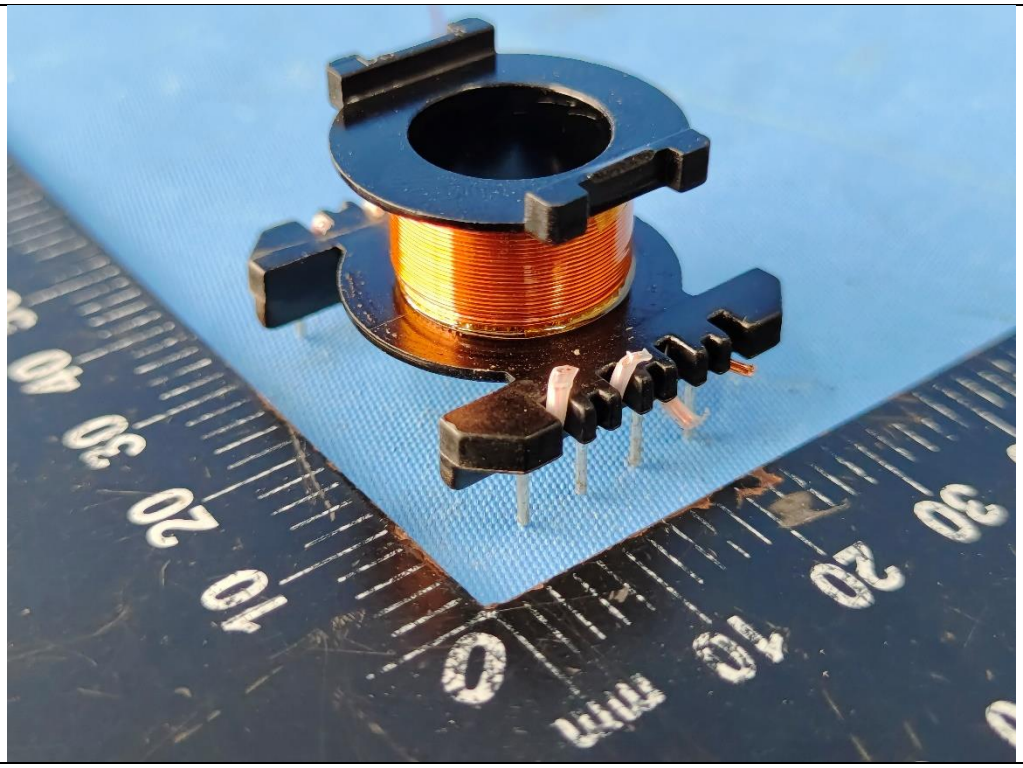
Details of: Transformer View



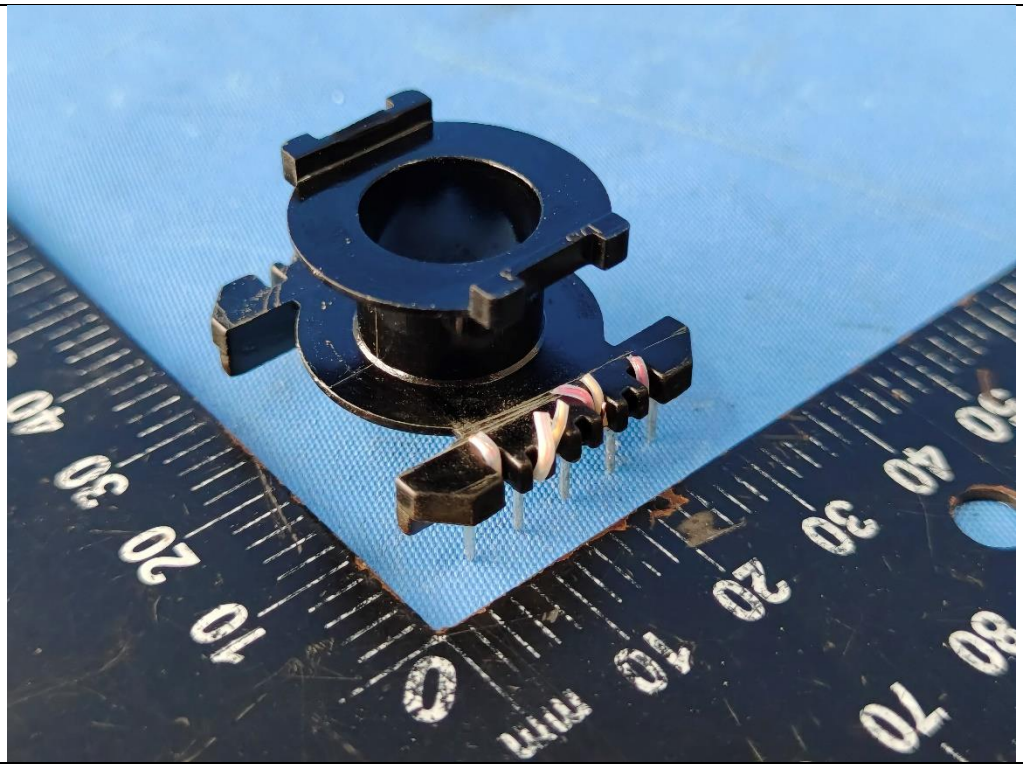
Details of: Transformer View



Details of: Transformer View



Details of: Transformer View



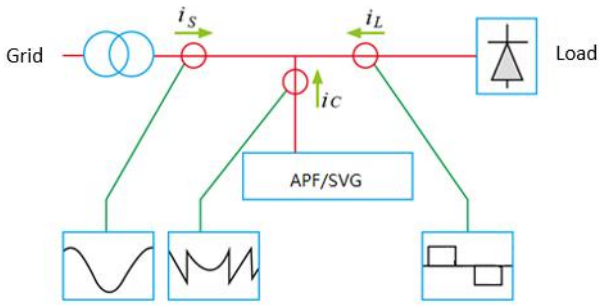
*******End of Attachment 1*******

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			
	CENELEC COMMON MODIFICATIONS (EN)		P
	Procedure for voltage tests		P
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

---End of Attachment 2---

❑ Product Principle

1） Functional Principle



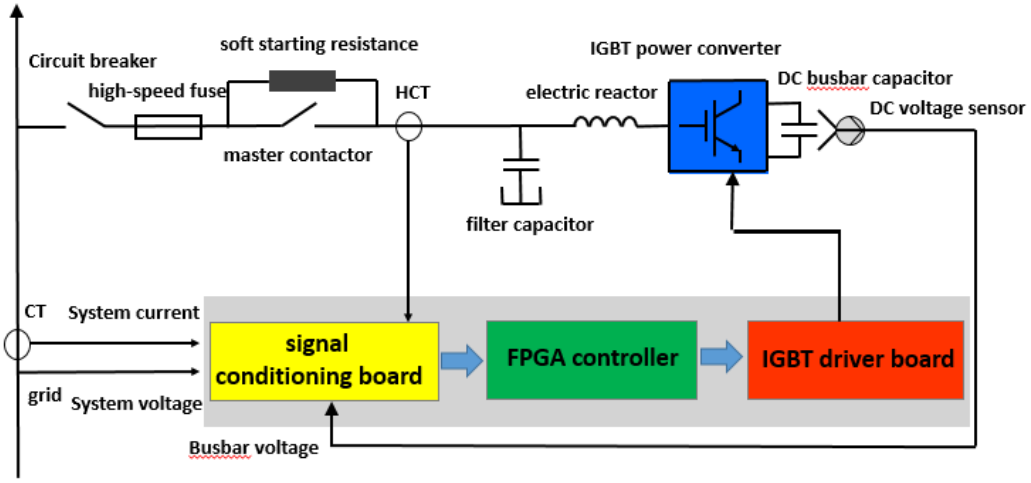
on

The user can set the parameters so that the device can simultaneously filter out harmonics, dynamically compensate reactive power, compensate for three-phase unbalance, and compensate for voltage drop,etc.

APF/SVG Functional Principle

Principle Name	Principle Description
Principle of filtering out harmonic	APF/SVG acquires the current signal in real time through an external current transformer, and separates the harmonic part through the internal detection circuit, and generates a compensation current with the opposite phase of the harmonics in the system through the IGBT power converter to realize the function of filtering out harmonic. The output compensation current of APF/SVG varies accurately according to the dynamic harmonics of the system, so there will be no compensation problem. In addition, APF/SVG has overload protection function. When the harmonic of the system is larger than the filter capacity, the device can automatically limit the output of 100% rated capacity without overload.
Principle of compensating for reactive power	According to the reactive power of the system, APF/SVG generates capacitive or inductive fundamental current through the IGBT power converter to achieve the purpose of dynamic reactive power compensation. The compensation target value can be set through the operation panel without overcompensation. The compensation is smooth and there is no inrush current impact on the load and the grid.
Principle of compensating for three-phase unbalance	The APF/SVG extracts the unbalanced component according to the system current, and the three phases emit a current of the same phase as the unbalanced component, and the unbalanced portion is compensated to zero, so that the three-phase unbalanced current can be corrected to the three-phase balanced current.

2） Control Principle



Schematic Diagram of APF/SVG Internal Control

After the circuit breaker is closed, in order to prevent the instantaneous impact of the grid on the DC bus capacitors during power-on, the APF/SVG firstly charges the DC bus capacitor through the soft-start resistor.When the bus voltage Udc reaches a predetermined value, the main contactor is closed.As a energy storage device, the DC capacitor supplies energy to the external output of the compensation current through the IGBT inverter and the internal reactor.The APF/SVG sends the current signal through the external CT to the signal conditioning circuit and then to the controller.The controller decomposes the sampling current, extracts each harmonic current, reactive current, and three-phase unbalanced current, and compares the collected current component to be compensated with the compensation current that has been sent by APF/SVG to obtain a difference. The real-time compensation signal is output to the driving circuit, and the IGBT converter is triggered to inject the compensation current into the power grid to realize closed-loop control and complete the compensation function.

❑ Product Features

1) Modular design, any module failure will not affect the normal operation of other modules, greatly improving the reliability of the whole equipment; can achieve smooth expansion of multiple direct parallel operation.The master-slave control mode is used when multiple units are expanded; when multiple modules are connected in parallel, all modules can share a set of current transformers;

2) The odd-order harmonic currents of 2 to 50 times or less can be filtered out at the same time, and the harmonics of the 13 types of filtering can be set as needed.When the load current distortion rate is >20%, not less than 85%; when the load current distortion rate is <20%, not less than 75%; reactive power compensation can make the power factor reach 1; the three-phase current unbalance can be corrected to complete balance;

3) Use the fifth generation IGBT of imported international well-known brand, it can automatically adjust the output according to the harmonic current of the load, and dynamically filter;

4) Use the American Xilinx military-grade FPGA control chip, which has fast running speed and high reliability;

5)With a layered design, dust and rain will not adhere to the circuit board, adapting to the use under harsh conditions;

6) Filtering, compensating reactive power, compensating for three-phase unbalance can be single-selected or multi-selected, and can set the priority of functions;

7) Use the iterative DFT detection algorithm of sliding window , the calculation speed is fast, the transient response time is less than 0.1ms, and the full response time of device compensation is less than 20ms;

8) The output filtering uses the LCL structure to connect to the grid, and its own high-frequency carrier does not feed back to the grid, and there is no interference to other devices in the power distribution system;
9) Complete protection functions, including over-voltage, over-current, over-heat, short-circuit and other complete protection functions, as well as system self-diagnosis function;

10) It has a soft start control loop to avoid excessive inrush current at the moment of starting, and limits the current between the rated ranges;

11)Use the reliable current limiting control link. When the current to be compensated in the system is greater than the rated capacity of the device, the device can automatically limit the output to 100% capacity, maintain normal operation, and no faults such as overload burning;

12) The main circuit uses a three-level topology, and the output waveform has high quality and low switching loss;

13) The wall mounted module comes with a 4.3 touch screen for parameter setting, parameter viewing, status viewing, event viewing and more.It can also be centrally monitored by high-definition 7-inch touch screen, which is easy to operate. The screen displays the system and device operating parameters in real time, and has a fault alarm function.

14) Save space for users, the maximum power of 600mm wide cabinet is 300A/200kvar, and the power of 800mm wide cabinet can reach 750A/500kvar.

❑ Unpacking inspection

When unpacking, please confirm carefully:

Attention	☑ The capacity on the nameplate of the complete cabinet unit, the capacity and model on the module label are the same as your order. ☑ The box contains **the user manual, product certificate, and factory inspection report.** ☑ If the order contains a centralized monitoring touch screen, it is usually packaged separately.The package contains **7-inch touch screen, touch screen related mounting accessories, communication line for touch screen connection module, equipment engineering drawings, and module terminal insulation cover.** ☑ Whether there is any damage during there-transportation of the product; if there is any missing or damage, please contact the company to solve the problem.

■ **Module package content:**

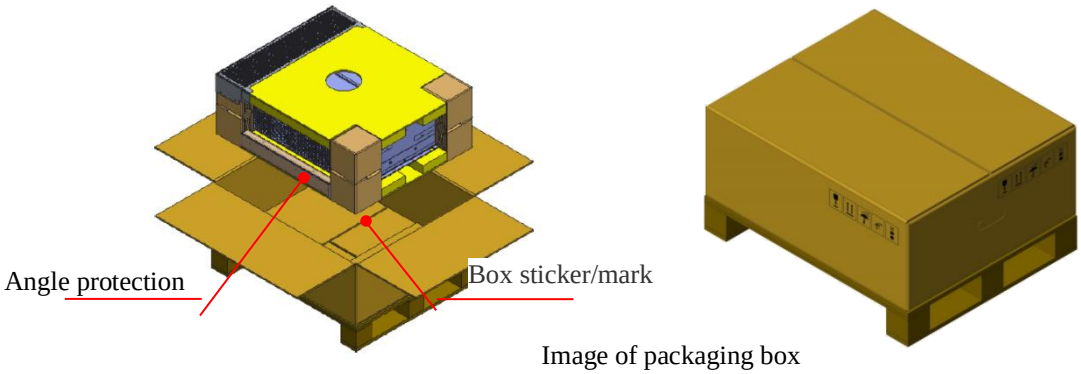


Image of packaging box

NOTE

- The module is packed in cartons and has passed the ISTA-3A drop test.

■ **Accessories package content:**

Touch screen packaging	Touch screen communication interface port conversion module	Communication line packaging	Module primary terminal insulation cover	Engineering drawings

❑ Initial Use

Users who are using this product for the first time should read this manual carefully.If you still have questions about the function and installation of the product, please consult our technical staff for help, which is beneficial to the correct use of this product.

In this manual, there are three types of safety levels:

Table 1-1 Use of symbols, terms and names

	Notes
 **Attention**	Failure to follow the instructions of the manual may result in damage or damage to the equipment!
 **Warning**	Failure to follow the instructions of the manual may result in equipment damage and personnel injuries!
 **Danger**	Failure to follow the instructions of the manual may result in serious accidents and serious personnel injury or death!!!

The use of these three types of markings in this manual indicates that it is an important part of safety.Failure to follow these precautions may result in economic loss, resulting in minor or serious injury or death, damage to the product, damage to supporting devices and parts as well as cabinets.In addition, the company will not be responsible for any damage or equipment damage caused by your company or your company's customers who fail to comply with the contents of this manual.

❑ Safety Precautions

Before installation	
 **Danger**	● Do not install if you find water in the box or water in the equipment, missing parts or obvious damage to the parts when unpacking! ● If the packing list does not match the physical name and the ordered equipment name, please do not install it!

 **Attention**	● When handling the module, be sure to hold the case tightly.If it is dropped during handling, there is a risk of injury and equipment damage. ● It should be lifted and handled gently when carrying it, otherwise there is danger of damage to the equipment! ● Do not use damaged or missing modules, there is a risk of injury! ● The equipment has been tested for withstand voltage before leaving the factory. It has not been confirmed by the company's technicians, and no voltage withstand test can be performed on any part of the equipment.And high voltage may cause damage to equipment insulation and internal components.

During installation	
 **Danger**	● Non-electrical construction professionals should not install, maintain, inspect, or replace parts.Otherwise there is a danger of electric shock! ● It is strictly forbidden to tear the tear-proof label of the equipment and cause damage, which is not within the scope of the company's responsibility and warranty. ● In the retrofit project, when installing the cable once and the current sampling secondary line, ensure that the access system is powered off and safe operation in the surrounding area.There is a risk of electric shock, which may result in personal injury or death!
 **Attention**	● Please handle the module with care when installing, and be careful not to bump the module, especially the touch panel on the front panel of the module.If it causes damage, it is not within the scope of the company's responsibility and warranty. ● When two or more modules are placed in the same cabinet, please pay attention to the installation position to ensure the heat dissipation effect.It is recommended to increase the heat dissipation measures such as fans. ● The module should be installed in a position to ensure ventilation. Do not cover the module's own cooling fan inlet and outlet. ● The installation position of the module should ensure the safe commissioning and maintenance of the after-sales personnel. ● The installation of the wall-mounted module should be as close as possible to the position where the personnel move less, and the safety hazard sign should be made in an obvious position.

During power-on operation	
 **Danger**	● Do not open the cover after powering on.Otherwise there is a danger of electric shock, resulting in casualties! ● It is strictly forbidden to install and wire the equipment with electricity! ● Do not touch any of the primary and secondary terminals of the module.Otherwise there is a risk of electric shock, resulting in casualties! ● This equipment requires the company's designated after-sales engineers to carry out commissioning, other personnel operations must be carried out under the guidance of the company's after-sales engineers, prohibiting private operation! Otherwise it may cause equipment damage, and even cause casualties!
 **Attention**	● When equipment is running, do not arbitrarily change the factory parameters of the equipment.Failure to do so may result in damage to the equipment! ● When the equipment is running, you should avoid something falling into the equipment.Failure to do so may result in equipment damage! ● After the equipment is powered on, you should avoid frequently starting or stopping the equipment or frequently switching the upper switch of the device. ● During commissioning, if the equipment has abnormal noise or fault information, it should be powered off in time and contact our technical staff.

During repair and maintenance

 **Danger**	● Personnel without professional training should not perform repairs and maintenance on the equipment.Failure to do so may result in personal injury or equipment damage! ● Do not repair or maintain the equipment with electricity.Otherwise there is danger of electric shock! ● After confirming that the input power of the equipment is powered off for at least 10 minutes, the equipment can be maintained and repaired.Otherwise the residual charge on the capacitor will cause personal injury! ● Before performing maintenance work on the equipment, make sure that the equipment is securely disconnected from all power sources. ● The parameters must be set and checked after the equipment is replaced. ● Do not power on the equipment that has reported fault or damaged equipment, otherwise it will increase the damage of the equipment.

❑ Special purpose

 **Attention**	● Attention should be paid to whether there are reactive power compensation equipment consisting of passive equipment such as capacitor reactance in the same system. If they are not properly set up, the active filter/static var generator may conflict with these passive compensation devices or fail to give full play to their compensation capabilities. ● When APF/SVG is used for harmonic compensation, it is necessary to ensure that there is no pure capacitance compensation equipment or capacitive load equipment in the system. If necessary, it must take necessary measures (such as series reactor) to make the harmonics of the required compensation times. The wave is inductive and avoids resonance. Otherwise, there is a risk of APF/SVG fault damage or damage to pure capacitance compensation equipment and capacitive load equipment; ● The APF/SVG output contains harmonic components, which may interfere with the communication equipment nearby. It is necessary to keep the communication and control transmission signal lines away from the APF/SVG primary circuit. If necessary, an anti-interference EMI filter can be installed to reduce the interference. ● The altitude is no more than 1000 meters.If it exceeds 1000 meters, the equipment will be derated by 1% for every 100 meters.

Installation Space and Direction

1）Installation space

When installing APF/SVG, the space of air inlet and outlet should be ensured.

Requirements of Installation Space	
Attention **Warning**	● Do not block the air outlet of module ● Vertical cabinet type installation, outlet in front and back of cabinet. Reserve at least **600 mm** of air space and rear maintenance space. Ensure that the back door of the cabinet can be opened and closed normally. ● Wall-mounted installation, at least **150mm** of inlet and outlet air space should be reserved at the upper and lower exits of the module. ● The wall-mounting position should be more than 1.5 meters away from the ground and marked with an electric shock hazard warning.

■ **Space requirement of cabinet type installation**

When installed by cabinet type, the module enters the wind from the front and exhausts to the rear.Heat is emitted from the back.

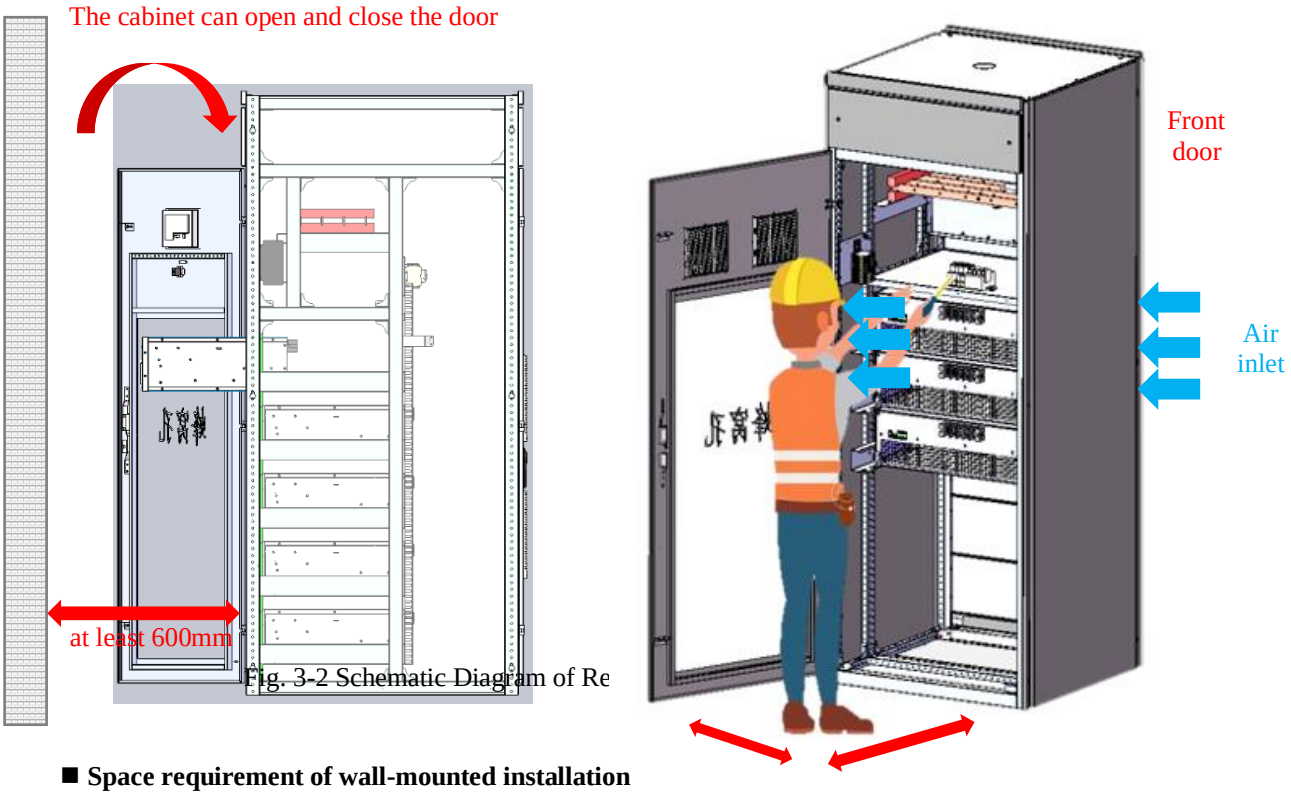
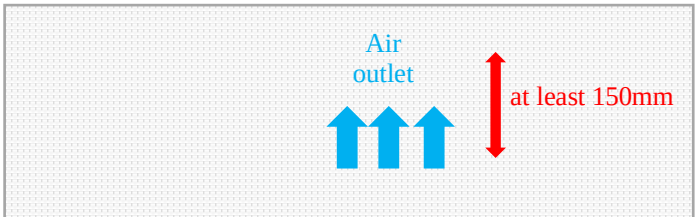


Fig. 3-2 Schematic Diagram of Re

■ **Space requirement of wall-mounted installation**

When installed in a wall mount, the module enters the air from below and vents upwards.Heat is emitted from the bottom up.



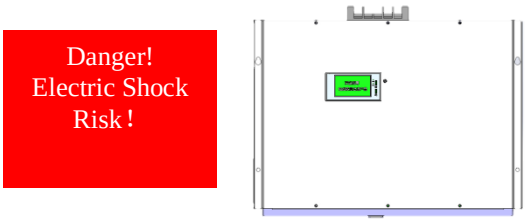


Fig.3-3 Schematic Diagram of Requirement of Wall-mounted Installation Space

2）Installation direction

When installing the device, please install it horizontally, and try not to install it in other directions such as side-lying, inverted or inclined. The wall hanging module is the same, try to install the wall hanging vertically, do not hang side or upside down.

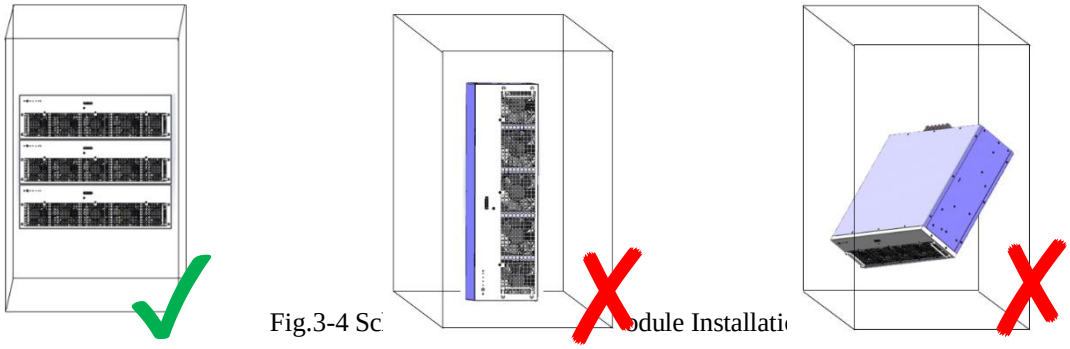


Fig.3-4 Sc odule Installati

Attention	● The weight of the module with 480mm wide is 27kg, and the weight of the module with 680mm wide is 44kg. The handling needs to be carried out with certain transportation equipment. At least 2 personnel should be lifted and installed during installation. ● Please handle the module when installing, and be careful not to bump the module, especially the touch panel on the front panel of the module.If it causes damage, it is not within the scope of the company's responsibility and warranty.

When the module is installed in the cabinet, our company will provide two mounting lugs for a single module to fix the front end of the module and the cabinet. In addition, our company proposes to install two guide beams on the left and right sides of the module to fix and support the module. The rear side of the module needs to be fixed. Refer to Fig. 3-10. The module and the guide beam are fixed together. (the mounting lug is provided by our company, but the guide rail

beam is not provided by our company. It is recommended that the cabinet body be matched during the production of sheet metal.)

Schedule 1 Technical Specification Table

Type	Items		Indicators								
Name	Product name		**SVG（kvar）**				**APF（A）**				
Specification	Voltage classes		400V			660V	400V				660V
	Module specification		30k	50k	100k/150k	50/100k	35A	50A	75A	100A/150A/200A	50/100A
	Module size w*h*d Note 1	480*130*440	✔				✔				
		480*200*530		✔				✔	✔		
		680*200*530		✔	✔			✔	✔	✔	
		680*200*580				✔					✔
	Parallel number		12								
	Maximum capacity of a single cabinet		800*800	500kvar			500kvar			750A	500A
Input	Operating Voltage		380V（-20%～+20%）								
	Working frequency		50Hz（-10%～+10%）								
	Current Transformer		100:5～10000:5								
Functions	Compensation harmonic		2-13 Odd times (50% of rated current)				2-50 Odd times				
	Harmonic filtering rate		It is better than the standard JB/T11067-2011 low voltage Active Power Filter.								
	Compensation for reactive power		-1~+1 adjustable								
	Compensation for three-phase imbalance		100% imbalance full compensation								
Communication protocol	Communication method		RS485,Modbus protocol								
	Communication Interface		RS485								
	PC software		Yes, all parameters can be set by the host computer								
	Error alarm		Yes, up to 500 alarm messages can be recorded								
	Monitoring		Support independent monitoring of each module / centralized monitoring of the whole machine								
Technical index	Full response time		<20ms								
	Active loss		<2.5%								
	Heat dissipation method		Intelligent air cooling								
	Noise		<60dB								
	Protective function		Over 20 kinds of protections such as over-voltage, under-voltage, overheating, over-current, short circuit, etc.								
	CT installation position		Load side / grid side optional								
Mechanical features	Weight		13kg（35A/30k）；24kg（75A/50k）； 38kg（100A/150A/100kvar）；45kg(200A/150K)								
	colour		7035								
Environmental requirement	Operating temperature		-10℃～+50℃								
	Altitude		<5000 meters (more than 1500 meters, 1% reduction for each additional 100 meters)								
	Relative humidity		<95%, no condensation								
	Protection level		Module IP20, electronic layer IP42 (IP54 can be customized)								
	Anti-pollution level		Level 2 (Customizable level 3)								

************End of Attachment 3************

Attachment 4 Equipment List

Item	Equipment Index No.	Name	Model No.	Calibrate Completed Date	Calibration due date	Remark
1	KSES101706	Digital temperature& humidity recorder	175H1	2023/11/09	2024/11/08	
2	KSES302201	digital pressure metre	DYM3	2023/10/23	2024/10/22	
3	KSES100202	DC Power	62012P-80-60	2024/01/06	2025/01/05	
4	KSES101403	DC electronic load	3305F	2024/02/05	2025/02/04	
5	KSES201301	stopwatch	PC2810	2023/11/23	2024/11/22	
6	KSES101604	Digital push pull gauge	HF-20	2024/02/05	2025/02/04	
8	KSES110128	three storey fall plank	/	/	/	
9	KSES102601	tapeline	5m	/	/	
10	KSES100310	Power meter	PA310	2024/02/05	2025/02/04	
11	KSES101808	Data Acquisition	0-150mm	2024/02/05	2025/02/04	
12	KSES104901	High-low temperature cabinet	THS-D2C-150	2024/02/05	2025/02/04	
13	KSES101002	HI-POT Tester	TOS9201	2024/02/05	2025/02/04	
14	KSES110103	Steel ball	ITB-01	2023/05/06	2026/05/05	
15	KSES102003	Digital platform balance	AM-01	2024/02/05	2025/02/04	
16	KSES101205	Contact current test network (IEC60990 figure 5)	SC-JCDLP5	2024/02/05	2025/02/04	
17	KSES101204	Leakage current box	/	2024/02/05	2025/02/04	
18	KSES100702	oscillograph	MDO32	2024/02/05	2025/02/04	
19	KSES102402	Torsiometer	40FTD2-S	2024/02/05	2025/02/04	
20	KSES101101	Ground Impedance Tester	7306	2024/02/05	2025/02/04	
21	KSES110103	Impact steel balls	ITB-01	2023/02/27	2026/02/26	
22	KSES106801	Impact hammer	F22.50	2024/02/05	2025/02/04	

*******End of Attachment 4*******