

# **APPLICATION FOR LOW VOLTAGE DIRECTIVE**

**On Behalf of**

**Shenzhen New Huayi Instrument Co., Ltd**

**DIGITAL POWER CLAMP METER**

**MS2203,MS2205**

**Prepared for:** Shenzhen New Huayi Instrument Co., Ltd  
**Address:** F3, Block 2, Instrument World Industrial Park,  
Guiyue Road, Longhua New District, Shenzhen  
City

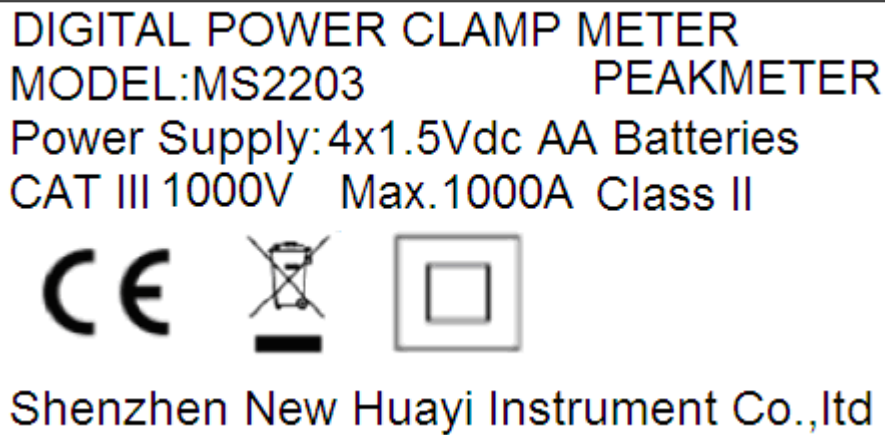
**Prepared by:** LiTest Technology Service Co., Ltd  
**Address:** No.42 FuKang Road, Houjie Town, Dongguan  
City, Guangdong, China

**Date of Test:** March 15, 2016  
**Date of Report:** March 16, 2016  
**Report Number:** 16LTS030921E

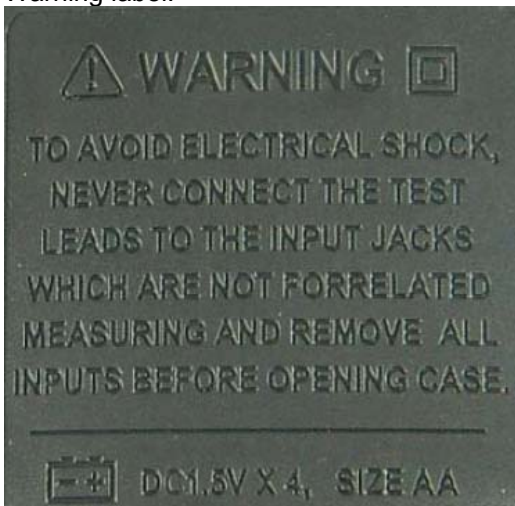
<b>TEST REPORT</b> <b>EN 61010-1</b> <b>Safety requirements for electrical equipment for measurement,</b> <b>control, and laboratory</b> <b>Part 1:General requirements</b>	
<b>Report reference No.</b>	16LTS030921E
Tested by (+ signature)	Ramon Wang 
Approved by (+ signature)	Vincent Fan 
Date of issue	Date:March 16, 2016
<b>Testing laboratory</b>	
Name	LiTest Technology Service Co., Ltd
Address	FuKang Road, HouJie Town, DongGuan City, GuangDong Province
Testing location	LiTest Technology Service Co., Ltd
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Tel: +86-769-82272566/7; Fax: +86-769-82272565; Web: www.litest.cn; Email: service@litest.cn	
<b>Client</b>	
Name	Shenzhen New Huayi Instrument Co., Ltd
Address	F3, Block 2, Instrument World Industrial Park, Guiyue Road, Longhua New District, Shenzhen City
<b>Test specification</b>	
Standard	EN 61010-1:2010
Test procedure	CE Marking serial in LVD
Non-standard test method	N/A.
<b>Test Report Form No.</b> .....:	IEC/EN 61010_1J
TRF Originator.....:	VDE testing and Certification Institute
Master TRF.....:	2013-11
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<b>Test item</b>	
Description	DIGITAL POWER CLAMP METER
Manufacturer	Shenzhen New Huayi Instrument Co., Ltd
Address	F3, Block 2, Instrument World Industrial Park, Guiyue Road, Longhua New District, Shenzhen City
Trademark	PEAKMETER
Model and/or type reference	MS2203,MS2205
Rating(s)	4x1.5Vdc AA battery 1000V CAT III, Max.1000A, class II

Test item particulars	
Type of item tested.....:	Measuring Equipment
Description of equipment function.....:	MS2203: measure for AC voltage, AC current, power of 3-phase 3 wire circuit, power of 3-phase 4 wire circuit, single-phase circuit; MS2205:measure for power, voltage, current, peak value, phase, frequency, power factor, phase angle and reaction factor of single-/three-phase circuit.
Installation/overvoltage category.....:	1000V CAT III
Pollution degree.....:	Pollution degree 2
Environmental rating.....:	Temperature:0~+40°C
Equipment to mains supply.....:	Hand-held equipment
Connection to mains supply.....:	None
Operation conditions.....:	Continuous
Marked degree of protection to IEC 60529.....:	IP20
Accessories and detachable parts included in the evaluation.....:	N/A
Options.....:	N/A
Test case verdicts:	
The case does not apply to the object.....:	N/A
The case does meet the requirement.....:	P(Pass)
The case does not meet the requirement.....:	F(Fail)
Testing .....	
Date of receipt of test item.....:	March 9, 2016
Date (s) of performance of tests.....:	March 15, 2016
General remarks:	
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.	
The test results presented in this report relate only to the item(s) tested.	
“(see remark #)” refers to a remark appended to the report.	
“(see Annex #)” refers to an annex appended to the report.	
“(see Form A.#)” refers to a table appended to the report.	
Throughout this report a comma (point) is used as the decimal separator.	
<b>General product information:</b>	
MS2203: measure for AC voltage, AC current, power of 3-phase 3 wire circuit, power of 3-phase 4 wire circuit, single-phase circuit;	
MS2205:measure for power, voltage, current, peak value, phase, frequency, power factor, phase angle and reaction factor of single-/three-phase circuit.	

Copy of marking plate:  
For model MS2203 as representative.



Warning label:



Summary of test results (information/comments):

- The max. temperature of the appliance is 40°C, declared by the manufacturer.
- EUT complies with EN 61010-1:2010, EN61010-2-030 and EN 61010-2-032.

TABLE:1 – Documents attached to this report			P
Document No.	Document description	Page Numbers	
Appendix 2	Photo documentation	6	

TABLE:2 – Test Equipment list					P
Item	Manufacturer	Equipment	Calibration date		comments
-	-		Last <sup>1</sup>	Due	
*Note: Appendix 1(Page )					
1) Or interval between calibration.					

TABLE:3 – List of components and circuits relied on for safety					P
Unique component reference or location (including drawing reference if required)	Manufacturer (NOTE 1)	Part number	Rating (NOTE 2)		Evidence of acceptance
For MS2203					
Enclosure, Battery cover Key, LCD Cover and enclosure of clamp jaw	Various	Various	V-0, 85°C,		UL
PCB	Various	Various	V-0, 130°C		UL
LCD lens	Various	Various	PMMA HB 50°C		UL
Function selecting	Various	Various	HB 150°C		UL
fuse	Various	Various	F300mA H 250V		VDE
Internal wire	Various	Various	80°C, 600V, VW-1 18AWG		UL
Transformer	Shenzhen New Huayi instrument Co.,Ltd	MS2003	DC4.5V		Test with appliance
-bobbin	Various	Various	V-0, 150°C		UL
-winding	Various	Various	130°C		UL
varistor	Various	Various	250V~, 391K,85°C		VDE
Battery	--	--	4x1.5Vdc AA battery		--
For MS2205					
Enclosure, Battery cover Key, LCD Cover and enclosure of clamp jaw	Various	Various	V-0, 85°C,		UL
PCB	Various	Various	V-0, 130°C		UL
LCD lens	Various	Various	PMMA HB 50°C		UL

Function selecting	Various	Various	HB 150°C	UL
Function selecting	Various	Various	HB 150°C	UL
Battery	--	--	4x1.5Vdc AA battery	--

NOTE 1 – List all manufacturers concerned.

NOTE 2 - Electrical, mechanical, flammability, etc.

NOTE 3 - Licence number, file number or other documentary evidence of acceptance.

EN 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)	N/A
4.4.2.2	PROTECTIVE IMPEDANCE		N/A
4.4.2.3	PROTECTIVE CONDUCTOR		N/A
4.4.2.4	Equipment or parts for short-term or intermittent operation		N/A
4.4.2.5	Motors	No motors	N/A
	– stopped while fully energized		N/A
	– prevented from starting		N/A
	– one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors	No such capacitor	N/A
4.4.2.7	MAINS transformers	No transformer	N/A
4.4.2.7.2	Short circuit		N/A
4.4.2.7.3	Overload		N/A
4.4.2.8	Outputs		N/A
4.4.2.9	Equipment for more than one supply		N/A
4.4.2.10	Cooling		N/A
	– air holes closed		N/A
	– fans stopped		N/A
	– coolant stopped		N/A
	– loss of cooling liquid		N/A
4.4.2.11	Heating devices		N/A
	– timer overridden		N/A
	– temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		N/A
4.4.2.13	Interlocks		N/A
4.4.2.14	Voltage selectors		N/A
4.4.3	Duration of tests	(see Form A.1)	P
4.4.4	Conformity after application of fault conditions	(see Form A.1,A.6,A.18)	P
5	MARKING AND DOCUMENTATION		P
5.1.1	Required equipment markings		P

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	– visible from the exterior; or	Marking for double insulation, caution, CE are marked on apparatus surface.	P
	– visible after removing cover or opening door		N/A
	– visible after removal from a rack or panel		N/A
	Not put on parts which can be removed by an operator		P
	Letter symbols (IEC 60027) used		P
	Graphic symbols (IEC 61010-1: Table 1) used	Refer to rating label	P
5.1.2	Identification		P
	Equipment is identified by:		P
	a) Manufacturer's or supplier's name or trademark	See marking label	P
	b) Model number, name or other means	See marking label	P
	Manufacturing location identified	Only one factory	N/A
5.1.3	MAINS supply		P
	Equipment is marked as follows:		P
	a) Nature of supply:		P
	1) a.c. RATED MAINS frequency or range of frequencies..... :		N/A
	2) d.c. with symbol 1 ..... :	==	P
	b) RATED supply voltage(s) or range..... :	Powered by 4 pieces of 1.5V AA battery.	P
	c) Max. RATED power (W or VA) or input current ..... :		N/A
	The marked value not less than 90 % of the maximum value		N/A
	If more than one voltage range:		N/A
	Separate values marked; or		N/A
	Values differ by less than 20 %		N/A
	d) OPERATOR-set for different RATED supply voltages:		N/A
	Indicates the equipment set voltage		N/A
	Portable equipment indication is visible from the exterior		N/A
	Changing the setting changes the indication		N/A
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:		N/A
	With the voltage if it is different from the MAINS supply voltage..... :		N/A
	For use only with specific equipment		N/A
	If not marked for specific equipment it is marked with:		N/A
	The maximum rated current or power; or		N/A



EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		N/A
	Operator replaceable fuse marking (see also 5.4.5) .....		N/A
5.1.5	TERMINALS, connections and operating devices		P
5.1.5.1	General		P
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		P
	If insufficient space, symbol 14 used		P
	Push-buttons and actuators of emergency stop devices and indicators:	No such component	N/A
	– 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):		N/A
	– to safety of persons; or		N/A
	– safety of the environment		N/A
5.1.5.2	TERMINALS		P
	MAINS supply TERMINAL identified		N/A
	Other TERMINAL marking:		P
	a) FUNCTIONAL EARTH TERMINALS (symbol 5 used)		N/A
	b) PROTECTIVE CONDUCTOR TERMINALS:		N/A
	Symbol 6 is placed close to or on the TERMINAL; or		N/A
	Part of appliance inlet		N/A
	c) TERMINALS of control circuits (symbol 7 used)		N/A
	d) HAZARDOUS LIVE TERMINALS supplied from the interior		P
	Standard MAINS socket outlet; or		N/A
	RATINGS marked; or		P
	Symbol 14 used		P
5.1.6	Switches and circuit breakers	No such device	N/A
	If disconnecting device, off position clearly marked		N/A
	If push-button used as power supply switch:		N/A
	– symbol 9 and 15 used for on-position		N/A
	– symbol 10 and 16 used for off-position		N/A

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	– 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)	See marking label	P
	Only partially protected (symbol 11 not used)		N/A
5.1.8	Field-wiring TERMINAL boxes		N/A
	If TERMINAL or ENCLOSURE exceeds 60 °C:		N/A
	Cable temperature RATING marked .....		N/A
	Marking visible before and during connection or beside TERMINAL		N/A
5.2	Warning markings		P
	Visible when ready for NORMAL USE		P
	Are near or on applicable parts		P
	Symbols and text correct dimensions and colour:		P
	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		P
	Statement to isolate or disconnect if access by using a tool to HAZARDOUS LIVE 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
5.4.1	General		P
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY	User manual provided	P
	Safety documentation for service personnel authorized by the manufacturer		P
	Documentation necessary for safe operation is provided in printed media or		P
	in electronic media if available at any time		N/A
	Documentation includes:		P
	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	See 5.4.2 to 5.4.5	P

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	e) information to mitigate residual RISK (see also subclause 17)		N/A
	f) accessories for safe operation of the equipment specified		N/A
	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		N/A
	Warning statements and a clear explanation of warning symbols:		P
	– provided in the documentation; or		P
	– information is marked on the equipment		N/A
5.4.2	Equipment ratings		P
	Documentation includes:		P
	a) Supply voltage or voltage range .....	Powered by 4 pieces of 1.5V AA battery.	P
	Frequency or frequency range .....		N/A
	Power or current rating .....		N/A
	b) Description of all input and output connections in accordance to 6.6.1 a)		P
	c) RATING of insulation of external circuits in accordance to 6.6.1 b)		N/A
	d) Statement of the range of environmental conditions (see 1.4)		P
	e) Degree of protection (IEC 60529)	IP20	N/A
	f) If impact rating less than 5 J:		N/A
	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	User manual provided	P
	Documentation includes instructions for:		P
	a) assembly, location and mounting requirements		P
	b) protective earthing		P
	c) connections to supply		N/A
	d) PERMANENTLY CONNECTED EQUIPMENT:		N/A
	1) Supply wiring requirements		N/A
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
	e) ventilation requirements		N/A

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	f) special services (e. g. air, cooling liquid)		N/A
	g) instructions relating to sound level		N/A
5.4.4	Equipment operation		P
	Instructions for use include:		P
	a) identification and description of operating controls		P
	b) positioning for disconnection		N/A
	c) instructions for interconnection		N/A
	d) specification of intermittent operation limits		N/A
	e) explanation of symbols used	Symbols have explanation in user manual.	P
	f) replacement of consumable materials	Battery	P
	g) cleaning and decontamination	Use soft dry cloth without any solvents or water.	P
	h) listing of any poisonous or injurious gases and quantities		N/A
	i) RISK reduction procedures relating to flammable liquids (see 9.5)		N/A
	j) RISK reduction procedures relating burn from surfaces permitted to exceed limits of 10.1		N/A
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and Service		P
	Instructions for RESPONSIBLE BODY include:		P
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:		P
	Instruction against the use of detachable MAINS supply cord with inadequate rating		N/A
	Specific battery type of user replaceable batteries		P
	Any manufacturer specified parts		N/A
	Rating and characteristics of fuses		P
	Instructions include following subjects permitting safe servicing and continued safety:		P
	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		N/A
	Aspects described in documentation		N/A

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
6	PROTECTION AGAINST ELECTRIC SHOCK		P
6.1	General	(see Form 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	All accessible parts are not hazardous live.	P
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:		N/A
	ACCESSIBLE parts and earth		N/A
	two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m		N/A
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		N/A
6.1.2	Exceptions		N/A
	Following HAZARDOUS LIVE parts may be ACCESSIBLE to an OPERATOR:		N/A
	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		N/A
	Capacitance test if charge is received from internal capacitor		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		N/A
	– with jointed test finger (as specified B.2)		N/A
	– with rigid test finger (as specified B.1) and a force of 10 N		N/A
6.2.3	Openings above parts that are HAZARDOUS LIVE	No openings.	N/A
	– test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls		N/A
	– test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.3	Limit values for ACCESSIBLE parts		N/A
6.3.1	Levels in NORMAL CONDITION	(see Form A.5)	P

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	a) Voltage limits less than 33 V r.m.s. and 46,7 V <sub>peak</sub> or 70 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:		P
	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
	or		N/A
	c) Levels of capacitive charge or energy less:		N/A
	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 55 V r.m.s. and 78 V peak or 140 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:		P
	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
	or		N/A
	c) Levels of capacitive charge or energy less line B of Figure 3		N/A
6.4	Primary means of protection		P
6.4.1	ACCESSIBLE parts prevented from being HAZARDOUS LIVE by one or more of following means:		P
	a) ENCLOSURES or PROTECTIVE BARRIERS (see 6.4.2)	By enclosure	P
	b) BASIC INSULATION (see 6.4.3)		P
	c) Impedance (see 6.4.4)		N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	(see Form A.15 and A.16)	P
	– meet rigidity requirements of 8.1		P

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	– meet requirements for BASIC INSULATION, if protection is provided by insulation		P
	– meet requirements of 6.7 for CREEPAGE and – CLEARANCES between ACCESSIBLE parts and – HAZARDOUS live parts, if protection is provided by – limited access		P
6.4.3	BASIC INSULATION	(see Form A.15 and A.16)	P
	– meet CLEARANCE, CREEPAGE DISTANCE and solid – insulation requirements of 6.7		P
6.4.4	Impedance		N/A
	Impedance used as primary means of protection meets all of following requirements:		N/A
	a) limits current or voltage to level of 6.3.2		N/A
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7		N/A
6.5	Additional means of protection in case of SINGLE FAULT CONDITION		P
6.5.1	ACCESSIBLE parts are prevented from becoming HAZARDOUS live by the primary means of protection and supplemented by one of:		P
	a) PROTECTIVE BONDING (see 6.5.2)		N/A
	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:		P
	e) REINFORCED INSULATION (see 6.5.3)		P
	f) PROTECTIVE IMPEDANCE (see 6.5.4)		N/A
6.5.2	PROTECTIVE BONDING		N/A
6.5.2.1	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		N/A
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		N/A
	Separated by conductive screen or barrier bonded to PROTECTIVE CONDUCTOR TERMINAL		N/A
6.5.2.2	Integrity of PROTECTIVE BONDING		N/A
	a) PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N/A
	b) Soldered connections:		N/A
	Independently secured against loosening		N/A

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
	Not used for other purposes		N/A
	c) Screw connections are secured		N/A
	d) PROTECTIVE BONDING not interrupted; or		N/A
	exempted as removable part carries MAINS SUPPLY input connection		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:		N/A
	Means provided for passing protective conductor;		N/A
	Impedance meets 6.5.2.4		N/A
	h) Protective conductors bare or insulated, if insulated, green/yellow		N/A
	Exceptions:		N/A
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3		N/A
6.5.2.3	<b>PROTECTIVE CONDUCTOR TERMINAL</b>		N/A
	a) Contact surfaces are metal		N/A
	b) Appliance inlet used		N/A
	c) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		N/A
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		N/A
	Is near terminals of circuit for which protective earthing is necessary		N/A
	External if other terminals external		N/A
	e) Equivalent current-carrying capacity to MAINS supply TERMINALS		N/A
	f) If plug-in, makes first and breaks last		N/A
	g) If also used for other bonding purposes, PROTECTIVE CONDUCTOR:		N/A
	Applied first;		N/A
	Secured independently;		N/A
	Unlikely to be removed by servicing		N/A
	h) PROTECTIVE CONDUCTOR of measuring circuit:		N/A



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Clause	Requirement - Test	Result - Remark	Verdict
	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:		N/A
	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		N/A
	k) Contact pressure not capable being reduced by deformation of materials		N/A
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment		N/A
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		N/A
	– less than 0,1 Ohm; or		N/A
	– less than 0,2 Ohm if equipment is provided with non-detachable cord		N/A
6.5.2.5	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT		N/A
6.5.2.6	Transformer PROTECTIVE BONDING screen		N/A
	Transformer provided with screen for PROTECTIVE BONDING:		N/A
	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:		N/A
	– Independently secured against loosening		N/A
	– Not used for other purposes		N/A
6.5.3	SUPPLEMENTARY and REINFORCED INSULATION	REINFORCED INSULATION	P
	Meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.5.4	PROTECTIVE IMPEDANCE		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

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Clause	Requirement - Test	Result - Remark	Verdict
	CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of DOUBLE or REINFORCED INSULATION of 6.7		N/A
	The PROTECTIVE IMPEDANCE consists of one or more of the following:		N/A
	a) appropriate single component suitable for safety and reliability for protection, it is:		N/A
	1) RATED twice the maximum WORKING VOLTAGE		N/A
	2) resistor RATED for twice the power dissipation for maximum WORKING VOLTAGE		N/A
	b) combination of components		N/A
	Single electronic device not used as PROTECTIVE IMPEDANCE		N/A
6.5.5	Automatic disconnection of the supply		N/A
	a) RATED to disconnect the load within time specified in Figure 2		N/A
	b) RATED for the maximum load conditions of the equipment		N/A
6.5.6	Current- or voltage-limiting devices	(see Form A.12)	P
	Device complies with all of:		P
	a) RATED to limit the current or voltage to the level of 6.3.2	(see Form A.6)	P
	b) RATED for the maximum WORKING VOLTAGE; and		P
	RATED for the maximum operational current if applicable		P
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of SUPPLEMENTARY INSULATION of 6.7	(see Form A.14, A.15)	P
6.6	Connections to external circuits		P
6.6.1	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		P
	– the external circuits		P
	– the equipment		P
	Protection achieved by separation of circuits; or		N/A
	short circuit of separation does not cause a HAZARD		P
	Instructions or markings for each terminal include:		P
	a) RATED conditions for TERMINAL		P
	b) Required RATING of external circuit insulation		N/A
6.6.2	TERMINALS for external circuits		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE after 10 s of interrupting supply connection		N/A
6.6.3	Circuits with terminals which are HAZARDOUS LIVE		P
	These circuits are:		P
	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	ACCESSIBLE terminals for stranded conductors		N/A
	No RISK of accidental contact because:		N/A
	– Located or shielded		N/A
	– Self-evident or marked whether or not connected to ACCESSIBLE conductive parts		N/A
	ACCESSIBLE TERMINALS will not work loose		N/A
6.7	Insulation requirements	(see Form A.14)	P
6.7.1	The nature of insulation		P
6.7.1.1	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 Form A.14 and A.15)	P
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied	Below 2000m	N/A
6.7.1.3	CREEPAGE DISTANCES		P
	Required CREEPAGE DISTANCES reflecting factors of 6.7.1.1 a) to d)	(see Form A.14 and A.15)	P
	CTI material group reflected by requirements		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 Form A.14 and A.15)	P
6.7.1.5	Requirements for insulation according to type of circuit	(see Form A.14 and A.15)	P
	a) 6.7.2 MAINS circuits of OVERVOLTAGE CATEGORY II up to nominal supply voltage of 300 V		N/A
	b) 6.7.3 secondary circuits separated from circuits defined in a) by transformer		N/A
	c) K.1 MAINS circuits of OVERVOLTAGE CATEGORY III and IV or OVERVOLTAGE CATEGORY II over 300 V		P

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Clause	Requirement - Test	Result - Remark	Verdict
	d) K.2 secondary circuits separated from circuits defined in c) by transformer		N/A
	e) K.3 circuits having one or more of:		N/A
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) WORKING VOLTAGE with a frequency above 30 kHz		N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V	See K.1	N/A
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(see Form A.14 and A.15)	N/A
	Values for MAINS CIRCUITS of Table 4 are met		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.2.2	Solid insulation		N/A
6.7.2.2.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		N/A
	Equipment passed voltage tests of 6.8.3 with values of Table 5	(see Form A.18)	N/A
	Complies as applicable:		N/A
	a) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	b) moulded and potted parts requirements of 6.7.2.2.2		N/A
	c) inner layers of printed wiring boards requirements of 6.7.2.2.3		N/A
	d) thin-film insulation requirements of 6.7.2.2.4		N/A
6.7.2.2.2	Moulded and potted parts		N/A
	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		N/A
	Separated by at least 0,4 mm between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		N/A
	a) thickness of insulation is at least 0,4 mm		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	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		N/A
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.2.1		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		N/A
	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		N/A
	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		N/A
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		N/A
6.7.3.1	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:		N/A
	– REINFORCED INSULATION		N/A
	– DOUBLE INSULATION		N/A
	– screen connected to the PROTECTIVE CONDUCTOR TERMINAL		N/A
6.7.3.2	CLEARANCES		N/A
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or		N/A
	twice the values of Table 6 for REINFORCED INSULATION		N/A
	or		N/A
	b) pass the voltage tests of 6.8 with values of Table 6;	(see Form A.18)	N/A
	with following adjustments:		N/A
	1) values for reinforced insulation are 1,6 times the values for basic insulation		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
	3) minimum CLEARANCE is 0,2 mm for POLLUTION DEGREE 2 and 0,8 mm for POLLUTION DEGREE 3		N/A
6.7.3.3	CREEPAGE DISTANCES		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		N/A
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation		N/A
6.7.3.4.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		N/A
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with VALUES of Table 6 for BASIC and SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		N/A
	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:		N/A
	1) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		N/A
	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		N/A
	Separated by at least by applicable distances of Table 8 between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		N/A
	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		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		N/A
6.7.3.4.4	Thin-film insulation		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.3.2 and 6.7.3.3		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		N/A
	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		N/A
	c) insulation is assembled of min. three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	N/A
	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 dielectric strength tests	(see Form A.14 and A.18)	P
6.9	Constructional requirements for protection against electric shock		P
6.9.1	If a failure could cause a HAZARD:		P
	a) security of wiring connections		N/A
	b) screws securing removable covers		P
	c) accidental loosening		P
	d) CLEARANCES and CREEPAGE DISTANCES not reduced below the values of basic insulation by loosening of parts or wires		P
6.9.2	Insulating materials		P
	Material not to be used for safety relevant insulation:		P
	a) easily damaged materials not used		P
	b) non-impregnated hygroscopic materials not used		P
6.9.3	Colour coding		N/A
	Green-and-yellow insulation shall not be used except:		N/A
	a) protective earth conductors;		N/A
	b) PROTECTIVE BONDING conductors;		N/A
	c) potential equalization conductors;		N/A
	d) functional earth conductors		N/A
6.10	Connection to MAINS supply source and connections between parts of equipment		N/A
6.10.1	MAINS supply cords		N/A
	RATED for maximum equipment current (see 5.1.3 c)		N/A
	Cable complies with IEC 60227 or IEC 60245		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Heat-resistant if likely to contact hot parts		N/A
	Temperature RATING (cord and inlet)..... :		N/A
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		N/A
	Detachable cords with IEC 60320 MAINS connectors:		N/A
	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		N/A
	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		N/A
	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		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:		N/A
	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		N/A
	Accessory MAINS socket outlets:		N/A
	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



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Clause	Requirement - Test	Result - Remark	Verdict

6.11	Disconnection from supply source		N/A
6.11.1	Disconnects all current-carrying conductors		N/A
6.11.2	Exceptions	Small battery	P
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:		N/A
	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:		N/A
	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	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:		N/A
	Meets IEC 60947-1 and IEC 60947-3		N/A
	Marked to indicate function..... :		N/A
	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):		N/A
	Readily identifiable and easily reached by the operator		N/A
	Single-phase portable equipment cord length not more than 3 m		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	PROTECTIVE EARTH CONDUCTOR connected first and disconnected last		N/A
7	PROTECTION AGAINST MECHANICAL HAZARDS		P
7.1	Equipment does not cause a mechanical HAZARD in NORMAL nor in SINGLE FAULT CONDITION	No any hazards.	P
	Conformity is checked by 7.2 to 7.7		P
7.2	Sharp edges		P
	Easily touched parts are smooth and rounded	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	No such parts	N/A
7.3.1	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5		N/A
	RISK assessment in accordance with 7.3.3 carried out		N/A
7.3.2	Exceptions		N/A
	Access to HAZARDOUS moving parts permitted under following circumstances:		N/A
	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:		N/A
	1) access requires TOOL		N/A
	2) statement about training in the instructions		N/A
	3) warning markings on covers prohibiting access by untrained OPERATORS		N/A
	or symbol 14 with full details in documentation		N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts		N/A
	RISK is reduced to a tolerable level by protective measures as specified in table 12		N/A
	Minimum protective measures:		N/A
	A. Low level measures		N/A
	B. Moderate measures		N/A
	C. Stringent measures		N/A
7.3.4	Limitation of force and pressure		N/A
	Following levels are met in NORMAL and SINGLE FAULT CONDITION:		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Continuous contact pressure below 50 N / cm <sup>2</sup> with force below 150 N		N/A
	Temporary force below 250 N for an area at least of 3 cm <sup>2</sup> for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts		N/A
7.3.5.1	Access normally allowed		—
	If levels of 7.3.4 exceeded and 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		N/A
	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:		P
	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		N/A
	c) downward force test for floor-standing equipment		N/A
	d) overload test with 4 times maximum load for castor or support that supports greatest load		N/A
	e) castor or support that supports greatest load removed from equipment		N/A
7.5	Provisions for lifting and carrying		N/A
7.5.1	Equipment more than 18 kg :		N/A
	Has means for lifting or carrying; or		N/A
	Directions in documentation		N/A
7.5.2	Handles and grips		N/A
	Handles or grips withstand four times weight		N/A
7.5.3	Lifting devices and supporting parts		N/A
	RATED for maximum load; or		N/A
	tested with four times maximum static load		N/A
7.6	Wall mounting		N/A
	Mounting brackets withstand four times weight		N/A
7.7	Expelled parts		N/A
	Equipment contains or limits the energy		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Protection not removable without the aid of a tool		N/A
8	RESISTANCE TO MECHANICAL STRESSES		P
8.1	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 following criteria are met:		N/A
	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:		P
	1) static test of 8.2.1		P
	2) impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT	Hand-held appliance	N/A
	if impact energy not selected to 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:		P
	– 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	No such barriers	N/A
	vi) No moving parts exposed, except permitted by 7.3		N/A
	vii) no damage which could cause spread of fire		P

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Clause	Requirement - Test	Result - Remark	Verdict

8.2	ENCLOSURE rigidity test		P
8.2.1	Static test	(see Form A.21A)	P
	– 30 N with 12 mm rod to each part of ENCLOSURE		P
	– in case of doubt test conducted at maximum RATED ambient temperature		N/A
8.2.2	Impact test	(see Form A.21A)	P
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged		P
	Impact energy level and corresponding IK code .....		P
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		P
8.3	Drop test	(see Form A.21B)	P
8.3.1	Other than HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		N/A
	Tests conducted with a drop height or angle of .....	100mm	N/A
8.3.2	HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		P
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		P
	Drop test conducted with an height of 1 m		P

9	PROTECTION AGAINST THE SPREAD OF FIRE		P
9.1	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)	P
	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		P
	c) Application of 9.3 (containment of fire within the equipment)		N/A
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
	b) 2) BASIC INSULATION provided for parts of different potential; or		N/A
	Bridging the insulation does not cause ignition		N/A
	c) Surface temperature of liquids and parts (see 9.5)		N/A
	d) No ignition in circuits designed to produce heat		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
9.3	Containment of the fire within the equipment, should it occur		P
9.3.1	Spread of fire outside equipment reduced to a tolerable level if:		P
	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		P
9.3.2	Constructional requirements		P
	a) Connectors and insulating material have flammability classification V-2 or better	(see TABLE 1 or Form A.23)	P
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)	(see TABLE 1 or Form A.23)	P
	c) ENCLOSURE meets following requirements:	(see Form A.22)	P
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		P
	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:		P
	Metal (except magnesium); or		N/A
	Non-metallic materials have flammability classification V-1 or better	(see TABLE 1 or Form A.22)	P
	3) ENCLOSURE and any baffle or flame barrier have adequate rigidity		N/A
9.4	Limited-energy circuit	(see Form A.24)	P
	a) Potential not more than 30 r.m.s. and 42,4 V peak, or 60 V dc		P
	b) Current limited by one of following means:	The output of the battery was considered inherently limited-energy circuit.	P
	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

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Clause	Requirement - Test	Result - Remark	Verdict

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:		N/A
	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		N/A
9.6.1	MAINS supplied equipment protected	Appliance not supply by mains	N/A
	BASIC INSULATION between MAINS parts of opposite polarity provided		N/A
	Devices not in the protective conductor		N/A
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		N/A
9.6.2	PERMANENTLY CONNECTED EQUIPMENT		N/A
	Overcurrent protection device:		N/A
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.6.3	Other equipment		N/A
	Protection within the equipment		N/A

10	EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT		P
10.1	Surface temperature limits for protection against burns		P
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION:	(see Form A.26A)	P
	– at an specified ambient temperature of 40 °C		P
	– for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C		N/A
	Heated surfaces necessary for functional reasons exceeding specified values:		N/A
	– Are recognizable as such by appearance or function; or		N/A
	– Are marked with symbol 13		N/A
	– Guards are not removable without tool		N/A
10.2	Temperatures of windings		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Limits not exceeded in:	(see Form A.26B)	N/A
	NORMAL CONDITION		N/A
	SINGLE FAULT CONDITION		N/A
10.3	Other temperature measurements		P
	Following measurements conducted if applicable:	(see Form A.26A)	P
	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		P
	d) Parts made of insulating material supporting parts connected to MAINS supply		N/A
	e) Terminals carrying a current more than 0,5 A		N/A
10.4	Conduct of temperature tests		P
10.4.1	Tests conducted under reference test conditions and manufacturer's instructions	(see Form A.26A)	P
10.4.2	Temperature measurement of heating equipment		N/A
	Tests conducted in test corner		N/A
10.4.3	Equipment intended for installation in a cabinet or wall		N/A
	Equipment built in as specified in installation instructions		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)	P
	Within 10 min after treatment:		P
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1		P
10.5.3	Insulating material		P
	a) Parts supporting parts connected to MAINS supply		N/A
	b) TERMINALS carrying a current more than 0,5 A		N/A
	Examination of material data; or		N/A
	in case of doubt:		N/A
	1) Ball pressure test; or		N/A
	2) Vicat softening test of ISO 306		N/A
11	PROTECTION AGAINST HAZARDS FROM FLUIDS		N/A
11.1	Protection to OPERATORS and surrounding area provided by EQUIPMENT	No liquids	N/A
	All fluids specified by manufacturer considered		N/A



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Clause	Requirement - Test	Result - Remark	Verdict

11.2	Cleaning		N/A
11.3	Spillage		N/A
11.4	Overflow		N/A
11.5	Battery electrolyte		N/A
	Battery electrolyte leakage presents no HAZARD		N/A
11.6	Specially protected equipment		N/A
11.7	Fluid pressure and leakage		N/A
11.7.1	Maximum pressure ..... :		N/A
	Maximum pressure of any part does not exceed P <sub>RATED</sub>		N/A
11.7.2	Leakage and rupture at high pressure		N/A
	Fluid-containing parts subjected to hydraulic test if.... :		N/A
	a) product of pressure and volume > 200 kPa; and		N/A
	b) pressure > 50 kPa		N/A
	Parts of refrigerating systems meets pressure-related requirements of IEC 60335-24 or IEC 60335-2-89		N/A
11.7.3	Leakage from low-pressure parts		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		N/A
12.1	Equipment provides protection		N/A
12.2	Equipment producing ionizing radiation		N/A
12.2.1	Ionizing radiation	(see Form A.33)	N/A
12.2.1.1	Equipment meets the following requirements:		N/A
	a) if intended to emit radiation meets requirements of 12.2.1.2; or		N/A
	tested, classified and marked in accordance to IEC 60405		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	b) if only emits stray radiation meets requirements of 12.2.1.3		N/A
12.2.1.2	Equipment intended to emit radiation		N/A
	Effective dose rate of radiation measured ..... :		N/A
	If dose rate exceeds 5 $\mu\text{Sv/h}$ marked with the following:		N/A
	a) symbol 17 (ISO 361)		N/A
	b) abbreviations of the radionuclides ..... :		N/A
	c) with maximum dose at 1 m; or ..... :		N/A
	with dose rate value between 1 $\mu\text{Sv/h}$ and 5 $\mu\text{Sv/h}$ in m..... :		N/A
12.2.1.3	Equipment not intended to emit radiation	(see Form A.34)	N/A
	Limit for unintended stray radiation of 1 $\mu\text{Sv/h}$ 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	Ultraviolet (UV) radiation		N/A
	No unintentional HAZARDOUS escape of UV radiation:		N/A
	– checked by inspection; and		N/A
	– evaluation of RISK assessment documentation		N/A
12.4	Microwave radiation		N/A
	Power density does not exceed 10 $\text{W/m}^2$ ..... :		N/A
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:		N/A
	Marked with Symbol 14 of table 1		N/A
	and following information in the documentation:		N/A
	a) dimensions of useful beam		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	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		N/A
	No poisonous or injurious gases or substances liberated in NORMAL CONDITION		N/A
	Attached data/test reports demonstrate conformity		N/A
13.2	Explosion and implosion		N/A
13.2.1	Components		
	Components liable to explode:		N/A
	Pressure release device provided; or		N/A
	Apparatus incorporates operator protection (see also 7.7)		N/A
	Pressure release device:		N/A
	Discharge without danger		N/A
	Cannot be obstructed		N/A
13.2.2	Batteries and battery charging	Use non-recharge battery (see Form A.37)	N/A
	If explosion or fire HAZARD could occur:		N/A
	Protection incorporated in the equipment; or		P
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		P
	No HAZARD; or		P
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		N/A
	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 .....		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Intrinsically protected and correctly mounted; or		N/A
	ENCLOSURE provides protection:		N/A
	If non-intrinsically protected:		N/A
	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	Where safety is involved, components and subassemblies meet relevant requirements	(see TABLE 1)	P
14.2	Motors	No motor	N/A
14.2.1	Motor temperatures		N/A
	Does not present a HAZARD when stopped or prevented from starting; or		N/A
	Protected by over-temperature or thermal protection device conform with 14.3		N/A
14.2.2	Series excitation motors		N/A
	Connected direct to device, if overspeeding causes a HAZARD		N/A
14.3	Overtemperature protection devices	No such devices	N/A
	Devices operating in a SINGLE FAULT CONDITION		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		P
	No access to HAZARDOUS LIVE parts		P
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 circuit boards		P
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or	V-0	P
	Test shows conformity with V-1 of IEC 60695-11-10 or better	(see Form A.23)	N/A
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	Circuits or components used as TRANSIENT OVERVOLTAGE limiting devices		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Test conducted between each pair of MAINS SUPPLY TERMINALS	(see Form A.41)	N/A
	No HAZARD resulting from rupture or overheating of the component:		N/A
	– no bridging of safety relevant insulation		N/A
	– no heat to other parts above the self-ignition points		N/A
15	PROTECTION BY INTERLOCKS		N/A
15.1	Interlocks are designed to remove a HAZARD before OPERATOR exposed	No such component	N/A
15.2	Prevention of reactivation		N/A
15.3	Reliability		N/A
	Single fault unlikely to occur; or		N/A
	Cannot cause a HAZARD		N/A
16	HAZARDS RESULTING FROM APPLICATION		N/A
16.1	REASONABLY FORESEEABLE MISUSE		N/A
	No HAZARDS arising from settings not intended and not described in the instructions		N/A
	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:		N/A
	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:		N/A
	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

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Clause	Requirement - Test	Result - Remark	Verdict
	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:		N/A
	Information contained how to mitigate these RISKS		N/A
	Following principles in methods of RISK reduction applied by manufacturer in given order:		N/A
	1) RISKS eliminated or reduced as far as possible		N/A
	2) Protective measures taken for RISKS that cannot be eliminated		N/A
	3) User information about residual RISK due to any defect of the protective measures		N/A
	Indication of particular training is required		N/A
	Specification of the need for personal protective equipment		N/A
	Conformity checked by evaluation of the RISK assessment documentation		N/A

ANNEX F	ROUTINE TESTS		N/A
	Manufacturer 's declaration		N/A
ANNEX H	QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION		N/A
H.1	General		N/A
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N/A
H.2	Technical properties		N/A
	Technical properties of conformal coatings are suitable for the intended application. In particular:		N/A
	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		N/A
	Coating complies with the conformity requirements.		N/A
ANNEX K	INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7	(see Form A.15 and A.18)	N/A

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Clause	Requirement - Test	Result - Remark	Verdict

4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results			Form A.1	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
For MS2203					
4.4.4	1	s-c D10	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	2	s-c D13	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	3	s-c the secondary winding of transformer	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	4	s-c C54	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	5	s-c R96	00:10:00	Normal work, no hazards.	Yes
4.4.4	6	s-c RT2	00:10:00	Normal work, no hazards.	Yes
4.4.4	7	s-c C52	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	8	s-c Q4(c-e)	00:10:00	Unit shut down, no hazards.	Yes
4.4.4	9	s-c Q4(b-e)	00:10:00	Normal work, no hazards.	Yes
4.4.4	10	s-c R76	00:10:00	Unit shut sown, no hazards.	Yes
4.4.4	11	Battery short circuit	00:30:00	The appliance has no display and can't work, no hazards.	Yes
4.4.4	12	Battery reverse	00:30:00	The appliance has no display and can't work, no hazards.	Yes
For MS2205					
4.4.4	13	s-c TP1/TP2/TP3	00:10:00	Normal work, no hazards.	Yes
4.4.4	14	s-c C2	00:10:00	Normal work, no hazards.	Yes
4.4.4	15	s-c D59	00:10:00	Normal work, no hazards.	Yes
4.4.4	16	Battery short circuit	00:30:00	The appliance has no display and can't work, no hazards.	Yes
4.4.4	17	Battery reverse	00:30:00	The appliance has no display and can't work, no hazards.	Yes
NOTE Td = Test duration in hh:mm:ss Record dielectric strength test on Form A.18 and temperature tests on Form 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:					

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Clause	Requirement - Test	Result - Remark	Verdict

<b>5.1.3c)</b>	<b>TABLE: MAINS supply</b>	<b>Form A.2</b>	<b>N/A</b>
	Marked rating..... :	V	—
	Phase..... :		—
	Frequency ..... :	Hz	—
	Current ..... :	A	—
	Power ..... :	W	—
	Power ..... :	VA	—

Test No.	Voltage [V]	Frequency [Hz]	Current [A]	Power		Comments
				[W]	[VA]	

NOTE – Measurements are only required for marked ratings.

Supplementary information:



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Clause	Requirement - Test	Result - Remark	Verdict

<b>5.3</b>	<b>TABLE: Durability of markings</b>	<b>Form A.3</b>	<b>P</b>
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)	--
Fuses (5.1.4)	1
Terminals and operating devices (5.1.5.2)	--
Switches and circuit breakers (5.1.6)	--
Double/reinforced equipment (5.1.7)	5
Field wiring Terminal boxes (5.1.8)	--
Warning marking (5.2)	5
Battery charging (13.2.2)	--

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
1	A/B	Yes/No	Yes/No	Yes/No	P/F/NA
1	A/B	Yes/No	Yes/No	Yes/No	P/F/NA
5	A/B	Yes/No	Yes/No	Yes/No	P/F/NA
5	A/B	Yes/No	Yes/No	Yes/No	P/F/NA

Supplementary information:

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict

<b>6.2</b>	<b>TABLE: List of ACCESSIBLE parts</b>		<b>Form A.4</b>	<b>P</b>
6.1.2	Exceptions			—
6.2	Determination of ACCESSIBLE parts			—
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)	
1	Plastic enclosure, reinforced insulation is provided	Visual, test finger and rigid test finger	--	
<p>NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2)</p> <p>NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)</p> <p>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).</p> <p>NOTE 4 – Capacitor test may be required (see Form A.5).</p> <p>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.</p>				
Supplementary information:				

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Clause	Requirement - Test	Result - Remark	Verdict
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6	TABLE: Values in NORMAL CONDITION												Form A.5	P
6.1.2	Exceptions													—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)													—
6.6.2	Terminals for external circuit													—
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		
Enclosure to refer earth for MS2203	8.54	12.08	--	--	--	--	--	--	--	--	--	--	--	
Enclosure to refer earth for MS2205	28.9	39.8	--	--	--	--	--	--	--	--	--	--	--	
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:														

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Clause	Requirement - Test	Result - Remark	Verdict
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6.3.2	TABLE: Values in SINGLE FAULT CONDITION											Form A.6	P
Item  (see Form A.4)	Subclause and fault No. (see Form A.1)	Voltage			Transient (see NOTE)		Current				Capacitance	Comments	
		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)		
Enclosure to refer earth for MS2203	see Form A.1	25.6	33.14	--	--	--	--	--	--	--	--	--	
Enclosure to refer earth for MS2205	see Form A.1	40.8	52.9	--	--	--	--	--	--	--	--	--	

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:

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Clause	Requirement - Test	Result - Remark	Verdict

<b>6.5.2.2</b>	<b>TABLE: Cross-sectional area of bonding conductors</b>		<b>Form A.7</b>	N/A
Conductor location	CROSS-SECTIONAL AREA [mm <sup>2</sup> ]			Verdict
Supplementary information:				

<b>6.5.2.3</b>	<b>TABLE: Tightening torque test</b>		<b>Form A.8</b>	N/A
Conductor location	Size of screw	Tightening torque [Nm]	Verdict	
Supplementary information:				

<b>6.5.2.4</b>	<b>TABLE: Bonding impedance of plug connected equipment</b>			<b>Form A.9</b>	N/A
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	
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:					

<b>6.5.2.4</b>	<b>TABLE: Bonding impedance of plug connected equipment</b>			<b>Form A.9</b>	N/A
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	
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:					

<b>6.5.2.5</b>	<b>TABLE: Bonding impedance of permanently connected equipment</b>		<b>Form A.10</b>	N/A
ACCESSIBLE part under test	Test current [A]	Voltage attained after 1 min (maximum 10 V) [V]	Verdict	
Supplementary information:				

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict

<b>6.5.2.6</b>	<b>TABLE: Transformer PROTECTIVE BONDING screen</b>			<b>Form A.11</b>	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:					

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Clause	Requirement - Test	Result - Remark	Verdict

<b>6.5.4</b>	<b>TABLE: protective impedance</b>					<b>Form A.12</b>	<b>N/A</b>	
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:								

<b>6.5.6</b>	<b>TABLE: Current- or voltage-limiting device</b>					<b>Form A.13</b>	<b>N/A</b>
Component	Location	Measured		Rated		Verdict	Comments
		Working voltage [V]	Current [A]	Working voltage [V]	Current [A]		
Supplementary information:							





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Clause	Requirement - Test	Result - Remark	Verdict
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<b>6.7</b>	<b>TABLE: Insulation requirements- Clearances and Creepage</b>	<b>Form A.15</b>		<b>P</b>
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		CTI	Verdict	Comments
			RMS [V]	Peak [V]	Frequency [kHz]	Required [mm]	Measured [mm]	Required [mm]	Measured [mm]			
A	Live parts to enclosure	RI	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
B	Live parts to hand-held part	RI	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
C	Live parts to barrier	RI	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
D	Live parts to iron core to jaw surface	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--
E	Two sides of jaws	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--
F	V1/V2/V3 to COM	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--
G	Two terminals of fuse	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--

NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram (Form A.14)

NOTE 2 - to be used for definition of required insulation (see Form A.14)

Input supply voltage.....:	--	V	--	Hz
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Supplementary information:

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Clause	Requirement - Test	Result - Remark	Verdict

6.7	TABLE: Insulation requirements- Clearances and Creepages	Form A.16	P
6.4.2	ENCLOSURES OF PROTECTIVE BARRIERS	9.6.1	Overcurrent protection basic insulation between MAINS parts
8	Mechanical resistance to shock and impact	10.5.1	Integrity of CLEARANCES and CREEPAGE distances

Area	Location (See Form A.14)	Insulation type	Mechanical tests (NOTE)					Test at max. RATED ambient (10.5.1)	Measured after test (if required)		Verdict	Comments
			Applied force N	Rigidity (8.2)		Drop (8.3)			Clearance mm	Creepage distance mm		
				Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)	Hand-held/ Plug-in					
A	Live parts to enclosure	RI	30N	P	P		P	40°C	>12.0	>12.0	P	--
B	Live parts to hand-held part	RI	30N	P	P		P	40°C	>12.0	>12.0	P	--
C	Live parts to barrier	RI	30N	P	P		P	40°C	>12.0	>12.0	P	--
D	Live parts to iron core to jaw surface	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
E	Two sides of jaws	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
F	V1/V2/V3 to COM	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
G	Two terminals of fuse	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--

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

Supplementary information:

EN 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		

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 (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					
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:								

<b>6.8</b>	<b>TABLE: Dielectric strength tests</b>					<b>Form A.18</b>	P
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS <sup>1</sup>						P
6.4	Primary means of protection <sup>2</sup>						P
6.6	Connections to external circuits						N/A
6.7.	Insulation requirements <sup>2</sup> (see Annex K)						P
6.10.2	Fitting of non-detachable MAINS supply cords <sup>1</sup>						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 .....				Normal		—
	Test voltage correction factor (see table 10) .....				Nil		—
Location or references from Forms A.1 and A.14	Clause or sub-clause	Humidity	Working voltage	Test voltage	Comments (NOTE)	Verdict	
		Yes/No	V	r.m.s./peak/d.c.			
Live parts to enclosure	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	7400V rms	RI	P	
Live parts to hand-held part	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	7400V rms	RI	P	
Live parts to barrier	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	7400V rms	RI	P	
Live parts to iron core to jaw surface	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	4260V rms	BI	P	
Two sides of jaws	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	4260V rms	BI	P	
V1/V2/V3 to COM	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	4260V rms	BI	P	
Two terminals of fuse	4.4.4.1 b), 6.4,6.5.2, 6.7,8	Yes	1000V	4260V rms	BI	P	
<sup>1</sup> Record the fault, test or treatment applied before the dielectric strength test. <sup>2</sup> Humidity preconditioning required. NOTE: Test duration may be recorded. Supplementary information:							

<b>6.10.2</b>	<b>TABLE: Cord anchorage</b>					<b>Form A.19</b>	N/A
Location	Mass [kg]	Pull [N]	Verdict	Torque [Nm]	Verdict	Comment	

<b>6.10.2</b>	<b>TABLE: Cord anchorage</b>					<b>Form A.19</b>	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:							

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Clause	Requirement - Test	Result - Remark	Verdict

7.	<b>TABLE: Protection against mechanical HAZARDS</b>	<b>Form A.20</b>	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 /cm <sup>2</sup> @ max. 150 N	max. 250 N / 3 cm <sup>2</sup> @ 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:

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict
<b>8.2</b>	<b>ENCLOSURE rigidity test</b>	<b>Form A.21A</b>	P
8.2.1	Static test		P
	Material of enclosure.....:	<del>Metal</del> / non-metallic	—
	Preparation for the test:		—
	Operated at ambient temperature.....:	40 °C   -- h	—
	Location	Comments	Verdict
	1) Enclosure	--	P
Supplementary information:			
<b>8.2.2</b>	<b>Dynamic test</b>		P
	Material of enclosure.....:	<del>Metal</del> / non-metallic	—
	Corresponding IK-code.....:	14	—
	Preparation for the test:		—
	Cooled to (temperature).....:	25.0 °C	—
	Location	Comments	Verdict
	1) Top	--	P
	2) Side left / right	--	P
	3) Bottom	--	P
Supplementary information:			

<b>8.3</b>	<b>Drop test</b>	<b>Form A.21B</b>	N/A		
8.3.1	Other equipment				
	Location	Raised up to		Comments	—
		[mm]	30		—
	1)side	100	--	--	N/A
	2)top	100	--	--	N/A
	3)bottom	100	--	--	N/A
Supplementary information:					

8.3.2	Hand-held EQUIPMENT and direct plug-in equipment				P
	Material of enclosure.....:	Metal / non-metallic			—
	Preparation for the test:				—
	Cooled to (temperature).....:	25 ° C			—
	Location	Comments			Verdict
	Top	No damaged			P
	Side	No damaged			P
	Bottom	No damaged			P
Supplementary information:					



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Clause	Requirement - Test	Result - Remark	Verdict

<b>9</b>	<b>TABLE: Protection against the spread of fire</b>			<b>Form A.22</b>	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	Testing in single fault condition	9a	All of fault condition which are liable to result in hazards are applied, no hazards.	P	
2	Plastic enclosure	9c	Flammability of V-0	P	
3	PCB	9c	Flammability of V-0	P	
Supplementary information:					

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict

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

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict

<b>9.4</b>	<b>TABLE: Limited-energy circuit</b>				<b>Form A.24</b>	<b>P</b>
Item or Location  (see Form A.22)	9.4 a)	9.4 b) Current limitation (NOTE)		9.4 c)	Decision	Comments
	Maximum potential in circuit voltage r.m.s./d.c. [V]	Maximum available current [A]	Overload protection after 120 s [A]	Circuit separation	Yes/No	
NOTE – Maximum values see Tables 17 and 18 of IEC 61010-1						
Supplementary information: battery supplied and is considered limited-energy circuit.						

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

EN 61010-1			
Clause	Requirement - Test	Result - Remark	Verdict

<b>10.</b>	<b>TABLE : Temperature Measurements</b>	<b>Form A.26A</b>	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		N/A

Operating conditions: Normal operation			
Frequency..... :	-- Hz	Test room ambient temperature (ta).... :	25.0 °C
Voltage..... :	9 Vdc	Test duration..... :	2 h 45 min

Part / Location	$t_m$ [°C]	$t_c$ [°C]	$t_{max}$ [°C]	Verdict	Comments
MS2203					
Enclosure (front)	26.5	41.5	85	P	--
Enclosure (rear)	26.4	41.4	85	P	--
LCD display	25.9	40.9	85	P	--
Hand-held part	27.3	42.3	70	P	--
Key	27.4	42.4	85	P	--
PCB	31.4	46.4	130	P	--
Internal wire	32.5	47.5	105	P	--
C54	28.6	43.6	105	P	--
RC1	27.9	42.9	85	P	--
Transformer winding	31.8	46.8	110	P	--
Transformer bobbin	30.9	45.9	130	P	--
Ambient	25.0	40.0	--	--	--

MS2205. Test duration: 2h 30min					
Enclosure (front)	26.1	41.1	85	P	--
Enclosure (rear)	26.3	41.3	85	P	--
LCD display	25.5	40.5	85	P	--
Hand-held part	27.6	42.6	70	P	--
Key	27.8	42.8	85	P	--
PCB	30.8	45.8	130	P	--
Ambient	25.0	40.0	--	--	--

NOTE 1 -  $t_m$  = measured temperature  
 $t_c = t_m$  corrected ( $t_m - t_a + 40$  °C or max. RATED ambient)  
 $t_{max}$  = maximum permitted temperature

NOTE 2 - see also 14.1 with reference to component operating conditions

NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary

NOTE 4 - see Form A.26B for details of winding temperature measurements

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Clause	Requirement - Test	Result - Remark	Verdict

<b>10.</b>	<b>TABLE : Temperature Measurements</b>	<b>Form A.26A</b>	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		N/A

Operating conditions: Normal operation			
Frequency..... :	-- Hz	Test room ambient temperature (ta).... :	25.0 °C
Voltage..... :	9 Vdc	Test duration..... :	3 h 06 min

Part / Location	$t_m$ [°C]	$t_c$ [°C]	$t_{max}$ [°C]	Verdict	Comments
MS2203					
Enclosure (front)	26.6	41.6	105	P	--
Enclosure (rear)	29.5	44.5	105	P	--
LCD display	28.9	42.9	105	P	--
Hand-held part	27.4	42.4	105	P	--
Key	27.8	42.8	105	P	--
PCB	29.9	44.9	130	P	--
Transformer winding	31.4	46.4	175	P	--
Transformer bobbin	30.7	45.7	130	P	--
Ambient	25.0	40.0	--	--	--

MS2205. Test duration: 2h 50min					
Enclosure (front)	26.9	41.9	105	P	--
Enclosure (rear)	26.8	41.8	105	P	--
LCD display	26.3	41.3	105	P	--
Hand-held part	26.8	41.8	105	P	--
Key	26.2	41.2	105	P	--
PCB	26.5	41.5	130	P	--
Ambient	25.0	40.0	--	--	--

NOTE 1 -  $t_m$  = measured temperature  
 $t_c = t_m$  corrected ( $t_m - t_a + 40$  °C or max. RATED ambient)  
 $t_{max}$  = maximum permitted temperature

NOTE 2 - see also 14.1 with reference to component operating conditions

NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary

NOTE 4 - see Form A.26B for details of winding temperature measurements



<b>10.5.2</b>	<b>TABLE: Resistance to heat of non-metallic ENCLOSURES</b>		<b>Form A.27</b>	<b>P</b>
	Test method used:			—
	Non-operative treatment.....:	[ ]		
	Empty ENCLOSURE .....	[ ]		
	Operative treatment.....:	[ ]		
	Temperature during tests .....			—
Description	Material	Comments		Verdict
Enclosure	ABS, V-0	No damage		P
Dielectric strength test (6.8).....:		7400	V	r.m.s./peak/d.c.
NOTE – Within 10 minutes of the end of treatment suitable tests in acc. to 8.2 and 8.3 must be conducted and pass criteria of 8.1.				
Supplementary information:				

<b>10.5.3</b>	<b>TABLE: Insulating Materials</b>		<b>Form A.28</b>	P
10.5.3 1)	Ball-pressure test			
	Max. allowed impression diameter .....	:	2 mm	—
Part	Test temperature [°C]	Impression diameter [mm]	Verdict	
Enclosure	70	0.6	P	
PCB	125	0.5	P	
Supplementary information:				

10.5.3 2)	<b>Vicat softening test (ISO 306)</b>		<b>Form A.29</b>	N/A
Part	Vicat softening temperature [°C]	Thickness of sample [mm]	Verdict	
Supplementary information:				



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Clause	Requirement - Test	Result - Remark	Verdict
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<b>8</b>	<b>TABLE: Mechanical resistance to shock and impact</b>	<b>Form A.30</b>	N/A
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<b>11</b>	<b>Protection against HAZARDS from fluids</b>		
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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 [V]	Test voltage [V]	Verdict	Comments
	Static (8.2.1) 30 N	Impact (8.2.2)	Normal (8.3.1)	Handheld Plug-in	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)				
(see Form A.14)	√	√	--	√	--	--	--	--	1000Vac	7400 Vrms	P	RI
	√	√	--	√	--	--	--	--		7400 Vrms	P	RI
	√	√	--	√	--	--	--	--		7400 Vrms	P	RI
	√	√	--	√	--	--	--	--		4260 Vrms	P	BI
	√	√	--	√	--	--	--	--		4260 Vrms	P	BI
	√	√	--	√	--	--	--	--		4260 Vrms	P	BI
	√	√	--	√	--	--	--	--		4260 Vrms	P	BI

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

Supplementary information:

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Clause	Requirement - Test	Result - Remark	Verdict

<b>11.7.2</b>	<b>TABLE: Leakage and rupture at high pressure</b>					<b>Form A.31</b>	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:							

<b>11.7.3</b>	<b>Leakage from low-pressure parts</b>			<b>Form A.32</b>	N/A
Part	Test pressure [MPa]	Leakage Yes / No	Comments		
Supplementary information:					

<b>12.2.1</b>	<b>TABLE: Ionizing radiation</b>			<b>Form A.33</b>	N/A
<b>12.2.1.2</b>	<b>Equipment intended to emit radiation</b>				
Locations tested	Measured values [µSv/h]	Verdict	Comments		
Supplementary information:					

<b>12.2.1.3</b>	<b>Equipment not intended to emit radiation</b>			<b>Form A.34</b>	N/A
	Max. allowed effective dose rate at 100 mm.....:		1 µSv/h	—	
Locations tested	Measured values [µSv/h]	Verdict	Comments		
Supplementary information:					

<b>12.5.1</b>	<b>TABLE: Sound level</b>		<b>Form A.35</b>	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:				
<b>12.5.2</b>	<b>Ultrasonic pressure</b>		<b>Form A.36</b>	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:				

13.2.2	<b>TABLE: Batteries</b>		<b>Form A.37</b>	P
Battery load and charging circuit diagram:				
	Battery type..... :	AA	—	
	Battery manufacturer/model/catalogue No. .... :	--	—	
	Battery ratings..... :	4x1.5Vdc	—	
	Reverse polarity instalment test	No hazards		
Single component failures		Verdict		
Component		Open circuit	Short circuit	
Battery	P	P		
Supplementary information:				

14.3	<b>TABLE: Overtemperature protection devices</b>		<b>Form A.38</b>	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:				

<b>4.4.2.7</b>	<b>TABLE: MAINS transformer</b>			<b>Form A.39</b>	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 FormA.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:					

<b>4.4.2.7</b>	<b>TABLE: MAINS transformer</b>			<b>Form A.40</b>	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					
<p>NOTE 1: Primary fuse - PF / ( ) A  Secondary fuse - SF / ( ) A  Overtemperature protection - OP / ( ) °C  Impedance protection - Z</p> <p>NOTE 2: Indicate method of measurement TC = with thermocouple  R = resistance method</p> <p>If resistance method is used, record resistance in cold and warm condition in FormA.26B.</p> <p>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</p>					
Supplementary information:					

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Clause	Requirement - Test	Result - Remark	Verdict

<b>14.8</b>	<b>TABLE: Transient overvoltage limiting devices</b>									<b>Form A.41</b>	N/A
Component / Designation	Overvoltage Category	MAINS voltage [V rms]	Test voltage [V]	$t_m$ [°C]	$t_c$ [°C]	$t_{max}$ [°C]	Rupture Yes / No	Circuit breaker tripped	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) $t_{max}$ = 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 Supplementary information:											



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Clause	Requirement - Test	Result - Remark	Verdict

<b>Annex H</b>		<b>TABLE: Qualification of conformal coating for protection against pollution</b>						<b>Form A.42</b>		N/A	
Technical properties											
Manufacturer.....										—	
Type.....										—	
Meet requirements of ANSI / UL 746E .....		[yes / no]									
Manufacturer declaration of coating		[yes / no]									
Operating temperature of coating.....		[ ] °C									
Comparative tracking index (CTI).....		[ ]									
Insulation resistance.....		[ ] Ω									
Dielectric strength.....		[ ] V									
UV resistance (if required).....		[yes / no]									
Flammability rating.....											
Preparation of the test specimens		[yes / no]									
Item	Test conditioning	Parameter	Td h	Samples						Verdict	Comments
				1	2	3	4	5	6		
1	Scratch resistance										
	Visual inspection										
2	Cold		24								
3	Dry heat		48								
4	Rapid temp. change										
5	Damp heat		24								
6	Adhesion of coating	5 N									
	Visual inspection										
7	Humidity		48								
8	Insulation resistance	>= 100 Ω									
	Visual inspection										
NOTE Td = Test duration time											
Supplementary information:											

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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:				

<b>TEST REPORT</b> <b>EN 61010-1</b> <b>Safety requirements for electrical equipment for measurement,</b> <b>control, and laboratory</b> <b>Part 2-030: Particular requirements for testing and measurement circuits</b>	
<b>Testing laboratory</b>	
Name	LiTest Technology Service Co., Ltd
Address	FuKang Road, HouJie Town, DongGuan City, GuangDong Province
Testing location	LiTest Technology Service Co., Ltd
Address	No.42 FuKang Road, Houjie Town, Dongguan City, Guangdong, China
Tel: +86-769-82272566/7; Fax: +86-769-82272565; Web: www.litest.cn; Email: service@litest.cn	
<b>Client</b>	
Name	Shenzhen New Huayi Instrument Co., Ltd
Address	F3, Block 2, Instrument World Industrial Park, Guiyue Road, Longhua New District, Shenzhen City
<b>Test specification</b>	
Standard	EN61010-2-030:2010,
Test procedure	CE Marking serial in LVD
Non-standard test method	N/A.
<b>Test Report Form No.....:</b>	IEC61010_2_030A
TRF Originator.....:	Underwriters Laboratories Inc.
Master TRF.....:	Dated 2011-12
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<b>Test item</b>	
Description	DIGITAL POWER CLAMP METER
Manufacturer	Shenzhen New Huayi Instrument Co., Ltd
Address	F3, Block 2, Instrument World Industrial Park, Guiyue Road, Longhua New District, Shenzhen City
Trademark	PEAKMETER
Model and/or type reference	MS2203,MS2205
Rating(s)	4x1.5Vdc AA battery 1000V CAT III, Max.1000A, class II

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Clause	Requirement - Test	Result - Remark	Verdict
<b>5.</b>	<b>MARKING AND DOCUMENTATION</b>		P
5.1.5	TERMINALS, connections and operating devices		P
5.1.5.101	Measuring circuit TERMINALS		P
5.1.5.101.1	General		P
	a)The RATED voltage to earth of measuring circuit TERMINALS is marked	Marked on the product.	P
	b)the RATED voltage or the RATED current, as applicable, for each pair or set of measuring circuit TERMINALS that are intended to be used together are marked		P
	c)the pertinent MEASUREMENT CATEGORY for each pair or set of measuring circuit TERMINALS or symbol 14 of Table 1 of Part 1 are marked		P
	Symbol 14 of Table 1 is marked if current measuring TERMINALS are not intended for connection to current transformers without internal protection (see 101.2).		P
	Markings are placed adjacent to the TERMINALS, however, if there is insufficient space, the marking may be on the RATING plate or scale plate, or the TERMINAL may be marked with symbol 14 of Table 1.	Marked on the product.	P
5.1.5.101.2	The relevant MEASUREMENT CATEGORY is marked for measuring circuit TERMINALS. The CATEGORY markings are "CAT II", "CAT III" or "CAT IV" as applicable.	CAT III marked.	P
5.1.5.101.3	Measuring circuit TERMINALS RATED for connection to voltages above the level of 6.3.1 are marked with Symbol 14 of Table 1, if not RATED for measurements within MEASUREMENT CATEGORIES II, III or IV		P
5.1.5.101.4	Low voltage, permanently connected, or dedicated measuring circuit TERMINALS do not need to be marked if a), b), c) below apply	Not for permanently connected.	N/A
	a)they are intended to be permanently connected and not ACCESSIBLE (see 5.4.3 aa) and bb), or		N/A
	b)they are dedicated only for connection to specific TERMINALS of other equipment, or		N/A
	c)It is obvious from other indications that the RATED voltage is below the levels of 6.3.1.		N/A
5.4.1	General		P
	aa)information about each relevant MEASUREMENT CATEGORY if the measuring circuit has a RATING for MEASUREMENT CATEGORY II, III or IV (see 5.1.5.101.2).	CAT III marked.	P

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Clause	Requirement - Test	Result - Remark	Verdict
	bb)for measuring circuits that do not have a RATING for MEASUREMENT CATEGORY II, III or IV, but could be misused by connection to such circuits, a warning not to use the equipment for measurements on MAINS CIRCUITS, and a detailed RATING including TRANSIENT OVERVOLTAGES (see AA.2.4)		N/A
5.4.3	Equipment installation		N/A
	aa)for permanently connected measuring circuit TERMINALS RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the MEASUREMENT CATEGORY, RATED max WORKING VOLTAGE, and RATED max current, as applicable (see 5.1.5.101);		N/A
	bb)for permanently connected measuring circuit TERMINALS that are not RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the RATED max WORKING VOLTAGE, RATED max current, and RATED max TRANSIENT OVERVOLTAGES as applicable (see 5.1.5.101).		N/A

<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		P
6.1.2	Exceptions: aa)locking or screw-held type measuring TERMINALS, including TERMINALS which do not require the use of a TOOL.		P
6.5.2.3	Protective conductor terminal		P
	h) 2) the PROTECTIVE BONDING is not be interrupted by any switching or interrupting device. Devices used for indirect bonding in test and measurement circuits (see 6.5.2.101) are permitted to be part of the PROTECTIVE BONDING.		P
6.5.2.101	Indirect bonding for testing and measuring circuits		N/A
	Indirect bonding establishes a connection between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if these become HAZARDUS LIVE as a result of fault. Devices to establish indirect bonding are:		N/A
	a) voltage limiting devices which become conductive when the voltage across them exceeds the relevant levels of 6.3.2 a), with overcurrent protection to prevent breakdown of the device		N/A
	The voltage between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL did not exceed the relevant levels of 6.3.2 a) for more than 0,2 s..... :		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	b) voltage-sensitive tripping devices which interrupt all poles of the MAINS supply, and connect the ACCESSIBLE conductive parts to the PROTECTIVE CONDUCTOR TERMINAL whenever the voltage across them reaches the relevant levels of 6.3.2 a).		N/A
	The tripping action took place within 0,2 s ..... :		N/A
6.6	Connections to external circuits		N/A
6.6.101	Conductive parts of each unmated measuring circuit TERMINAL which could become HAZARDOUS LIVE when the maximum RATED voltage is applied to other measuring circuit TERMINALS on the equipment are separated by at least the CLEARANCE and CREEPAGE DISTANCE of Table 101		N/A
6.6.102	Components, sensors, and devices intended to be connected to specialized measuring circuit TERMINALS are not both ACCESSIBLE and HAZARDOUS LIVE, in either NORMAL CONDITION or SINGLE-FAULT CONDITION, even when the maximum RATED voltage is applied to any other measuring circuit TERMINAL		N/A
	Accessible parts did not exceed the levels of 6.3.1 and 6.3.2.....:	(See appended Table 6.6.102)	N/A
6.9	Constructional requirements for protection against electric shock		P
6.9.101	If a HAZARD could arise from an OPERATOR'S reliance on the value (for example, voltage) displayed by the equipment, the display gives an unambiguous indication whenever the value is above the maximum positive value or below the minimum negative value of the range to which the equipment is set.	(See appended Table 6.9.101)	P
<b>14</b>	<b>COMPONENTS AND SUBASSEMBLIES</b>		N/A
14.101	Circuits or components used as TRANSIENT OVERVOLTAGE limiting devices in measuring circuits are used to measure MAINS		N/A
	If control of TRANSIENT OVERVOLTAGE is employed in a measuring circuit used to measure MAINS, any overvoltage limiting component or circuit has adequate strength to limit TRANSIENT OVERVOLTAGES		N/A
<b>101</b>	<b>MEASURING CIRCUITS</b>		P
101.1	The equipment provides protection of HAZARD resulting from NORMAL USE and REASONABLY FORSEEABLE MISUSE of measuring circuits as specified below:		P

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Clause	Requirement - Test	Result - Remark	Verdict
	a) If a HAZARD could result, a current measuring circuit does not interrupt the circuit being measured during range changing, or during the use of current transformers without internal protection (see 101.2)		P
	b) An electrical quantity that is within specification for any TERMINAL does not cause a HAZARD when it is applied to that TERMINAL or any other compatible TERMINAL, with the range and function settings set in any possible manner (see 101.3)		N/A
	c) Any interconnection between the equipment and other devices or accessories does not cause a HAZARD even if the documentation or markings prohibit the interconnection while the equipment is used for measurement purposes (see 6.6).		N/A
	d) For measuring circuits that include one or more FUNCTIONAL EARTH TERMINALS, a RISK assessment (see Clauses 16 and 17) addresses the HAZARDS that may result if the equipment is operated with a disconnected PROTECTIVE CONDUCTOR TERMINAL and if the operator unintentionally connects a FUNCTIONAL EARTH TERMINAL to any RATED voltage for any other TERMINAL.	No function earth.	N/A
	e) Other HAZARDS that could result from REASONABLY FORESEEABLE MISUSE is addressed by RISK assessment (see Clauses 16 and 17).		P
101.2	Current measuring circuits		P
	Current measuring circuits are so designed that, when range changing takes place, there is no interruption which could cause a HAZARD.	(See appended Table 101.2)	P
	Current measuring circuits intended for connection to current transformers without internal protection are adequately protected to prevent a HAZARD arising from interruption of these circuits during operation.		N/A
101.3	Protection against mismatches of inputs and ranges		P
101.3.1	In NORMAL CONDITION and in cases of REASONABLY FORESEEABLE MISUSE, no HAZARD arises when the maximum RATED voltage or current of a measuring TERMINAL is applied to any other compatible TERMINAL, with any combination of function and range settings		P
	The equipment provides protection against these HAZARDS; one of the following techniques is used.		P

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Clause	Requirement - Test	Result - Remark	Verdict
	a)Use of a certified overcurrent protection device to interrupt short-circuit currents before a HAZARD arises; requirements of Clause 101.3.2 apply, or	Certified fuse as a protection device.	P
	b)Use an uncertified current limitation device, an impedance, or a combination of both to prevent the HAZARD from arising; requirements of 101.3.3 apply		N/A
101.3.2	Protection by a certified overcurrent protection device	(See appended Table 101.3.2)	P
	Overcurrent protection device certified by an independent laboratory meet all of the specified requirements		P
	a) The a.c. and d.c. RATED voltages of the overcurrent protection device is at least as high as, respectively, the highest a.c. and d.c. RATED voltages of any measuring TERMINAL on the equipment.		P
	b) The RATED time-current characteristic (speed) of the overcurrent protection device is such that no HAZARD will result from any possible combination of RATED input voltages, TERMINALS, and range selection		N/A
	c) The a.c. and d.c. RATED breaking capacities of the overcurrent protection device exceeds the possible a.c. and d.c. short-circuit currents.		N/A
	Additionally, spacings surrounding the overcurrent protection device in the equipment and following the protection device in the measuring circuit is sufficiently large to prevent arcing after the protection device opens.		P
101.3.3	Protection by uncertified current limitation devices or by impedances		N/A
	Devices used for current limitation are capable of safely withstanding, dissipating, or interrupting the energy that will be applied as a result of short-circuit current in the case of REASONABLY FORESEEABLE MISUSE.		N/A
	An impedance used for limitation of current is one or more of the following:		N/A
	a)An appropriate single component which is constructed, selected, and tested so that safety and reliability for protection against relevant HAZARDS is assured.		N/A
	1)the component RATED for the max voltage that may be present during the REASONABLY FORESEEABLE MISUSE event;		N/A



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Clause	Requirement - Test	Result - Remark	Verdict
	2)if a resistor, be RATED for twice the power dissipation that may result from the REASONABLY FORESEEABLE MISUSE event;		N/A
	3)meets the applicable CLEARANCE requirements of Annex K for REINFORCED INSULATION between its terminations of the combination of components.		N/A
	b)A combination of components		N/A
	1)which can withstand the maximum voltage that may be present during the REASONABLY FORESEEABLE MISUSE event,		N/A
	2)be able to dissipate the power that may result from the REASONABLY FORESEEABLE MISUSE event,		N/A
	3)meet the applicable CLEARANCE requirements of Annex K for REINFORCED INSULATION between the terminations of each component.		N/A
101.3.4	Test leads for the tests of 101.3.2 and 101.3.3		N/A
	a)length = 1 m;		N/A
	b)cross section of the conductor = 1,5 mm <sup>2</sup> , stranded copper wire;		N/A
	c)equipment connector compatible with the measuring circuit TERMINALS;		N/A
	d)connection to the test voltage source via bare wire into suitable screw TERMINALS or thimble connectors (twist-on wire connectors) or equivalent means of providing a low impedance connection;		N/A
	e)arranged as straight as possible.		N/A
	If the manufacturer-supplied test leads are permanently connected to the equipment, then the attached test leads supplied by the manufacturer were used without modification		N/A

<b>Annex K.3</b>	<b>Insulation in circuits not addressed in 6.7, K.1 or K.2, and in measuring circuits where MEASUREMENTS CATEGORIES do not apply</b>		N/A
K.101	<b>Insulation requirements for measuring circuits of MEASUREMENT CATEGORIES II, III, IV</b>		N/A
K.101.1	General		N/A
K.101.2	CLEARANCES		N/A
	For equipment intended to be powered from the circuit being measured, CLEARANCES of the MAINS CIRCUIT are designed according to the requirements of the RATED MEASUREMENT CATEGORIES		N/A
	Overvoltage limiting devices may be used to reduce the transients to a level consistent with a lower MEASUREMENT CATEGORIES (see K.102)		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	Additional marking requirements in 5.1.5.2 and 5.1.5.101		N/A
	CLEARANCES for MEASUREMENT CATEGORIES II, III, IV meet Table K.101		N/A
	Equipment rated to operate at an altitude greater than 2000 m, correction factor of Table K.1 of 61010-1 applied		N/A
	Voltage tests of 6.8.3.1 or 6.8.3.3 of 61010-1		N/A
K.101.3	CREEPAGE DISTANCES		N/A
	The requirements of K.2.3 of 61010-1 applied		N/A
K.101.4	Solid insulation		N/A
K.101.4.1	General		N/A
	Solid insulation withstands the electrical and mechanical stresses that may occur in NORMAL USE in all RATED environmental conditions (see 1.4) during the intended life of the equipment		N/A
	Solid insulation also meets the following requirements as applicable		N/A
	a) solid insulation used as an ENCLOSURE or PROTECTIVE BARRIER, the requirements of Clause 8		N/A
	b) moulded parts, the requirements of K.101.4.2		N/A
	c) inner layers of printed wiring boards, the requirements of K.101.4.3		N/A
	d) thin-film insulations, the requirements of K.101.4.4		N/A
K.101.4.2	Moulded and potted parts		N/A
	Conductors located between same two layers moulded together are separated by at least the value of Table K.9 of 61010-1		N/A
K.101.4.3	Inner insulating layers of printed wiring boards		N/A
	Conductors located between same two layers are separated by at least the applicable minimum distances of Table K.9 of 61010-1		N/A
	REINFORCED INSULATION have adequate electric strength; one of the following methods are used:		N/A
	a) thickness at least the value of Table K.9 of 61010-1		N/A
	b) insulation is assembled from at least two separate layers, each RATED for test voltage of Table K.102 to K.104 for BASIC INSULATION		N/A

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Clause	Requirement - Test	Result - Remark	Verdict
	c) insulation is assembled from at least two separate layers, where the combination is RATED for test voltage of Table K.102 to K.104 for REINFORCED INSULATION		N/A
K.101.4.4	Thin-film insulation		N/A
	Conductors between same layers are separated by at least the applicable CLEARANCES and CREEPAGE DISTANCE of K.101.2 and K.101.3		N/A
	REINFORECD INSULATION have adequate electric strength; one of the following methods are used:		N/A
	a) thickness at least the value of Table K.9 of 61010-1		N/A
	b) insulation consists of at least two separate layers, each RATED for test voltage of Table K.102 to Table K.104 for BASIC INSULATION		N/A
	c) insulation consists of at least three separate layers, where the combination of two layers passed voltage tests of Table K.102 to K.104 for REINFORCED INSULATION		N/A
	Voltage tests of 6.8.3.1 of 61010-1		N/A
K.102	<b>Reduction of MEASUREMENT CATEGORIES by the use of overvoltage limiting devices</b>		N/A
	If the overvoltage limiting device or circuit is intended to reduce TRANSIENT OVERVOLTAGES, a RISK ASSESSMENT (see Clause 17) is performed taking into account both of the followings		N/A
	a) the circuit reduces TRANSIENT OVERVOLTAGES to the lower MEASUREMENT CATEGORY under SINGLE FAULT CONDITIONS		N/A
	b) the circuit operates as intended even after withstanding repeated TRANSIENT OVERVOLTAGES		N/A

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

<b>6.6.101</b>	<b>TABLE: CLEARANCES and CREEPAGE distances for measuring circuit terminals with HAZADUS LIVE conductive parts</b>				N/A
Location/ Terminal/Rated Voltage (ac or dc)	Required		Measured		Location/ Terminal CLEARANCE mm
	CREEPAGE DISTANCE	CLEARANCE	CREEPAGE DISTANCE	CREEPAGE DISTANCE	
	mm	mm	mm	mm	
Live parts to enclosure	--	--	>12.0	>12.0	--
Live parts to hand-held part	--	--	>12.0	>12.0	--
Live parts to barrier	--	--	>12.0	>12.0	--
Live parts to iron core to jaw surface	--	--	>10.0	>10.0	--
Two sides of jaws	--	--	>10.0	>10.0	--
V1/V2/V3 to COM	--	--	>10.0	>10.0	--
Two terminals of fuse	--	--	>10.0	>10.0	--
Supplementary information:					

<b>6.6.102 (6.3.1)</b>	<b>TABLE: Values in NORMAL CONDITION</b>					P
Accessible parts	Voltage r.m.s./peak/d.c. (V)	Current (mA)	Capacitance			Comments
		Test circuit A1/A2/A3	r.m.s. or peak or d.c.	μC or mJ		

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Clause	Requirement - Test	Result - Remark	Verdict

<b>6.6.102 (6.3.1)</b>	<b>TABLE: Values in NORMAL CONDITION</b>					P
	Voltage r.m.s./peak/d.c. (V)	Current (mA)	Capacitance			
Enclosure to refer earth for MS2203	12.08	A1	--	--	--	
Enclosure to refer earth for MS2205	39.8	A1	--	--	--	
Supplementary information:						

<b>6.6.102 (6.3.2)</b>		<b>TABLE: Values in SINGLE FAULT CONDITION</b>					P	
Accessible parts	Subclause/ Fault No.	Voltage r.m.s./ peak/d.c. (V).	Transient		Current; (mA)		Capacitance ( $\mu$ F)	Comments
			(V)	(s)	Test circuit A1/A2/A3	r.m.s. or peak or d.c.		
Enclosure to refer earth for MS2203	--	33.14	--	--	A1	--	--	
Enclosure to refer earth for MS2205	--	52.9	--	--	A1	--	--	
NOTE - Required values are determined by calculation for Reinforce Insulation. Transients are not taken into account.								
Supplementary information:								
Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.								

<b>6.9.101</b>	<b>TABLE: Over range indication test</b>			<b>N/A</b>
Measuring Terminal	Applied Voltage (V)	Contents of Display	Verdict	Comments
Supplementary information:				

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Clause	Requirement - Test	Result - Remark	Verdict
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14.101	<b>TABLE: Transient overvoltage limiting devices</b>								N/A
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Component / Designation	Overvoltage Category	MAINS voltage V rms	Test voltage V	$t_m$ °C	$t_c$ °C	$t_{max}$ °C	Rupture Yes / No	Circuit breaker tripped	Comments

Test room ambient temperature ..... °C

NOTE -  $t_m$  = measured temperature  
 $t_c$  =  $t_m$  corrected ( $t_m - t_a + 40$  °C or max. RATED)  
 $t_{max}$  = 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

Supplementary information:

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Clause	Requirement - Test	Result - Remark	Verdict

<b>101.2</b>	<b>TABLE: Current measuring circuits - Current transformers</b>			N/A
Type/Model	RATED current (A)	Test current (A)	Interrupt Yes / No	Result / Comments
NOTE - These tests are performed with all types and models of current transformers without internal protection, and which are specified by the manufacturer for use with the equipment				
Supplementary information:				

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

<b>101.3.2</b>	<b>TABLE: Certified overcurrent protection device test</b>				N/A	
Type / Model / Terminal	Max. rated Voltage (V)	Test Voltage (V)	Test leads		Verdict	Comments
			Mfr.	Std.		
NOTE 1: Test voltage = 2 times max. rated Voltage for 1 min.						
NOTE 2: Mfr – Manufacturer supplied leads						
Std. – Leads as described in 101.3.4						
Supplementary information:						

<b>101.3.3</b>	<b>TABLE: Uncertified overcurrent protection device test</b>				N/A		
Type / Mfr. / Model / Terminal	Max. rated Voltage (V)	Test Voltage (V)	Test current (A peak)	Test leads		Verdict	Comments
				Mfr.	Std.		
NOTE 1 - Test was conducted 3 times.							
NOTE 2 - Any damage to a device used for current limitation was ignored when other parts of the equipment were not affected during the test.							
NOTE 3 - Mfr – Manufacturer supplied leads							
Std. – Leads as described in 101.3.4							
NOTE 4 - Note current limit devices manufacture, type and ratings.							
Supplementary information:							

<b>TEST REPORT</b> <b>EN 61010-2-032</b> <b>Safety requirements for electrical equipment for measurement,</b> <b>control, and laboratory</b> <b>Part 2-032: Particular requirements for HAND-HELD and</b> <b>HAND-MANIPULATED CURRENT SENSORS for electrical test and measurement</b>	
<b>Testing laboratory</b>	
Name	LiTest Technology Service Co., Ltd
Address	FuKang Road, HouJie Town, DongGuan City, Guangdong Province
Testing location	LiTest Technology Service Co., Ltd
Address	No.42 FuKang Road, Houjie Town, Dongguan City, Guangdong, China
Tel: +86-769-82272566/7; Fax: +86-769-82272565; Web: www.litest.cn; Email: service@litest.cn	
<b>Client</b>	
Name	Shenzhen New Huayi Instrument Co., Ltd
Address	F3, Block 2, Instrument World Industrial Park, Guiyue Road, Longhua New District, Shenzhen City
<b>Test specification</b>	
Standard	EN61010-2-032:2012
Test procedure	CE Marking serial in LVD
Non-standard test method	N/A.
<b>Test Report Form No.....:</b>	IEC61010_2_032C
TRF Originator.....:	VDE Testing and Certification Institute
Master TRF.....:	2013-07
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<b>Test item</b>	
Description	DIGITAL POWER CLAMP METER
Manufacturer	Shenzhen New Huayi Instrument Co., Ltd
Address	F3, Block 2, Instrument World Industrial Park, Guiyue Road, Longhua New District, Shenzhen City
Trademark	PEAKMETER
Model and/or type reference	MS2203,MS2205
Rating(s)	4x1.5Vdc AA battery 1000V CAT III, Max.1000A, class II



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Clause	Requirement - Test	Result - Remark	Verdict

<b>4.4</b>	<b>TESTING IN SINGLE FAULT CONDITIONS</b>		P
4.4.2.8	Outputs of CURRENT SENSORS were short-circuited or open-circuited, one at a time		P

<b>5</b>	<b>MARKING AND DOCUMENTATION</b>		P
5.1.2	Identification		—
5.1.2 aa)	If designed for specific equipment it is clearly indicated or	For general use	N/A
	If information only in documentation, marked with symbol 14	Noted as above	N/A
5.1.2 bb)	Type A CURRENT SENSOR marked with symbol 102	Type A	P
5.1.2 cc)	Type B and C CURRENT SENSORS marked with symbol 101 of table 1.		N/A
5.1.2 dd)	Type D CURRENT SENSORS marked with symbol 101, additional marking see 5.1.5.102		N/A
	The marking above is adjacent to JAWS or any CAT marking of JAWS		N/A
5.1.5	TERMINALS, connections and operating devices		P
5.1.5.101	Measuring circuit TERMINALS		P
5.1.5.101.1	General		P
	a) RATED voltage to earth of measuring circuit TERMINALS.....:	600V CAT III	P
	b) RATED voltage or current as applicable, of each pair or set of measuring circuit TERMINALS that are intended to be used together.....:		N/A
	c) pertinent MEASUREMENT CATEGORY for each individual, pair, or set of measuring circuit TERMINALS or symbol 14.....:		N/A
5.1.5.101.2	Relevant MEASUREMENT CATEGORY.....:		N/A
5.1.5.101.3	Marked with symbol 14		P
5.1.5.101.4	Measuring circuit TERMINALS do not need to be marked if:		—
	a) they are intended to be permanently connected and not ACCESSIBLE, or		N/A
	b) they are dedicated only for connection to specific TERMINALS of other equipment, or		N/A
	c) it is obvious from other indications that the RATED voltage is below the levels of 6.3.1		N/A
5.1.5.102	Marked with the value of the RATED voltage to earth of the JAWS.....:		N/A

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Clause	Requirement - Test	Result - Remark	Verdict

	Marked to indicate that the current sensor must not be used on UNINSULATED conductors, or with symbol 14.....:		P
	Marked with the relevant MEASUREMENT CATEGORY adjacent to the voltage to earth marking.....:		P
	JAWS and output circuit TERMINALS of Type D current sensors not marked with any MEASUREMENT CATEGORY		N/A
	Marked with the value of the RATED current.....:		N/A
	The nature of the current marked unless the marked value applies to both a.c. and d.c. current.:		P
5.4.2	Equipment RATINGS		P
5.4.2 aa)	Information about each relevant MEASUREMENT CATEGORY	CAT III	P
5.4.2 bb)	Warning not to use the current sensor for measurements on MAINS CIRCUITS		P
	Detailed RATING including TRANSIENT OVERVOLTAGES		P
	Documentation clearly identified the MEASUREMENT CATEGORIES where the current sensor is intended to be used and where it must not be used		P
5.4.3	Equipment installation		N/A
5.4.3 aa)	For measuring circuit TERMINALS intended for permanent connection and RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the MEASUREMENT CATEGORY:		—
	RATED voltages.....:		N/A
	RATED currents.....:		N/A
5.4.3 bb)	For measuring circuit TERMINALS intended for permanent connection and that are not RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the RATED voltages:		—
	RATED voltages.....:		N/A
	RATED currents.....:		N/A
	RATED TRANSIENT OVERVOLTAGES.....:		N/A
5.4.4	Equipment operation		P
	a) Identification and description of operating controls and their use		P
	b) Clear identification of specific model of equipment to be connected to		P
	c) Limits of intermittent operation		N/A
	d) Specifications of limits of the current versus the frequency		P
	e) Explanations of symbols related to safety		P

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Clause	Requirement - Test	Result - Remark	Verdict

	f) Instructions for interconnection to accessories and other equipment		P
	g) Instructions for replacement of consumable materials		P
	h) Instructions for cleaning and decontamination		N/A
	i) Instructions for the application and removal of the .....current sensor		P
	j) Type B current sensors: Instructions to de-energise the installation on which the current is measured		P
	Instructions to adopt safe operating procedures when working on HAZARDOUS LIVE installations		P
	k) Type C current sensors: Instructions to de-energise the installation on which the current is measured		N/A
	l) Instructions about the function of the tactile indicator or PROTECTIVE BARRIER		N/A
	Limit of safe access of the HAND-HELD part		P
	m) Warning to the OPERATOR that Type D current sensors are only for use around insulated conductors or limited energy circuit conductors		N/A
	n) Warning to the OPERATOR that individual protective equipment were used		P
	o) Warning to the OPERATOR not to use a flexible current sensor if the wear indicator of the flexible cord used for the JAW of the flexible current sensor is visible		P
	p) Warning to the OPERATOR not to use a current sensor if the wear indicator in the JAW END is visible		P
	q) Warning to the OPERATOR not to use a current sensor above its RATED frequency		P
	Statement if the current sensor is used in a manner not specified by the manufacturer, the protection provided by the current sensor may be impaired.		P

<b>6</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		P
6.1.2	Exceptions		P
6.1.2 aa)	Conductive parts of a JAW END, provided that they meet the requirements of 6.9.101		P
6.6	Connections to external circuits		P
6.6.101	Measuring circuit TERMINALS		P
	CLEARANCE and CREEPAGE DISTANCE	(see Form A.14 and A.15)	P

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Clause	Requirement - Test	Result - Remark	Verdict
6.6.102	Specialized measuring circuit TERMINALS		N/A
	Levels of 6.3.1 and 6.3.2 were not exceeded when each of the following voltages was applied to each other measuring circuit TERMINAL, if applicable:	(see Form A.5 and A.6)	—
	a) Highest RATED a.c. voltage at any RATED MAINS frequency		N/A
	b) Highest RATED d.c. voltage		N/A
	c) Highest RATED a.c. voltage at the maximum RATED measurement frequency		N/A
6.7.1.5	Requirements for insulation according to type of circuit		P
	Additional items specified as follows:		—
	e) 6) The circuit is a measuring circuit where MEASUREMENT CATEGORIES do not apply		P
	aa) In K.101 for measuring circuits of MEASUREMENT CATEGORIES II, III and IV		—
6.9	Constructional requirements for protection against electric shock		P
6.9.101	Insulation requirements for JAWS and JAWS ENDS		P
6.9.101.1	Pre-treatment of the JAWS ENDS		P
	Tests performed after pre-treatment only for Type A and Type B CURRENT SENSORS		P
6.9.101.2	Protection against touching the HAZARDOUS LIVE conductor		P
	Type A CURRENT SENSORS have barrier or tactile indicator	Have barrier	P
	Cover at least 50% of the perimeter	Full perimeter covered	P
	Extend along two opposite sides		P
	CLEARANCE and CREEPAGE meet the requirements for DOUBLE or REINFORCED INSULATION	(see Form A.14 and A.15)	P
6.9.101.3	HAND-HELD or hand-manipulated parts		P
	Parts of type A CURRENT SENSORS separated by DOUBLE or REINFORCED INSULATION from:	(see Form A.14, A.15 and Form A.18)	—
	- ACCESSIBLE CONDUCTIVE PART OF magnetic circuit	(see Form A.4 )	N/A
6.9.101.4	Insulation of a flexible CURRENT SENSOR		N/A
	Provided with wear indicator		N/A
	DOUBLE or REINFORCED INSULATION when new		N/A
	At least BASIC INSULATION when reached the wear indicator	(see Form A.14 and A.15)	N/A
	Contrasting colour exhibit when limit of wear reached		N/A

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Clause	Requirement - Test	Result - Remark	Verdict

	If not provided with wear indicator, DOUBLE or REINFORCED INSULATION provided after typical lifetime wear	(see Form A.14, A.15 and Form A.18)	N/A
	Treatment used .....		N/A
6.9.101.5	Pull test for endcaps of flexible current sensors		N/A
	Force used .....		N/A
	Displacement measured .....		N/A
	Repeated test, if applicable.....		N/A
	After the last pull:		—N/A
	a) Insulation have not moved more than 1 mm		N/A
	b) CLEARANCE and CREEPAGE not have been reduced below the limits of K.101 for REINFORCED INSULATION	(see Form A.14 and A.15)	N/A
	c) Dielectric strength test acc. to K.101.4 for REINFORCED INSULATION	(see Form A.18)	N/A
6.9.102	Input measuring circuit leads		P
	Input measuring circuit leads and their accessories meet the requirements of IEC 61010-031, if applicable		P
6.9.103	Output circuit leads		N/A
	The output circuit leads of current sensors had REINFORCED INSULATION between their outer surfaces and their conductors		N/A
	The mated connectors and TERMINALS located at the current sensor ENCLOSURE body had REINFORCED INSULATION between their outer surfaces and their conductors		N/A
	CLEARANCE and CREEPAGE distances	(see Form A.14 and A.15)	N/A
	Dielectric strength test acc. to K.101.4 for solid insulation	(see Form A.18)	N/A

<b>8</b>	<b>RESISTANCE TO MECHANICAL STRESSES</b>		P
8.1	General		P
8.1.101	Type A current sensors RATED for MEASUREMENT CATEGORIES III and IV, passed the impact test of 8.2.101	(see Form A.14 and A.16)	P
8.2	ENCLOSURE rigidity tests		P
8.2.101	JAW impact test		P
	Test method used .....		P
	Dielectric strength test acc. to 6.8 without humidity preconditioning	(see Form A.18)	P
<b>10</b>	<b>EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT</b>		P

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Clause	Requirement - Test	Result - Remark	Verdict
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10.5	Resistance to heat		P
10.5.101	Resistance to heat of current sensors	(see Form A.28)	P
	Insulating material of JAWS surrounding a magnetic material which can overheat, have adequate resistance to heat		P
	Examination of material data, or one of following tests performed:		—
	a) Heating cabinet temperature.....:	70°C for enclosure 125°C for PCB	P
	Diameter of the impression .....	1.2 mm for enclosure 0.6mm for PCB	P
	b) The Vicat softening test of ISO 306, method A120		N/A
	The Vicat softening temperature.....:		N/A
10.101	Other temperatures of current sensors		N/A
	Easily touched surfaces did not exceed the values of Table 19	(see Form A.26A)	N/A
	Temperature of the insulating material of windings did not exceed the values of Table 20	(see Form A.26A and/or Form A.26B)	N/A
	Measured maximum current .....		N/A
	At frequency .....		N/A

<b>14</b>	<b>COMPONENTS AND SUBASSEMBLIES</b>		N/A
14.101	Circuits or components used as TRANSIENT OVERVOLTAGE limiting devices in measuring circuits used to measure MAINS		N/A
	TRANSIENT OVERVOLTAGE limiting device used		N/A
	Impulse voltage .....		N/A
	Resistance added to increase the impedance .....		N/A
	Test impulse applied in combination with the MAINS voltage		N/A
	No HAZARD arose in the event that the component ruptured or overheated		N/A
	CLEARANCE and CREEPAGE not have been reduced below the limits of K.101	(see Form A.14 and A.15)	N/A
	Dielectric strength test acc. to K.101.4	(see Form A.18)	N/A
	Other material did not heat up to their self-ignition points		N/A
	Circuit breaker of the MAINS installation did not trip		N/A

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Clause	Requirement - Test	Result - Remark	Verdict

<b>16</b>	<b>HAZARDS RESULTING FROM APPLICATION</b>		P
16.101	Reliance on the displayed value		P
16.101.1	Over-range indication		P
	Unambiguous indication is given whenever the value is above the maximum positive value or below the minimum negative value of the range to which the equipment is set		P
16.101.2	Low battery indication		P
	No HAZARD arose from an OPERATORS'S reliance on a value displayed by the current sensor, at every battery voltage or energy level		P

<b>101</b>	<b>MEASURING CIRCUITS</b>		P
101.1	General		P
	The equipment provides protection against HAZARDS resulting from normal use and REASONABLY FORESEEABLE MISUSE of measuring circuits, as specified:		—
	a) Current measuring circuit did not interrupt the circuit being measured during range changing		P
	During the use of current sensors with an internal current transformer		P
	b) Electrical quantity within specification for any TERMINAL did not cause a HAZARD when it was applied to that TERMINAL or any other compatible TERMINAL, with the range and function settings set in any possible manner		P
	c) Any interconnection between the equipment and other devices or accessories did not cause a HAZARD while the equipment is used for measurement purposes		P
	d) TEMPORARY OVERVOLTAGE or TRANSIENT OVERVOLTAGE applied on the measuring circuits TERMINALS in voltage measurement function did not cause a HAZARD		N/A
	e) Other HAZARDS that could result from REASONABLY FORESEEABLE MISUSE were addressed by RISK assessment		N/A
101.2	Current sensor with an internal current transformer		P
	Any voltage above the levels of 6.3.2 was not ACCESSIBLE in an open circuit condition of the output circuit	(see Form A.6 and A.44)	P
101.3	Protection against mismatches of inputs and ranges		N/A
101.3.1	General		N/A

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Clause	Requirement - Test	Result - Remark	Verdict

	In NORMAL CONDITION and for REASONABLY FORESEEABLE MISUSE NO HAZARD occurred when the highest RATED voltage or current of a measuring circuit TERMINAL is applied to any other compatible TERMINAL, with any combination of function and range settings		N/A
	TERMINALS are clearly marked and will not retain the connectors of probe or accessory do not to be tested		—
	The equipment must provide protection against these HAZARDS. One of the following techniques was used.		N/A
	a) certified overcurrent protection device to interrupt short-circuit currents before a HAZARD arise used		N/A
	tests and requirements of 101.3.2 applied.		N/A
	b) uncertified current limitation device, an impedance or a combination of both used		N/A
	tests of 101.3.3 applied.		N/A
101.3.2	Protection by a certified overcurrent protection device		N/A
	Certified overcurrent protection device used .....		N/A
	Overcurrent protection device suitable if it is certified by an independent laboratory to meet all of the following requirements:		—
	a) The a.c. and d.c. RATED voltages of the overcurrent protection device were at least as high as, respectively, the highest a.c. and d.c. RATED voltages of any measuring circuit TERMINAL on the equipment.....:		N/A
	b) The RATED time-current characteristic (speed) of the overcurrent protection device was such that no HAZARD will result from any possible combination of RATED input voltages, TERMINALS, and range selection.....:		N/A
	c) The a.c. and d.c. RATED breaking capacities of the overcurrent protection device exceed, respectively, the possible a.c. and d.c. short-circuit currents.....:		N/A
	The possible a.c. short-circuit current need not exceed the applicable value of Table AA.1 .....		N/A
	Spacings surrounding the overcurrent protection device in the equipment and following the protection device in the measuring circuit were sufficiently large to prevent arcing after the protection device opens.		N/A
	No damage to the equipment occurred during and after the test		N/A



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Clause	Requirement - Test	Result - Remark	Verdict
101.3.3	Protection by uncertified current limitation devices or by impedances		N/A
	Uncertified overcurrent protection device used.....:		N/A
	Impedance used for limitation of current by one or more of the following:		—
	a) An appropriate single component which is constructed, selected, and tested so that safety and reliability for protection against relevant HAZARDS is assured:		N/A
	1) RATED for the maximum voltage that may be present during the REASONABLY FORESEEABLE MISUSE event;		N/A
	2) A resistor, be RATED for twice the power or energy dissipation that may result from the REASONABLY FORESEEABLE MISUSE event;		N/A
	3) Applicable CLEARANCE and CREEPAGE requirements of Annex K for REINFORCED INSULATION between its terminations	(see Form A.14 and A.15)	N/A
	b) A combination of components which:		—
	1) Withstand the maximum voltage that may be present during the REASONABLY FORESEEABLE MISUSE event;		N/A
	2) Able to dissipate the power or energy that may ..... result from the REASONABLY FORESEEABLE MISUSE event;		N/A
	3) meet the applicable CLEARANCE and CREEPAGE requirements of Annex K for REINFORCED INSULATION between the terminations of the combination of components	(see Form A.14 and A.15)	N/A
	No HAZARD occurred during and after the test		N/A
	No evidence of fire, arcing, explosion or damage to impedance limitation devices or any component intended to provide protection against electric shock, heat, arc or fire, including the ENCLOSURE and traces on the printed wiring board, during and after the test		N/A
	The source voltage did not decrease by more than 20 % for more than 10 ms		N/A
101.3.4	Test leads for the tests of 101.3.2 and 101.3.3		N/A
	Test of 101.3.2 and 101.3.3 were performed with tests leads which were included with the equipment and were repeated with tests leads that meet the following specifications:		N/A
	a) Length = 1 m;		N/A
	b) Cross section of the conductor = 1.5 mm <sup>2</sup> , stranded copper wire;		N/A

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Clause	Requirement - Test	Result - Remark	Verdict

	c) Equipment connector compatible with the measuring circuit TERMINALS;		N/A
	d) Connection to the test voltage source via bare wire into suitable screw TERMINALS or		N/A
	Thimble connectors (twist-on wire connectors) or		N/A
	Equivalent means of providing a low impedance connection;		N/A
	e) arranged as straight as possible		N/A
	If the manufacturer supplied test leads which permanently connected, then the leads shall be used without modification		—
101.4	Protection against MAINS overvoltages		N/A
	TEMPORARY OVERVOLTAGE or TRANSIENT OVERVOLTAGE applied to mains voltage measuring circuits in voltage measurement function in proper range. No damage and HAZARD occurred.		N/A
	MAINS voltage measuring circuits had a minimum of BASIC INSULATION between MAINS connected conductive parts of opposite polarity.....:	(see Form A.14 and A.15)	N/A
	Passed the impulse withstand voltage test of 101.4	(see Form A.18)	N/A
	or		—
	Passed the impulse withstand voltage test of 14.101	(see Form A.18)	N/A

<b>102</b>	<b>PREVENTION OF HAZARD FROM ARC FLASH AND SHORT-CIRCUITS</b>		N/A
102.1	General		N/A
	The current sensor was constructed to mitigate the RISK of arc flash and short-circuits		N/A
	Tests conducted after the pre-treatment of the JAW ENDS specified in 6.9.101.1		N/A
102.2	Protection against short-circuits during clamping	(see Form A.45)	N/A
	Type A and Type B current sensors have additional protection against short circuit caused by JAWS		N/A
102.3	Protection against short-circuits in closed position		N/A
	Passed the test of K.101.4	(see Form A.18)	N/A
	JAW ENDS were not ACCESSIBLE in closed position in accordance with 6.2		N/A
	JAW ENDS of Type A, B and C current sensors have basic insulation between outer surface of JAW ENCLOSURE and all conductive parts		N/A
<b>ANNEX F</b>	<b>ROUTINE TESTS</b>		N/A
	Manufacturer 's declaration		N/A

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Clause	Requirement - Test	Result - Remark	Verdict

4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results			Form A.1.	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
For MS2203					
4.4.4	1	s-c D10	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	2	s-c D13	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	3	s-c the secondary winding of transformer	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	4	s-c C54	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	5	s-c R96	00:10:00	Normal work, no hazards.	Yes
4.4.4	6	s-c RT2	00:10:00	Normal work, no hazards.	Yes
4.4.4	7	s-c C52	00:00:01	Fuse open immediately, no hazards.	Yes
4.4.4	8	s-c Q4(c-e)	00:10:00	Unit shut down, no hazards.	Yes
4.4.4	9	s-c Q4(b-e)	00:10:00	Normal work, no hazards.	Yes
4.4.4	10	s-c R76	00:10:00	Unit shut sown, no hazards.	Yes
4.4.4	11	Battery short circuit	00:30:00	The appliance has no display and can't work, no hazards.	Yes
4.4.4	12	Battery reverse	00:30:00	The appliance has no display and can't work, no hazards.	Yes
For MS2205					
4.4.4	13	s-c TP1/TP2/TP3	00:10:00	Normal work, no hazards.	Yes
4.4.4	14	s-c C2	00:10:00	Normal work, no hazards.	Yes
4.4.4	15	s-c D59	00:10:00	Normal work, no hazards.	Yes
4.4.4	16	Battery short circuit	00:30:00	The appliance has no display and can't work, no hazards.	Yes
4.4.4	17	Battery reverse	00:30:00	The appliance has no display and can't work, no hazards.	Yes

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Clause	Requirement - Test	Result - Remark	Verdict

4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results			Form A.1.	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
NOTE Td = Test duration in hh:mm:ss Record dielectric strength test on Form A.19 and temperature tests on Form A.27A and or A.27.B. Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.					
Supplementary information:          					

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Clause	Requirement - Test	Result - Remark	Verdict
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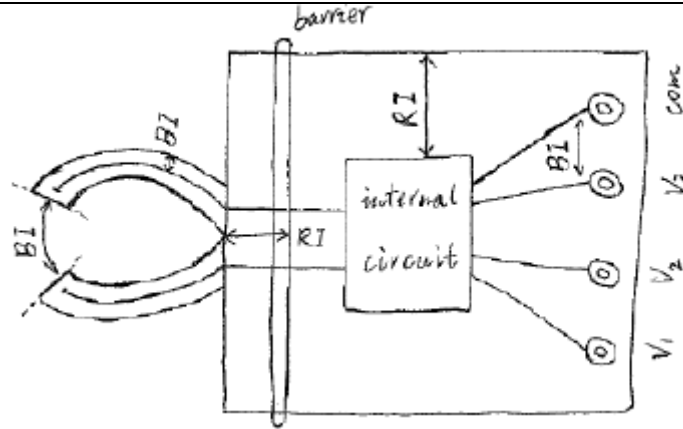
6	TABLE: Values in NORMAL CONDITION											Form A.5	P
6.1.2	Exceptions												—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)												—
6.6.102	Specialized measuring circuit TERMINALS												—
Item	Voltage			Current				Capacitance		10 s / 5 s test (NOTE)			Comments
(see Form A.4)	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μC	mJ	V	μC	mJ	Supply voltage:
Enclosure to refer earth for MS2203	8.54	12.08	--	--	--	--	--	--	--	--	--	--	--
Enclosure to refer earth for MS2205	28.9	39.8	--	--	--	--	--	--	--	--	--	--	--
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:													

6.	TABLE: Values in SINGLE FAULT CONDITION											Form A.6	P
6.3.2	Values in SINGLE FAULT CONDITION												—
6.6.102	Specialized measuring circuit TERMINALS												—
101.2	Current sensor with an internal current transformer												—
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)	Supply voltage: -	
Enclosure to refer earth for MS2203	see Form A.1	25.6	33.14	--	--	--	--	--	--	--	--	--	
Enclosure to refer earth for MS2205	see Form A.1	40.8	52.9	--	--	--	--	--	--	--	--	--	
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:													

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Clause	Requirement - Test	Result - Remark	Verdict
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6. **TABLE: Insulation requirements- Block diagram of system** Form P



Pollution degree ..... : II Measurement (overvoltage) category ..... : III

Area	Location	Insulation type (NOTE 1)	WORKING VOLTAGE			Test voltage (NOTE 2) V	Comments (NOTE 3)
			RMS V	Peak V	Frequency kHz		
A	Live parts to enclosure	RI	--	1000Vac	50/60	7400	--
B	Live parts to hand-held part	RI	--	1000Vac	50/60	7400	--
C	Live parts to barrier	RI	--	1000Vac	50/60	7400	--
D	Live parts to iron core to jaw surface	BI	--	1000Vac	50/60	4260	--
E	Two sides of jaws	BI	--	1000Vac	50/60	4260	--
F	V1/V2/V3 to COM	BI	--	1000Vac	50/60	4260	--
G	Two terminals of fuse	BI	--	1000Vac	50/60	4260	--

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:

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Clause	Requirement - Test	Result - Remark	Verdict
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<b>6.7</b>	<b>TABLE: Insulation requirements- Clearances and Creepages</b>	<b>Form A.15</b>	<b>P</b>
6.6.101	Measuring circuit TERMINALS		—
6.6.102	Specialized measuring circuit TERMINALS		—

Area	Location	Insulation type	WORKING VOLTAGE (NOTE 2)			Clearance		Creepage		CTI	Verdict	Comments
			RMS V	Peak V	Frequency kHz	Required mm	Measured mm	Required mm	Measured mm			
	(See Form A.14)	(NOTE 1)	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
A	Live parts to enclosure	RI	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
B	Live parts to hand-held part	RI	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
C	Live parts to barrier	RI	--	1000Vac	50/60	--	>12.0	--	>12.0	--	P	--
D	Live parts to iron core to jaw surface	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--
E	Two sides of jaws	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--
F	V1/V2/V3 to COM	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--
G	Two terminals of fuse	BI	--	1000Vac	50/60	--	>10.0	--	>10.0	--	P	--

NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram (see Form A.14)

NOTE 2 - to be used for definition of required insulation (see Form A.14)

Input supply voltage.....:	V	Hz
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Supplementary information:



6.7		TABLE: Insulation requirements- Clearances and Creepages									Form A.16	P
6.9.101		Insulation requirements for jaws and JAWS ENDS										—
8		Resistance to mechanical stresses										—
Area	Location (See Form A.14)	Insulation type	Mechanical tests (NOTE)					Test at max. RATED ambient (10.5)	Measured after test (if required)		Verdict	Comments
			Applied force N	Rigidity (8.2)		Drop (8.3)			CREEPAGE DISTANCE mm	CLEARANCE mm		
				Static	Impact	Normal	Hand-held/ Plug-in					
A	Live parts to enclosure	RI	30N	P	P		P	40°C	>12.0	>12.0	P	--
B	Live parts to hand-held part	RI	30N	P	P		P	40°C	>12.0	>12.0	P	--
C	Live parts to barrier	RI	30N	P	P		P	40°C	>12.0	>12.0	P	--
D	Live parts to iron core to jaw surface	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
E	Two sides of jaws	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
F	V1/V2/V3 to COM	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
G	Two terminals of fuse	BI	30N	P	P		P	40°C	>10.0	>10.0	P	--
NOTE – Refer to Form A.19 for dielectric strength tests following the above tests.												
Supplementary information:												

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Clause	Requirement – Test	Result - Remark	Verdict

<b>6.8</b>	<b>TABLE: Dielectric strength tests</b>	<b>Form A.18</b>	N/A
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS <sup>1</sup>		
6.9.101.2	Protection against touching the HAZARDOUS LIVE conductor		
6.9.101.3	HAND-HELD or hand-manipulated parts		
6.9.101.4	Insulation of a flexible CURRENT SENSOR		
6.9.101.5	Pull test for endcaps of flexible CURRENT SENSORS		
6.9.103	Output circuit leads		
8.2.101	JAW impact test		
101.4	Protection against MAINS overvoltages		
14.101	TRANSIENT OVERVOLTAGE limiting devices		
102.3	HAZARD FROM ARC FLASH AND SHORT-CIRCUITS		

<sup>1</sup> Record the fault, test or treatment applied before the dielectric strength test

Test site altitude .....	m	—
Test voltage correction factor (see Table 10).....		—

Location or references from Forms A.1 and A.14	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/ d.c.	Comments (NOTE)	Verdict

<sup>1</sup> Record the fault, test or treatment applied before the dielectric strength test. <sup>2</sup> Humidity preconditioning required.

NOTE: Test duration may be recorded.

Supplementary information:

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Clause	Requirement – Test	Result - Remark	Verdict
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<b>10.</b>	<b>TABLE : Temperature Measurements</b>	<b>Form A.26A</b>	<b>P</b>
10.101	Surface temperature limits - NORMAL CONDITION and / or SINGLE FAULT CONDITION		
10.101	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION		
10.101	Other temperature measurements		

Operating conditions:

Frequency.....:	-- Hz	Test room ambient temperature (ta)....:	25 °C
Voltage .....	-- V	Test duration.....:	2 h 45 min

Part / Location	$t_m$ °C	$t_c$ °C	$t_{max}$ °C	Verdic t	Comments
For MS2203					
Enclosure (front)	26.5	41.5	85	P	--
Enclosure (rear)	26.4	41.4	85	P	--
LCD display	25.9	40.9	85	P	--
Hand-held part	27.3	42.3	70	P	--
Key	27.4	42.4	85	P	--
PCB	31.4	46.4	130	P	--
Internal wire	32.5	47.5	105	P	--
C54	28.6	43.6	105	P	--
RC1	27.9	42.9	85	P	--
Transformer winding	31.8	46.8	110	P	--
Transformer bobbin	30.9	45.9	130	P	--
Ambient	25.0	40.0	--	--	--

For MS2205 Test duration 2h 30min

Enclosure (front)	26.1	41.1	85	P	--
Enclosure (rear)	26.3	41.3	85	P	--
LCD display	25.5	40.5	85	P	--
Hand-held part	27.6	42.6	70	P	--
Key	27.8	42.8	85	P	--
PCB	30.8	45.8	130	P	--
Ambient	25.0	40.0	--	--	--

 NOTE 1 -  $t_m$  = measured temperature

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

 $t_{max}$  = maximum permitted temperature

NOTE 2 - see also 14.1 with reference to component operating conditions

NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary

NOTE 4 - see Form A.26B for details of winding temperature measurements



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Clause	Requirement – Test	Result - Remark	Verdict

<b>10.</b>	<b>TABLE: Temperature of windings Resistance method Temperature Measurements</b>					<b>Form A.26B</b>	N/A
10.101	WINDING TEMPERATURES AT CURRENT SENSORS						
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	tr K	tc °C	tmax °C	Verdict Comments
Supplementary information:							

<b>10.5</b>	<b>TABLE: Resistance to heat</b>					<b>Form A.28</b>	N/A
10.5.101a)	Resistance to heat of current sensors						
	Max. allowed impression diameter .....				2 mm	—	
Part	Test temperature °C			Impression Diameter (mm)		Verdict	
Enclosure	70			0.6		P	
PCB	125			0.5		P	
Supplementary information:							

10.5.101b)	<b>Vicat softening test (ISO 306)</b>					<b>Form A.29</b>	N/A
Part	Vicat softening temperature °C			Thickness of sample (mm)		Verdict	



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Clause	Requirement – Test	Result - Remark	Verdict

<b>102</b>	<b>TABLE: Prevention of HAZARD from arc flash and short-circuits</b>			<b>Form A.45</b>	N/A
102.2	Protection against short-circuits during clamping				
	Type of current sensor .....				—
Type / Model	RATED voltage of JAWS r.m.s. / d.c.	Thickness of Test probe <sup>1</sup> [mm]	Test voltage <sup>2</sup> r.m.s. / d.c.	Comments	Verdict

<sup>1</sup> If the JAWS do not open to the appropriate dimension, the probe thickness will equal the maximum JAW opening.

<sup>2</sup> The values for Test voltage apply to Tests performed at 2.000 m. For other Test site altitudes, the corrections of Table 10 are applied. Test duration time at least 1 min.

Supplementary information:

## Appendix 1 Equipment list

Inst. No.	ID	Instrument Type	Test Number+, Test title or conditioning	Function/Range	Uncertainty	Last Cal. Date	Next Cal. Date
1	S101	Withstand Voltage Tester	ChangChuang, CC2672C, 04162	0~5KV, 600VA, 1-99S 0-100mA(AC), 0-20mA(DC)	DC voltage: $U_{95}=1.1\%$ AC voltage: $U_{95}=1.9\%$ DC breakdown voltage: $U_{95}=0.5\%$ AC breakdown voltage: $U_{95}=1.5\%$ Time control: $U_{95}=1.5\%$ $k=2$	2016-3-11	2017-3-10
2	S102	HV Instrument	ZhiLiTong, KQ-1, KQ011103	UL1310, IEC 60950-1	--	2016-3-11	2017-3-10
3	S103	Ground Continuity Tester	YESDO, MN1101M, RC110108G	<12VAc/Dc, 5~40A, 1~100mΩ, 50/60Hz, 1-999S	Resistance: $U_{95}=0.8\%$ Current: $U_{95}=0.7\%$ Time: $U_{95}=1.5\%$	2016-3-11	2017-3-10
4	S104	Insulation Tester	YESDO, MN3501M, RD350029	1.0M~1000M, 300~1000VDC, 1-999S	Insulation resistance $U_{95}=0.8\%$ Test current: $U_{95}=0.7\%$	2016-3-11	2017-3-10
5	S108	Leakage Current Meter	Simpson, 229-2, 03-714556-2	0-100mA, 0-300V	Current: $U_{95}=0.8\%$ Voltage: $U_{95}=1.2\%$	2016-3-11	2017-3-10
6	S109	Touch current tester	410B, CEPREI, 1104AG08	IEC 60590-1, 60065, 60335-1, 60598-1 0.90 %	Current: $U_{95}=0.8\%$ Voltage: $U_{95}=0.15\%$	2016-3-11	2017-3-10
7	S111	Audio Generator	Tronson, TAG-101, Tr11026041	Sine:5Vrms; 10Hz-1Mhz	Frequency: $U_{95}=0.4\%$ Attenuation: $U_{95}=0.2dB$	2016-3-11	2017-3-10
8	S112	Audio Generator	Tronson, TAG-101, Tr11026076	Sine:5Vrms; 10Hz-1Mhz	Frequency: $U_{95}=0.4\%$ Attenuation: $U_{95}=0.2dB$	2016-3-11	2017-3-10
9	S113	Digital Oscilloscope	Tektronix, TDS3032B, B030956	300MHz 2.5GS/s	vertical deflection factor:	2016-3-11	2017-3-10

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					$U_{95}=0.7\%$ Scan time factor: $U_{95}=0.4\%$		
10	S114	Oscilloscope Probe	HP, HP-9256, HF-D0806A	100:1, 100MΩ, 20pF	Voltage: $U_{95}=0.08\%$ $k=2$	2016-3-11	2017-3-10
11	S201	Clamp Current Meter	UNI-T, UT204, 3110186315	0.1~600VAc/Dc, 0.1~400A, 20~40MΩ	DC voltage: $U_{95}=0.04\%$ AC voltage: $U_{95}=0.09\%$ DC current: $U_{95}=0.4\%$ AC current: $U_{95}=0.6\%$ Resistor: $U_{95}=0.05\%$ $K=2$	2016-3-11	2017-3-10
12	S202	Digital Multi-meter	FLUKE, FLUKE179, 6LR61	0.1mV-1000V, 1mA~10A, 0.1Ω-500MΩ, 0-50KHz	DC voltage: $U_{95}=0.03\%$ AC voltage: $U_{95}=0.08\%$ DC current: $U_{95}=0.2\%$ AC current: $U_{95}=0.3\%$ Resistor: $U_{95}=0.09\%$ $K=2$	2016-3-11	2017-3-10
13	S203	Digital Multi-meter	FLUKE, FLUKE289C, 17070047	0.1mV-1000V, 1mA~10A, 0.1Ω-40MΩ, 0-50KHz	DC voltage: $U_{95}=0.01\%$ AC voltage: $U_{95}=0.08\%$ DC current: $U_{95}=0.08\%$ AC current: $U_{95}=0.2\%$ Resistor: $U_{95}=0.07\%$ $K=2$	2016-3-11	2017-3-10
14	S222	Temperature record	YOKOGAWA, MV1024, S5J402547	-100-400 degree	Temperature: $U_{95}=0.5\%$	2016-3-11	2017-3-10
15	S223	Temperature record	YOKOGAWA, MV1024, S5K205431	-100-400 degree	Temperature: $U_{95}=0.5\%$	2016-3-11	2017-3-10
16	S224	Temperature record	MAODI, DR-40, J201304160709	-100-500 degree	Temperature: $U_{95}=0.5\%$	2016-3-11	2017-3-10
17	S231	Digital Power Meter	YOKOGAWA, WT210	0~20A, 0~600V, 0-5999W, 50/60Hz Computer port	DCV:0.006%,ACV:0.05% DCA:0.06%,ACA:0.08% PF:0.1%,Frequency:0.02%	2016-3-11	2017-3-10

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					THD:0.05%		
18	S232	Digital Power Meter	WEIBO, PF1020, PF10200111022	0~20A, 0~400V, 0-5999W, 50/60Hz	AC voltage:0.29% AC current:0.2% AC power:0.29% Frequency:0.02%	2016-3-11	2017-3-10
19	S233	Digital Power Meter	WEIBO, PF1020, PF10200111025	0~20A, 0~400V, 0-5999W, 50/60Hz	AC voltage:0.29% AC current:0.2% AC power:0.29% Frequency:0.02%	2016-3-11	2017-3-10
20	S234	Digital Power Meter	WEIBO, PF1020, PF102001127733	0~20A, 0~400V, 0-5999W, 50/60Hz	AC voltage:0.29% AC current:0.2% AC power:0.29% Frequency:0.02%	2016-3-11	2017-3-10
21	S241	Electric load	ARRAY, 3710A, A06AL04018	0-360V/30A/150W	DC voltage:0.06%	2016-3-11	2017-3-10
22	S242	Electric load	ARRAY, 3710A, A06AL04029	0-360V/30A/150W	DC voltage:0.06%	2016-3-11	2017-3-10
23	S243	Electric load	ARRAY, 3711A, A06BL01098	0-360V/30A/300W	DC voltage:0.06%	2016-3-11	2017-3-10
24	S244	Electric load	FAST, FA-828ATE, 91L816092	40V MAX, 40A MAX.	--	2016-3-11	2017-3-10
25	S301	Digital Scale	NaiKeSi, CH-30L, 198092	1g-10g-30Kg	0.5e	2016-3-11	2017-3-10
26	S302	Digital Caliper	UPM, UPM, 179939	0~150mm	10um	2016-3-11	2017-3-10
27	S304	Measuring tape	HuWei, 71mm, 14000044	0-5m	0.1	2016-3-11	2017-3-10
28	S306	Stop Watch	KTJ, TA228, 0801	0.01s-48h	0.11	2016-3-11	2017-3-10
29	S309	Torque Driver	TOHNICHI, 12RTD, 453163A	0~12.0kgf.cm	1.4%	2016-3-11	2017-3-10
30	S311	Stability Tester	NANYI, JZC-B2, 02-2002	0-30℃	0.1℃	2016-3-11	2017-3-10
31	S312	Push-Pull Scale	IMADA, FB-30K, 278518	1 ~ 30kgf	0.1%	2016-3-11	2017-3-10
32	S313	Spring Hammer	ZhiLiTong, CJ-2, C031153	0.5 J, IEC 60068-2-75	0.02	2016-3-11	2017-3-10

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33	S315	Ball Pressure Tester	ZhiLiTong, QY-1, Q011114	IEC60995-10-2	L:0.05mm,Q=0.05N	2016-3-11	2017-3-10
34	S316	Steel Ball	GQ-1, ZhiLiTong, G111103	∅ 50mm/500± 25g	L:0.05mm,Q=0.01g	2016-3-11	2017-3-10
35	S317	Steel Ball	GQ-1, ZhiLiTong, G121104	∅ 50mm/535± 25g	L:0.05mm,Q=0.01g	2016-3-11	2017-3-10
36	S318	Feeler gauge	ZhiLiTong, CK-1, K011117	1-8mm	6um	2016-3-11	2017-3-10
37	S319	Test Finger	ZhiLiTong, ZX-11, X111133	IEC60950-1, fig.2A	Radius:10um,L=12um Angle:0.9°	2016-3-11	2017-3-10
38	S320	Test Pin	ZhiLiTong, ZX-13, X131117	IEC60950-1, fig.2B	Radius:10um,L=12um Angle:0.9°	2016-3-11	2017-3-10
39	S401	Test probe	ZhiLiTong, ZLT-I23, V061104	IEC60950-1, fig.2C	Radius:10um,L=12um	2016-3-11	2017-3-10
40						2016-3-11	2017-3-10
41	S402	Temp. & Humi. Meter	KTJ, TA218B, 0811	10℃~40℃,20~95%R.H	0.3k,1.5%RH	2016-3-11	2017-3-10
42	S403	Temp. & Humi. Chamber	BELL, BE-TH-150M8, 201109102715	-40℃/20~150℃, 30~98%R.H, 0-120H <90cm	T:0.5℃,RH=2.4%	2016-3-11	2017-3-10
43	S404	Temperature Oven	KENTON, 101-3A, 10714187	25-300℃	0.07-0.16 ℃	2016-3-11	2017-3-10
44	S405	Plug torque tester	ZhiLiTong, ZLT-LJ2, LJ021108,	0-20cm	0.5%	2016-3-11	2017-3-10
45	S406	Thermal coupler				2016-3-11	2017-3-10
	S421	Tumbling barrel	---	IEC 61568-1, IEC 60068-2-32	---		---
	S422	Petroleum spirit	---	---	---		---
	S423	Cheesecloth	---	Cotton cloth 40g/m2	---		---
	S424	Wrapping Tissue	---	12g/ m2 - 30g/m2	---		---
	S427	Hardwood Floor	---	Hardwood 13mm on 19mm to 20mm plywood, two layers.	---		---
	S428	Break	---	FAL14015, 15A / 20A, By UL Approved	---		---

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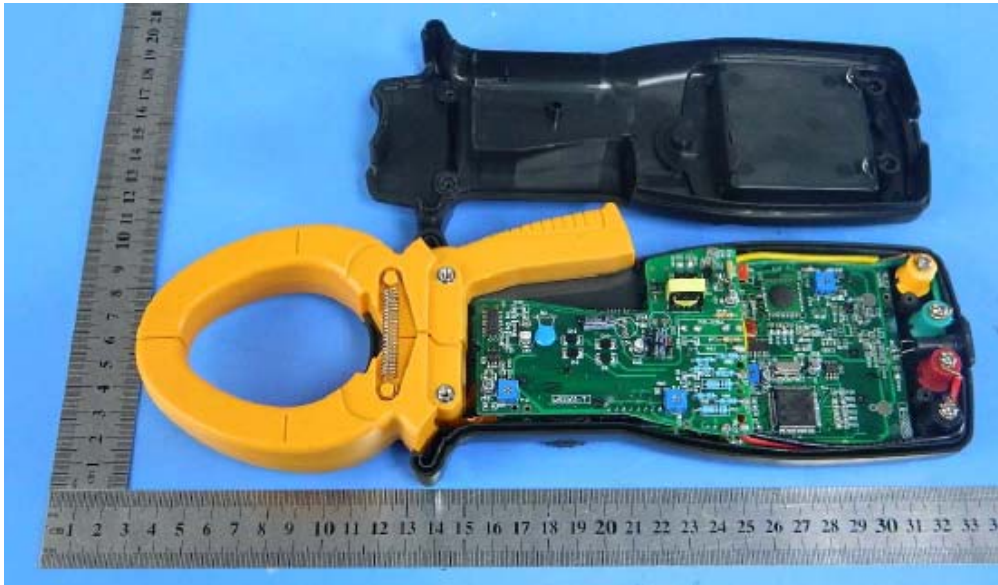
**Appendix 2  
Photo Documentation  
Photo 1# Unit overview for MS2203**



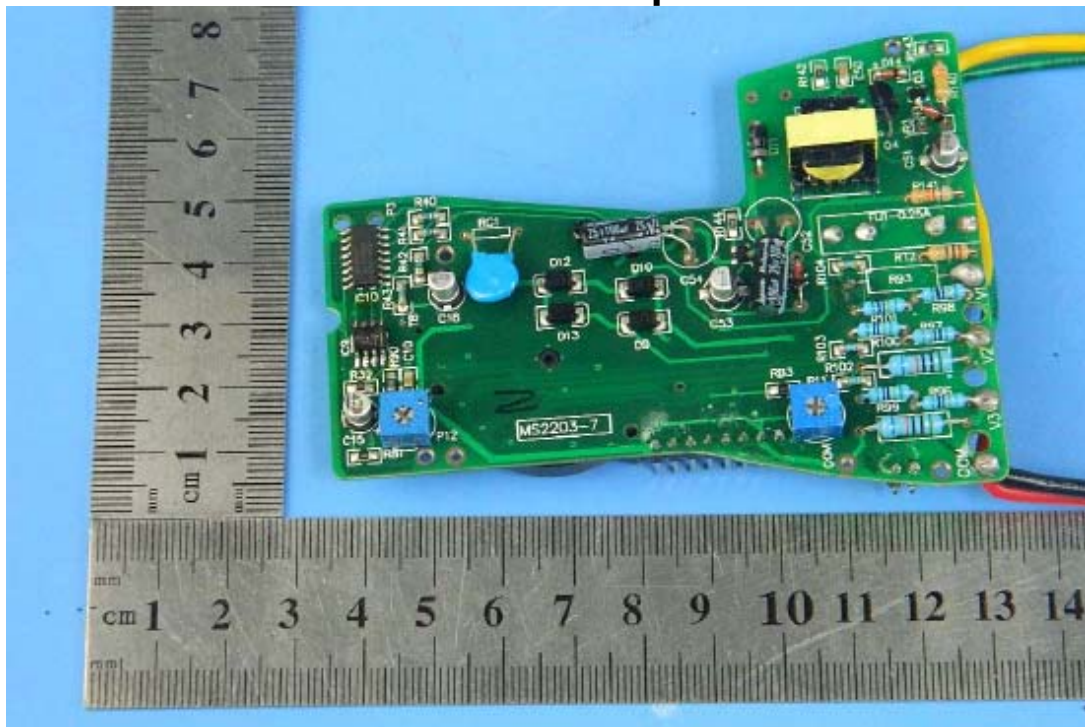
**Photo 2# Unit Overview for MS2203**



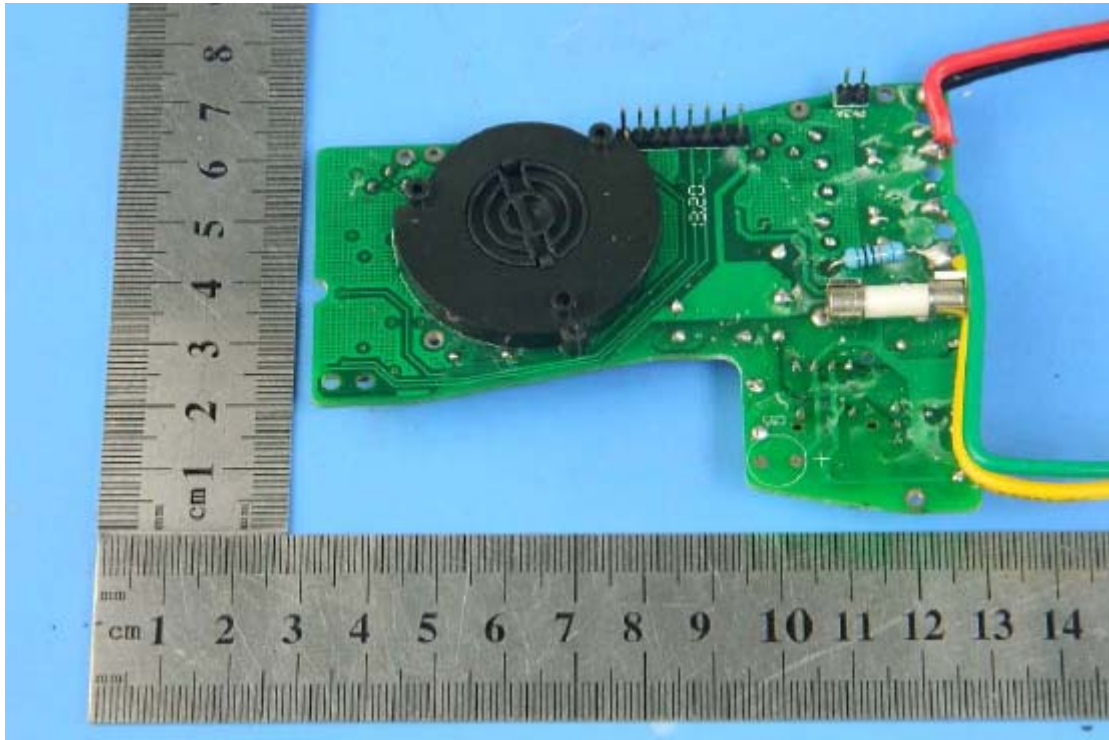
**Photo 3# Unit Internal view**



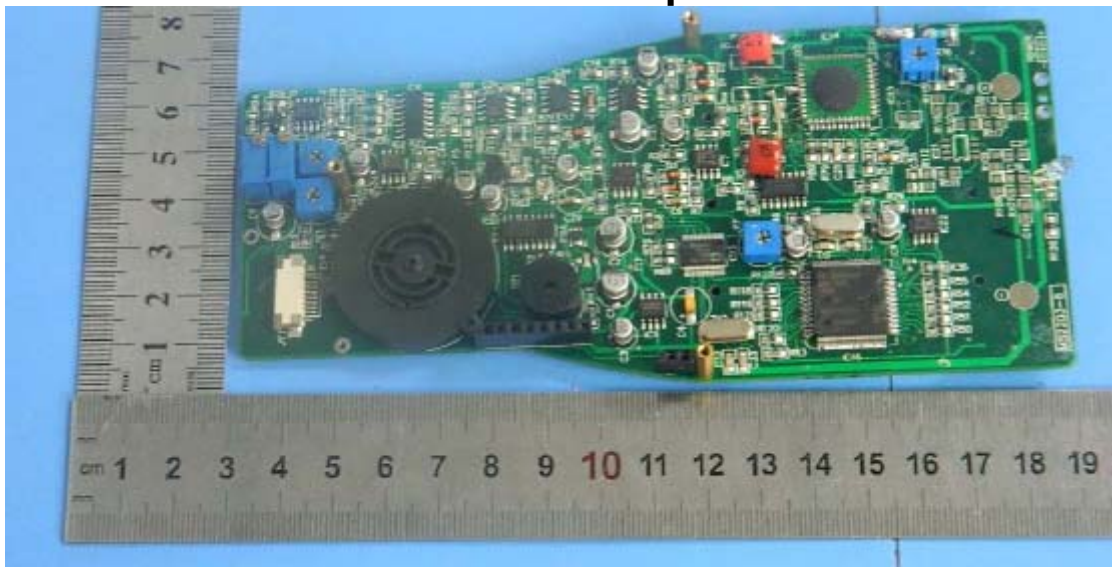
**Photo 4# PCB on component side**



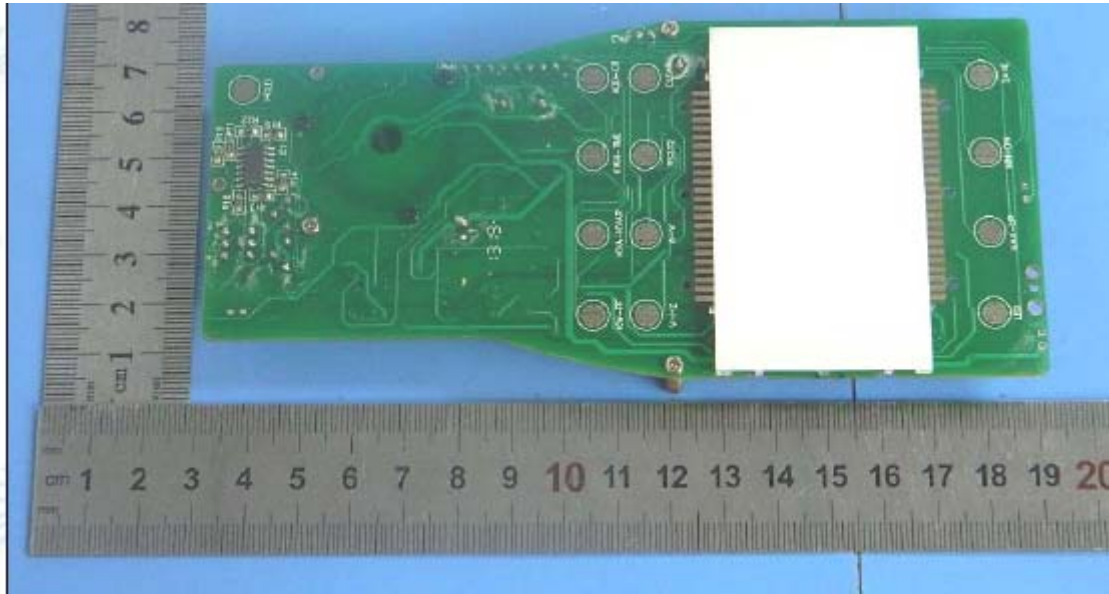
**Photo 5# PCB on trace side**



**Photo 6# PCB on component side**



**Photo 7# PCB on trace side**



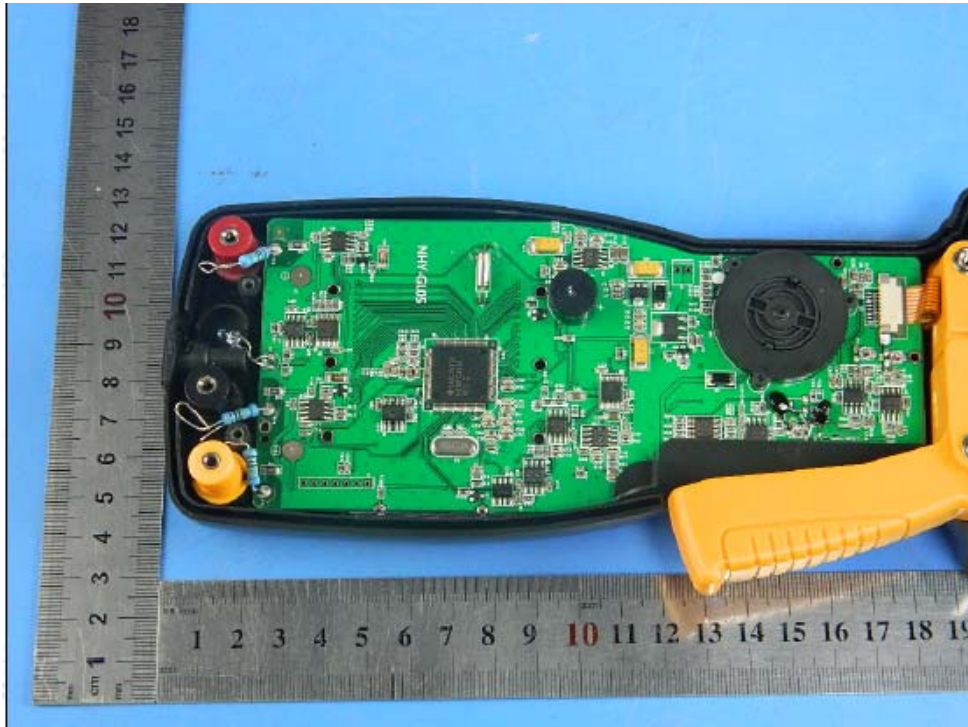
**Photo 8# Unit View for MS2205**



**Photo 9# Unit View for MS2205**



**Photo 10# Unit View for MS2205**



**Photo 11# Unit View for MS2205**

