



TEST REPORT	
IEC 61010-1/ EN 61010-1	
Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements	
Report Reference No.....	GZ09010112-1
Tested by (name and signature).....	Spark He <i>Spark</i>
Approved by (name and signature) ..:	Justin He <i>JWH</i>
Date of issue	2 Jun 2009
Contents	62 Pages
Testing Laboratory	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address.....	Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
Testing location/procedure	CBTL <input checked="" type="checkbox"/> SMT <input type="checkbox"/> TMP <input type="checkbox"/>
Address.....	Same as above
Applicant's name	Precision Mastech Enterprises Co.
Address.....	Room 1708-1709,Hewlett Centre, 54 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong
Test specification:	
Standard	IEC 61010 – 1 : 2001 (2 nd Edition); EN 61010 – 1 : 2001 (2 nd Edition)
Test procedure.....	LVD
Non-standard test method	—
Test Report Form No.....	IECEN61010_1C
TRF Originator	VDE
Master TRF	Dated 01-07-27
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Test item description.....	MS2203: Three Phase Digital Power Clamp Meter MS2205: Harmonic Power Clamp Meter
Trademark	MASTECH
Model/Type reference.....	MS2203, MS2205
Rating(s)	4×1,5V AA batteries, 600 V, CAT III

Test item particulars :	
Type of item tested	Measurement
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	CAT III
Pollution degree	2
Environmental rating	extended (specify): 0 - 40°C
Equipment mobility	Portable
Connection to mains supply	none
Operating conditions	continuous
Overall size of the equipment (L x W x H)	300×103×51mm
Mass of the equipment (kg)	0,5 (with battery)
Marked degree of protection to IEC 60529	N/A
Accessories and detachable parts included in the evaluation	N/A
Options	N/A
Test case verdicts:	
Test case does not apply to the test object.....	N/A
Test object does meet the requirement.....	P(Pass)
Test object does not meet the requirement	F(Fail)
Testing :	
Date of receipt of test item	7 Jan 2009
Date (s) of performance of tests	7 Jan 2009 – 30 Apr 2009
General remarks:	

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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 is used as the decimal separator.

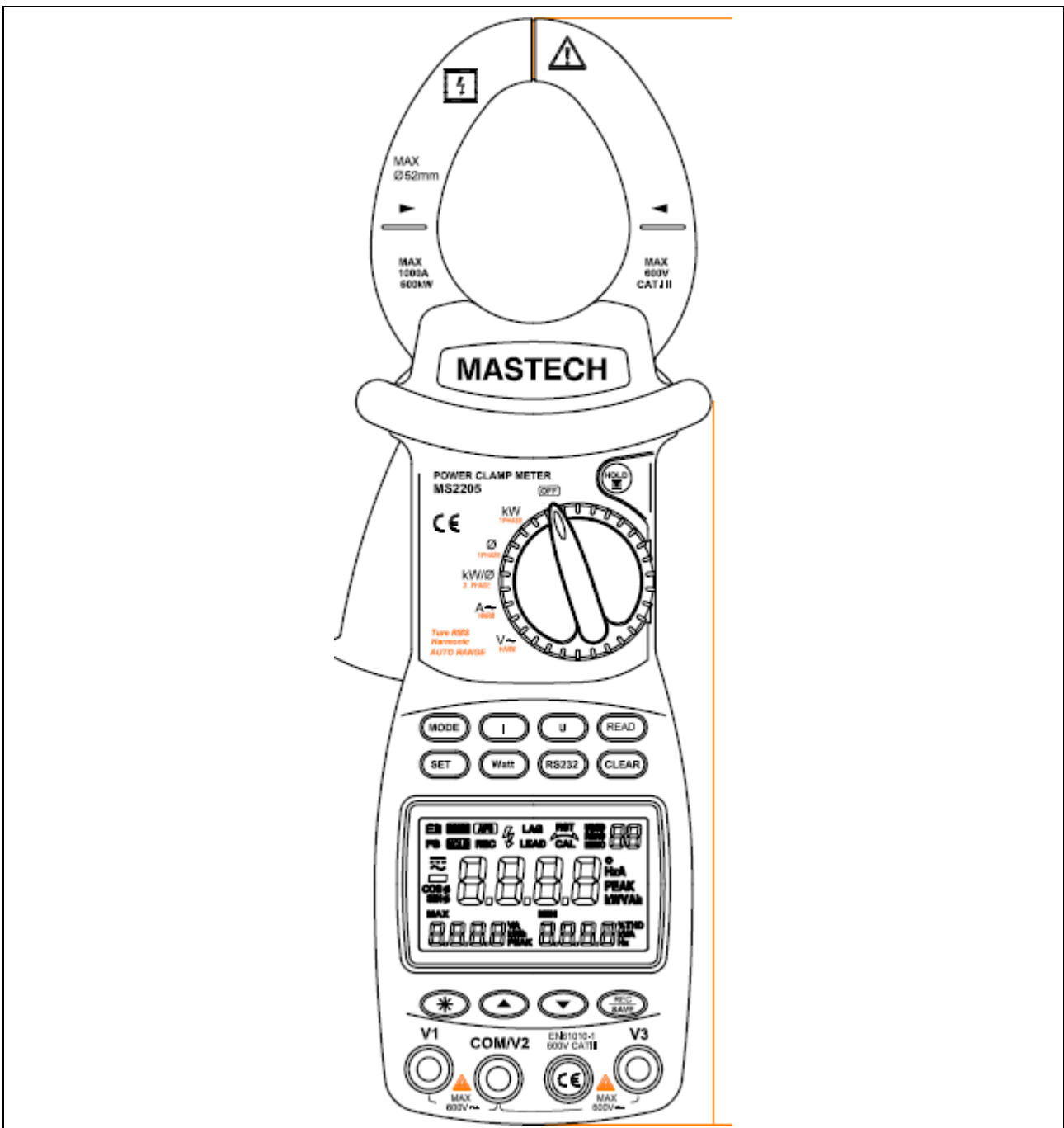
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There are different function between MS2203 and MS2205, but both of them have similar enclosure.

Copy of marking plate: (representative)





Summary of test results (information/comments):
 The apparatus comply with EN61010-1: 2001.



TABLE: 1 - Documents attached to this report		
Document No.	Document description	Page Numbers
None		

IEC 61010-1

Clause	Requirement + Test	Result – Remark	Verdict
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TABLE: 3 - List of components and circuits relied on for safety

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Unique component reference or location (including drawing reference if required)	Application/Function	Manufacturer (NOTE 1)	Part number	RATING (NOTE 2)	Evidence of acceptance (NOTE 3)
Enclosure, battery cover, key, LCD cover and enclosure of clamp jaw		Grand Pacific Petrochemical Corp	D-1000	ABS, V-0, 60°C, CTI: 250-400,	Tested with appliance
Alternative		Chi Mei Corporation	PA-765A(+)	ABS, V-0, 85°C, CTI: 400-600,	Tested with appliance
LCD lens		Mitsubishi Rayon Co Ltd	MF	PMMA, HB, 50°C, CTI: 175-250	Tested with appliance
Function Selecting Rubber Keypad		Momentive Performance Materials Japan L L C	TSE221-4U	SI, HB, 150°C, CTI: ≥600	Tested with appliance
PCB		Meizhou Kejie Integrated Circuit Co. Ltd	KJ-1	V-0, 130°C, min thickness: 1,6mm	UL
Alternative		Various	Various	V-0, 130°C, min thickness: 1,6mm	UL or EU
Fuse (for MS2203)		Hollyland Company Limited	50CF	F 300mA H 250 V, 5,2×20	VDE
Alternative		Various	Various	F 300mA H 250 V, 5,2×20	VDE
Internal wire (for MS2203)		Dongguan Wenchang Electronic Co Ltd	1028	PVC 18 AWG VW-1 600 V 80 °C	Tested in appliance

TRF No.: IEC 61010_C

TRF originator: VDE

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Clause	Requirement + Test	Result – Remark	Verdict

TABLE: 3 - List of components and circuits relied on for safety					P
Unique component reference or location (including drawing reference if required)	Application/Function	Manufacturer (NOTE 1)	Part number	RATING (NOTE 2)	Evidence of acceptance (NOTE 3)
Insulation tape		3m China Co Ltd	Cat. No.: 55257	PET, 80 °C	Tested in appliance

NOTE 1 - List all manufacturers concerned.
NOTE 2 - Electrical, mechanical, flammability, etc.
NOTE 3 - Licence number, file number or other documentary evidence of acceptance

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Clause	Requirement + Test	Result - Remark	Verdict
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5	MARKING AND DOCUMENTATION		—
5.1.1	General		—
	Required equipment markings are:		P
	visible:		P
	From the exterior; or		P
	After removing a cover; or		N/A
	Opening a door		N/A
	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		P
5.1.2	Identification		—
	Equipment is identified by:		—
5.1.2a)	Manufacturer's or supplier's name or trademark	Manufacturer's trademark	P
5.1.2b)	Model number, name or other means	Model number: MS2203, MS2205	P
	Manufacturing location identified		N/A
5.1.3	Mains supply	Powered by 4 × 1,5 V AA battery only	—
	Equipment is marked as follows:		—
5.1.3a)	Nature of supply:		—
	1) a.c. RATED mains frequency or range of frequencies		N/A
	2) d.c. with symbol 1		N/A
5.1.3b)	RATED supply voltage(s) or range		N/A
5.1.3c)	Max. RATED power (W or VA) or input current		N/A
	The measured value not more than 110 %		N/A
	If more than one voltage range:		—
	Separate values marked; or		N/A
	Values differ by less than 20 %		N/A
5.1.3d)	OPERATOR-set for different RATED supply voltages:		—
	Indicates the equipment set voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	PORTABLE EQUIPMENT indication is visible from the exterior		N/A
	Changing the setting changes the indication		N/A
5.1.3e)	Accessory mains socket-outlets accepting standard mains plugs are marked:		—
	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:		—
	The maximum RATED current or power; or		N/A
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		—
	OPERATOR replaceable fuse marking (see also 5.4.5)..... :	MS2203: F 300mA H 250 V MS2205: none	P
5.1.5	TERMINALS, connections and operating devices		—
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		P
	If insufficient space, symbol 14 used		N/A
5.1.5.1	TERMINALS		N/A
	Mains supply TERMINALS identified		N/A
	Other TERMINAL marking		N/A
5.1.5.1a)	FUNCTIONAL EARTH TERMINALS (symbol 5 used)		N/A
5.1.5.1b)	PROTECTIVE CONDUCTOR TERMINALS:		—
	Symbol 6 is placed close to or on the TERMINAL; OR		N/A
	Part of appliance inlet		N/A
5.1.5.1c)	TERMINALS of measuring and control circuits (symbol 7 used)		N/A
5.1.5.1d)	HAZARDOUS LIVE TERMINALS supplied from the interior		—
	Standard MAINS socket outlet; or		N/A
	RATINGS marked; or		N/A
	Symbol 14 used		N/A
5.1.5.1e)	ACCESSIBLE FUNCTIONAL EARTH TERMINALS:		—
	Self-evident; or		N/A
	Indication (symbol 8 acceptable)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.5.2	Measuring circuit TERMINALS		—
	For TERMINALS other than those permanently connected and not ACCESSIBLE:		—
	RATED voltage or current marked		P
	Unless clear indication that below limits:		—
	Maximum RATED voltage to earth is marked; or		P
	For specific connection to other equipment TERMINALS only, and means for identifying provided		N/A
	Appropriate measurement category marked (CAT II, CAT III or CAT IV); or	CAT III	P
	No measurement category marked (CAT I)		N/A
	Required markings are adjacent to TERMINALS; OR		P
	If insufficient space:		—
	On the RATING plate or scale plate; or		N/A
	TERMINAL is marked with symbol 14		N/A
5.1.6	Switches and circuit breakers		—
	If disconnecting device, on or off position marked		N/A
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION		—
	Protected throughout (symbol 11 used)		P
	Only partially protected (symbol 11 not used)		N/A
5.1.8	Field-wiring TERMINAL boxes		—
	If TERMINAL or ENCLOSURE exceeds 60 °C:		—
	Cable temperature RATING marked		N/A
	Marking visible or beside TERMINAL		N/A
5.2	Warning markings		—
	Visible when ready for NORMAL USE		P
	Are near or on applicable parts		P
	Symbols and text correct dimensions and colour		P
	If necessary marked with symbol 14		P
	Statement to isolate or disconnect		P
5.3	Durability of markings		—
	The required markings remain clear and legible in NORMAL USE	(see Form A.4)	P
5.4	Documentation		—

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1	General		—
	Equipment is accompanied by documentation which includes:		—
5.4.1a)	Intended use		P
5.4.1b)	Technical specification		P
5.4.1c)	Instructions for use		P
5.4.1d)	Name and address of manufacturer or supplier		P
5.4.1e)	Information specified in 5.4.2 to 5.4.5		—
5.4.1f)	If marking of TERMINALS required, definition of measurement category	CAT III 600 V	P
5.4.1g)	If CAT 1:		—
	Warning		N/A
	RATINGS		N/A
	Warning statements and a clear explanation of warning symbols:		—
	Provided in the documentation; or		N/A
	Information is marked on the equipment		N/A
5.4.2	Equipment RATINGS		—
	Documentation includes:		—
5.4.2a)	Supply voltage or voltage range	Powered by a DC battery	N/A
	Frequency or frequency range		N/A
	Power or current RATING		N/A
5.4.2b)	Description of all input and output connections		P
5.4.2c)	RATING of insulation of external circuits, when such circuits are nowhere ACCESSIBLE		N/A
5.4.2d)	Statement of the range of environmental conditions		P
5.4.2e)	Degree of protection (IEC 60529)		N/A
5.4.3	Equipment installation		—
	Documentation includes instructions for:		—
5.4.3a)	Assembly, location and mounting		N/A
5.4.3b)	Protective earthing		N/A
5.4.3c)	Connections to supply		N/A
5.4.3d)	PERMANENTLY CONNECTED EQUIPMENT:		—
	1) Supply wiring requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
5.4.3e)	Ventilation requirements		N/A
5.4.3f)	Special services (e. g. air, cooling liquid)		N/A
5.4.3g)	Maximum sound power level		N/A
5.4.3h)	Instructions about sound pressure		N/A
5.4.3i)	Permanently connected measuring TERMINALS:		—
	Measurement category		N/A
	RATED maximum WORKING VOLTAGE or current		N/A
5.4.4	Equipment operation		—
	Instructions for use include:		—
5.4.4a)	Identification of operating controls		P
5.4.4b)	Positioning for disconnection		N/A
5.4.4c)	Interconnection		N/A
5.4.4d)	Specification of intermittent operation limits		N/A
5.4.4e)	Explanation of symbols used		P
5.4.4f)	Replacement of consumable materials		P
5.4.4g)	Cleaning and decontamination (see 11.2)		P
5.4.4h)	Listing of any poisonous or injurious gases and quantities		N/A
5.4.4i)	Risk-reduction procedures relating to flammable liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance		—
	Instructions include:		—
	Sufficient preventive maintenance and inspection information		P
	Replacement of hoses, etc.		N/A
	Specific battery type		P
	Any manufacturer specified parts		N/A
	RATING and characteristics of fuses		N/A
6	PROTECTION AGAINST ELECTRIC SHOCK	(see Form A.5)	—
6.1	General		—
6.1.1	Requirements		—

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Clause	Requirement + Test	Result - Remark	Verdict
	ACCESSIBLE parts not HAZARDOUS LIVE in NORMAL CONDITION and SINGLE FAULT CONDITION		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		—
6.1.2	Exceptions		—
	Capacitance test		N/A
	Parts not HAZARDOUS LIVE 10 s after interruption of supply		N/A
6.2	Determination of ACCESSIBLE parts		—
6.2.1	General examination	(see Form A.6)	P
6.2.2	Openings above parts that are HAZARDOUS LIVE		N/A
6.2.3	Openings for pre-set controls		N/A
6.3	Permissible limits for ACCESSIBLE parts		—
6.3.1	Values in NORMAL CONDITION	(see Form A.7)	P
6.3.2	Values in SINGLE FAULT CONDITION	(see Form A.8)	P
6.4	Protection in NORMAL CONDITION (see 6.2, 6.3.1, 6.7, 6.8 and 8.1)		P
6.5	Protection in SINGLE FAULT CONDITION		—
	Additional protection is provided by:		—
	One or more of 6.5.1 to 6.5.3; or		P
	Automatic disconnection of the supply (6.5.4)		N/A
6.5.1	Protective BONDING		—
	ACCESSIBLE conductive parts:		—
	Separated by DOUBLE INSULATION or REINFORCED INSULATION; or		N/A
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		N/A
	Separated by screen or BARRIER bonded to PROTECTIVE CONDUCTOR TERMINAL from parts which are HAZARDOUS LIVE		N/A
6.5.1.1	Integrity of PROTECTIVE BONDING		—
6.5.1.1a)	PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N/A
6.5.1.1b)	Soldered connections:		—
	Independently secured		N/A
	Not used for other purposes		N/A
	Screw connections are secured		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.1.1c)	PROTECTIVE BONDING not interrupted		N/A
6.5.1.1d)	Any moveable connection specifically designed, and meets 6.5.1.3		N/A
6.5.1.1e)	No external metal braid of cables used		N/A
6.5.1.1f)	If MAINS supply passes through:		—
	Means provided for passing protective conductor;		N/A
	Impedance meets 6.5.1.3.		N/A
6.5.1.1g)	Protective conductors bare or insulated, if insulated, green/yellow		N/A
	Exceptions:		—
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A
6.5.1.1h)	TERMINAL suitable, and meets 6.5.1.2		N/A
6.5.1.2	PROTECTIVE CONDUCTOR TERMINAL		—
6.5.1.2a)	Contact surfaces are metal		N/A
6.5.1.2b)	Appliance inlet used		N/A
6.5.1.2c)	For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL IS close to MAINS supply TERMINALS		N/A
6.5.1.2d)	If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		—
	Is near TERMINALS of circuit for which protective earthing is necessary		N/A
	External if other TERMINALS external		N/A
6.5.1.2e)	Equivalent current-carrying capacity to MAINS supply TERMINALS		N/A
6.5.1.2f)	If plug-in, makes first and breaks last		N/A
6.5.1.2g)	If also used for other bonding purposes, protective conductor:		—
	Applied first;		N/A
	Secured independently;		N/A
	Unlikely to be removed by servicing; or		N/A
	Warning marking requires replacement of protective conductor		N/A
6.5.1.2h)	Protective conductor of measuring circuit:		N/A
	1) Current RATING;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	2) PROTECTIVE BONDING:		—
	Not interrupted; or		N/A
	Indirect bonding used (see 6.5.1.5)		N/A
6.5.1.2i)	FUNCTIONAL EARTH TERMINALS allow independent connection		N/A
6.5.1.2j)	If a binding screw:		—
	Suitable size for bond wire		N/A
	Not smaller than M 4 (No. 6)		N/A
	At least 3 turns of screw engaged		N/A
	Contact pressure not capable of reduction by deformation of materials		N/A
	Passes tightening torque test		N/A
6.5.1.3	Impedance of PROTECTIVE BONDING of plug-connected equipment		N/A
6.5.1.4	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT		N/A
6.5.1.5	Indirect bonding for measuring and test equipment		N/A
6.5.2	DOUBLE INSULATION and REINFORCED INSULATION (see 6.7, 6.8 and 6.9.2)		—
6.5.3	PROTECTIVE IMPEDANCE		N/A
6.5.3a)	HIGH-INTEGRITY single component used (s. 14.6); or		N/A
6.5.3b)	A combination of components used; or		N/A
6.5.3c)	A combination of BASIC INSULATION and current- or voltage-limiting device used		N/A
	Components, wires and connections are RATED as required		N/A
6.5.4	Automatic disconnection of the supply		N/A
	If used, it meets :		—
6.5.4a)	Supplied with the equipment; or		N/A
	Specified by installation instruction		N/A
6.5.4b)	RATED disconnecting time within limit specified		N/A
6.5.4c)	RATED for maximum RATED LOAD		N/A
6.6	Connections to external circuits		—
6.6.1	General		—
	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		—

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Clause	Requirement + Test	Result - Remark	Verdict
6.6.1a)	The external circuits		P
6.6.1b)	The equipment		P
	Separation of circuits provided; or		P
	Short circuit of separation does not cause a Hazard		N/A
	Instructions or markings include:		—
	1) RATED conditions for TERMINAL		P
	2) Required RATING of external circuit insulation		N/A
6.6.2	TERMINALS for external circuits		—
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE		N/A
	High voltage TERMINALS energized from the interior are:		—
	Not ACCESSIBLE if connected; or		N/A
	Unmated HAZARDOUS LIVE TERMINALS not ACCESSIBLE ; or		N/A
	marked with symbol 12		N/A
6.6.3	Circuits with TERMINALS which are HAZARDOUS LIVE		—
	These circuits are:		—
	Not connected to ACCESSIBLE conductive parts; or		P
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential		N/A
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE		P
6.6.4	ACCESSIBLE TERMINALS for stranded conductors		—
6.6.4a)	No risk of accidental contact because:		—
	Located or shielded		N/A
	Self-evident or marked whether connected to ACCESSIBLE conductive parts		N/A
6.6.4b)	ACCESSIBLE TERMINALS will not work loose		N/A
6.7	CLEARANCES and CREEPAGE DISTANCES	(See Form A.5 and A.13)	P
6.8	Procedure for dielectric strength tests	(See Form A.5 and A.14)	P
6.9	Constructional requirements for protection against electric shock		—
6.9.1	General		—
	If a failure could cause a HAZARD:		—

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Clause	Requirement + Test	Result - Remark	Verdict
6.9.1a)	Security of wiring connections		P
6.9.1b)	Screws securing removable covers		P
6.9.1c)	Accidental loosening		P
	Easily damaged materials not used		P
	Non-impregnated hydroscopic materials not used		P
6.9.2	ENCLOSURES of equipment with DOUBLE INSULATION or REINFORCED INSULATION		—
	ENCLOSURE surrounds all metal parts except for small metal parts which are separated		P
	ENCLOSURES or parts made of insulating material		P
	Protection for metal ENCLOSURES or parts by:		—
6.9.2a)	An insulating coating or BARRIER on the inside; or		N/A
6.9.2b)	CLEARANCES and CREEPAGE DISTANCES cannot be reduced by loosening of parts or wires		P
6.9.3	Over-range indication		—
	Unambiguous	Show "OL" when over-range	P
6.10	Connection to MAINS supply source and connections between parts of equipment		—
6.10.1	MAINS supply cords		—
6.10.1a)	RATED for maximum equipment current (see 5.1.3c)		N/A
	Cable complies with IEC 60227 or IEC 60245		N/A
6.10.1b)	Heat-resistant if likely to contact hot parts		N/A
6.10.1c)	Temperature RATING (cord and inlet)		N/A
6.10.1d)	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		N/A
	Detachable cords with IEC 60320 MAINS connectors:		—
	Conform to IEC 60799; or		N/A
	Have the current RATING of the MAINS connector		N/A
6.10.2	Fitting of non-detachable MAINS supply cords		—
	Non-detachable cord protection:		—
6.10.2a)	Inlet or bushing smoothly rounded; or		N/A
6.10.2b)	Insulated cord guard protruding $\geq 5D$		N/A
	The protective earth conductor is the last to take the strain		N/A
6.10.2	Cord anchorages:		—

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Clause	Requirement + Test	Result - Remark	Verdict
6.10.2a)	Cord is not clamped by direct pressure from a screw		N/A
6.10.2b)	Knots are not used		N/A
6.10.2c)	Cannot push the cord into the equipment to cause a hazard		N/A
6.10.2d)	No failure of cord insulation in anchorage with metal parts		N/A
6.10.2e)	compression bushing:		—
	1) Clamps all types and sizes of MAINS cords; and		N/A
	2) Is suitable:		—
	For connection to TERMINALS provided; or		N/A
	It is designed for screened MAINS cord		N/A
6.10.2f)	Cord replacement does not cause a HAZARD and method of strain relief is clear		N/A
	Push-pull test		N/A
6.10.3	Plugs and connectors		—
6.10.3a)	MAINS supply plugs, connectors etc., conform with relevant specifications		N/A
6.10.3b)	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		—
	Plugs of supply cords do not fit MAINS sockets above RATED supply voltage		N/A
	MAINS-type plugs used only for connection to MAINS supply		N/A
6.10.3c)	Plug pins which receive a charge from an internal capacitor		N/A
6.10.3d)	Accessory MAINS socket outlets:		—
	1) Marking if accepts a standard MAINS plug (see 5.1.3e)		N/A
	2) Input has a protective earth conductor if outlet has earth TERMINAL contact		N/A
6.11	Disconnection from supply source		—
6.11.1	General		—
	Disconnects all current carrying conductors		N/A
6.11.1.1	Exceptions		—
6.11.1.1a)	Equipment supplied by low energy source; or		N/A
6.11.1.1b)	Equipment connected to impedance protected supply; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.11.1.1c)	Equipment constitutes an impedance protected load		N/A
6.11.2	Requirements according to type of equipment		—
6.11.2.1	PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment		—
	Employs switch or circuit-breaker		N/A
	If switch or circuit-breaker is not part of the equipment, documentation specifies:		—
6.11.2.1a)	Switch or circuit-breaker to be included in building installation		N/A
6.11.2.1b)	Location		N/A
6.11.2.1c)	Marking		N/A
6.11.2.2	Single-phase cord-connected equipment		—
	Equipment is provided with:		—
6.11.2.2a)	Switch or circuit-breaker; or		N/A
6.11.2.2b)	Appliance coupler (disconnectable without TOOL); or		N/A
6.11.2.2c)	Separable plug (without locking device)		N/A
6.11.2.3	HAZARDS arising from function		—
	Emergency switch		N/A
	Emergency switch ≤ 1 m from the moving part		N/A
6.11.3	Disconnecting devices		—
	Electrically close to the supply		N/A
6.11.3.1	Switches and circuit-breakers		—
	When used as disconnection device:		—
	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
	If has other contacts meets separation requirements of 6.6 and 6.7		N/A
6.11.3.2	Appliance couplers and plugs		—
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.2.2):		—
	Readily identifiable and easily reached by the OPERATOR		N/A
	Single-phase PORTABLE EQUIPMENT cord length ≤ 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		—
7.1	General		—
	Conformity is checked by 7.2 to 7.6		P
7.2	Moving parts		—
	Moving parts not able to crush, etc. (see also 6.11.2.3)		N/A
	If OPERATOR access permitted:		—
7.2a)	Access requires TOOL		N/A
7.2b)	Statement about training		N/A
7.2c)	Warning markings or symbol 14		N/A
7.3	Stability		—
	Marking of non-automatic means		N/A
	Conformity tests:		—
7.3a)	10° tilt test		N/A
7.3b)	multi-directional force test		N/A
7.3c)	downward force test		N/A
7.4	Provisions for lifting and carrying		—
	Handles or grips withstand four times weight	For wrist belt	P
	Equipment >18 kg :		—
	Has means for lifting or carrying; or		N/A
	Directions in documentation		N/A
7.5	Wall mounting		—
	Mounting brackets withstand four times weight		N/A
7.6	Expelled parts		—
	Equipment contains or limits the energy		N/A
	Protection not removable without the aid of a TOOL		N/A
8	MECHANICAL RESISTANCE TO SHOCK AND IMPACT		—
	After the tests of 8.1 to 8.2:		—
	Voltage tests	(see Form A.14)	P
	Inspections:		—
8a)	HAZARDOUS LIVE parts not accessible		P

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Clause	Requirement + Test	Result - Remark	Verdict
8b)	ENCLOSURE shows no cracks (hazard)		P
8c)	CLEARANCES not less than their permitted values	(see Form A.13)	P
8d)	BARRIERS not damaged or loosened		N/A
8e)	No moving parts exposed, except permitted by 7.2		N/A
8f)	No damage which could cause spread of fire		P
9	PROTECTION AGAINST THE SPREAD OF FIRE		—
	Conformity for each source of HAZARD or area of the equipment is checked by one of the following:	(See Form A.16)	—
9a)	Fault test of 4.4; or	(See Forms A.1 and A.2)	P
9b)	Application of 9.1 (eliminating or reducing the sources of ignition); or		N/A
9c)	Application of 9.2 (containment of fire within the equipment)		P
9.1	Eliminating or reducing the sources of ignition within the equipment		—
9.1a)	1) Limited-energy circuit (see 9.3); or		N/A
	2) Insulation meets the requirements for BASIC INSULATION; OR	(see Form A.5 and A.14)	N/A
	Bridging the insulation does not cause ignition	(see Form A.2)	N/A
9.1b)	Surface temperature of liquids and parts (see 9.4.a)		N/A
9.1c)	No ignition in circuits designed to produce heat	(see Form A.2)	N/A
9.2	Containment of the fire within the equipment, should it occur		—
9.2a)	Energizing of the equipment is controlled by an OPERATOR held switch		N/A
9.2b)	Enclosure is conform with constructional requirements of 9.2.1; and		P
	Requirements of 9.4b) or c) are met		N/A
9.2.1	Constructional requirements		—
9.2.1a)	Insulated wires have flammability classification FV1 or better		N/A
	Connectors and insulating material have flammability classification FV2 or better		N/A
9.2.1b)	The enclosure is constructed as follows :		—
	1) Bottom constructed with:		—
	No openings; or		P
	Extent as specified in figure 7; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Baffles as specified in figure 6; or		N/A
	Perforated as specified in Table 12; or		N/A
	Metal screen with a mesh		N/A
	2) Sides have no openings as specified in figure 7		P
	3) Material of ENCLOSURE and any baffle or flame barrier is made of:		—
	Metal (except magnesium); or		N/A
	Non metallic materials have flammability classification FV1 or better	(see Table 3 or Form A.17)	P
	4) ENCLOSURE and any baffle or flame barrier have adequate rigidity		P
9.3	Limited-energy circuit		—
9.3a)	Potential not more than 30 r.m.s. and 42.4 V peak, or 60 V dc		N/A
9.3b)	Current limited by one of following means:		—
	1) Inherently or by impedance; or		N/A
	2) Overcurrent protective device; or		N/A
	3) A regulating network limits also in SINGLE FAULT CONDITION		N/A
9.3c)	Is separated by at least BASIC INSULATION		N/A
	If overcurrent protective device used:		—
	Fuse or a non adjustable electromechanical device		N/A
9.4	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		N/A
	Risk is reduced to a tolerable level :		—
9.4a)	The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N/A
9.4b)	The quantity of liquid is limited		N/A
9.4c)	Flames are contained within the equipment		N/A
	Detailed instructions for risk-reduction provided		N/A
9.5	Overcurrent protection	For MS2203	P
	Devices not in the protective conductor		P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		N/A
9.5.1	PERMANENTLY CONNECTED EQUIPMENT		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Overcurrent device:		—
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.5.2	Other equipment		P
	Protection within the equipment		P
10	EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT		—
10.1	Surface temperature limits for protection against burns		—
	Easily touched surfaces within the limits	(see Form A.20A)	P
	Heated surfaces necessary for functional reasons exceeding specified values:		—
	Are recognizable as such by appearance or function; or		N/A
	Are marked with symbol 13		N/A
	Guards are not removable without TOOL		N/A
10.2	Temperatures of windings	(see Form A.20B)	P
	Limits not exceeded in:	For MS2203 For MS2205 none such winding	—
	NORMAL CONDITION		P
	SINGLE FAULT CONDITION		P
10.3	Other temperature measurements	(see Form A.20A)	P
	Following measurements conducted if applicable:		—
10.3a)	Value of 60 °C of field-wiring TERMINAL box not exceeded		N/A
10.3b)	Surface of flammable liquids and parts in contact with this liquids		N/A
10.3c)	Surface of non-metallic ENCLOSURES		P
10.3d)	Parts made of insulating material supporting parts connected to MAINS supply		N/A
10.3e)	TERMINALS carrying a current more than 0.5 A		N/A
10.4	Conduct of temperature test	(see Form A20)	P
10.5	Resistance to heat		P
10.5.1	Integrity of CLEARANCE and CREEPAGE DISTANCES	(See Form A.13)	P
10.5.2	Non-metallic ENCLOSURES	(See Forms A.21)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	After treatment:		P
	No HAZARDOUS LIVE parts ACCESSIBLE;		P
	Tests of 8.1 and 8.2	(See Form A.13)	P
	In case of doubt, tests of 6.8 (without humidity preconditioning)	(See Form A.14)	P
10.5.3	Insulating material		N/A
10.5.3a)	Parts supporting parts connected to MAINS supply		N/A
10.5.3b)	TERMINALS carrying a current more than 0.5 A		N/A
	Examination of material data; or		N/A
	in case of doubt::		—
	1) Ball pressure test; or		N/A
	2) Vicat softening test of ISO 306		N/A
11	PROTECTION AGAINST HAZARDS FROM FLUIDS		—
11.1	General		N/A
11.2	Cleaning		N/A
11.3	Spillage		N/A
11.4	Overflow		N/A
11.5	Battery electrolyte		—
	Battery electrolyte leakage presents no hazard		N/A
11.6	Specially protected equipment		N/A
11.7	Fluid pressure and leakage		—
11.7.1	Maximum pressure		—
	Maximum pressure of any part does not exceed P_{RATED}		N/A
11.7.2	Leakage and rupture at high pressure		N/A
	Test to IEC 60335 (refrigeration only)		N/A
11.7.3	Leakage from low-pressure parts		N/A
11.7.4	Overpressure safety device		—
	Does not operate in NORMAL USE		N/A
	Meets ISO 4126-1; and		N/A
	It is conform with:		—
11.7.4a)	Connected as close as possible to parts intended to be protected		N/A
11.7.4b)	Easy access for inspection, maintenance and repair		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
11.7.4c)	Adjustment only with TOOL		N/A
11.7.4d)	No discharge towards person		N/A
11.7.4e)	No HAZARD from deposit of discharged material		N/A
11.7.4f)	Adequate discharge capacity		N/A
11.7.4g)	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		—
12.1	General		—
	Equipment provides protection		N/A
12.2	Equipment producing ionizing radiation		N/A
12.2.1	Ionizing radiation		N/A
12.2.2	Accelerated electrons		N/A
12.3	Ultra-violet (UV) radiation	(Conformity test under consideration)	—
	No unintentional and HAZARDOUS escape of UV radiation		N/A
12.4	Micro-wave radiation		—
	Power density does not exceed 10 W/m ²:		N/A
12.5	Sonic and ultrasonic pressure		—
12.5.1	Sound level		N/A
12.5.2	Ultrasonic pressure		N/A
12.6	Laser sources (IEC 60825-1)		N/A
13	PROTECTION AGAINST LIBERATED GASES, EXPLOSION AND IMPLOSION		—
13.1	Poisonous and injurious gases		N/A
	Attached data/test reports demonstrate conformity		N/A
13.2	Explosion and implosion		—
13.2.1	Components		—
	Components liable to explode:		—
	Pressure release device provided; or		N/A
	Apparatus incorporates OPERATOR protection (see also 7.6)		N/A
	Pressure release device:		—
	Discharge without danger		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Cannot be obstructed		N/A
13.2.2	Batteries and battery charging		—
	If explosion or fire hazard could occur:		—
	Protection incorporated in the equipment; or		N/A
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		—
	No HAZARD; or		N/A
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		—
	Warning against the charging of non-rechargeable batteries; and		N/A
	Type of rechargeable battery indicated; or		N/A
	Symbol 14 used		N/A
	Battery compartment design		N/A
	Single component failure		N/A
	Polarity reversal test	No hazards	P
13.2.3	Implosion of cathode ray tubes		—
	If maximum face dimensions > 160 mm.....:		—
	Intrinsically protected and correctly mounted; or		N/A
	ENCLOSURE provides protection:		N/A
	If non-intrinsically protected:		—
	Screen not removable without TOOL		N/A
	If glass screen, not in contact with surface of tube		N/A
13.2.4	Equipment RATED for high pressure (See 11.7)		N/A
14	COMPONENTS		P
14.1	General		P
	Where safety is involved, components meet relevant requirements	(see Table 3)	P
14.2	Motors		—
14.2.1	Motor temperatures		—
	Does not present a HAZARD when stopped or prevented from starting; or		N/A
	Protected by overtemperature or thermal protection device conform with 14.3		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
14.2.2	Series excitation motors		—
	Connected direct to device, if overspeeding causes a HAZARD		N/A
14.3	Overtemperature protection devices		N/A
	Devices operating in a SINGLE FAULT CONDITION		N/A
14.3a)	Reliable function is ensured		N/A
14.3b)	RATED to interrupt maximum current and voltage		N/A
14.3c)	Does not operate in NORMAL USE		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	HIGH INTEGRITY components		N/A
	Used in applicable positions (see Table 3)		N/A
	Conforms with IEC publications		N/A
	Single electronic device not used		N/A
14.7	Mains transformers tested outside equipment		N/A
14.8	Printed circuit boards	V-0	P
	Data shows conformity with FV-1 of IEC 60707 or better; or	UL approved PCB	P
	Test shows conformity with FV-1 of IEC 60707 or better; or		N/A
	Thin film flexible PCB with limited-energy circuit used		N/A
14.9	Circuits or components used as transient overvoltage limiting devices		—
	After test, no sign of overload or degradation		N/A
15	PROTECTION BY INTERLOCKS		—
15.1	General		—
	Interlocks are designed to remove a hazard before OPERATOR exposed		N/A
15.2	Prevention of reactivation		N/A
15.3	Reliability		—
	Single fault unlikely to occur; or		N/A
	Cannot cause a HAZARD		N/A
16	TEST AND MEASUREMENT EQUIPMENT		P

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Clause	Requirement + Test	Result - Remark	Verdict
16.1	Current measuring circuits		N/A
16.2	Multifunction meters and similar equipment	(see Form A.32)	P
	No HAZARD from:		—
	RATED input voltage combinations		P
	Settings of functions		P
	Settings of range controls		N/A
ANNEX F	ROUTINE TESTS		N/A
	Manufacturer's declaration		N/A

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

4.4.2	TABLE: Summary of SINGLE FAULT CONDITIONS	Form A.1	—
--------------	--	-----------------	---

Subclause	Title	Does not apply	Carried out	Comments
4.4.2.1	PROTECTIVE IMPEDANCE	√		
4.4.2.2	Protective conductor	√		
4.4.2.3	Equipment or parts for short-term or intermittent operation	√		
4.4.2.4	Motors	√		
4.4.2.5	Capacitors	√		
4.4.2.6	Mains transformers Attach drawing of MAINS TxS showing all protective devices (see Forms A.29 and A.30)	√		
4.4.2.7	Outputs	√		
4.4.2.8	Equipment for more than one supply	√		
4.4.2.9	Cooling – air holes closed – fans stopped – coolant stopped	√ √ √		
4.4.2.10	Heating devices – timer overridden – temperature controller overridden – loss of cooling liquid – overfilled or empty or both	√ √ √ √		
4.4.2.11	Insulation between circuits and parts		√	
4.4.2.12	Interlocks	√		

List below all SINGLE FAULT CONDITIONS not covered by 4.4.2.1 to 4.4.2.12:

13.2.2	Battery short circuit		√	
13.2.2	Battery reverse		√	

Supplementary information:
(see Form A.2 for details of tests)



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Clause	Requirement + Test	Result – Remark	Verdict

4.4	TABLE: Testing in single FAULT CONDITION – Results			Form A.2	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
4.4.1	1	Short D12 (EX-P, V1-com, input 250Vac) (for MS2203)	<1s	Fuse open immediately, no hazards	Yes
4.4.1	2	Short C52 (EX-P, V1-com, input 250Vac) (for MS2203)	<1s	Fuse open immediately, no hazards	Yes
4.4.1	3	Short transformer pin5-pin6 (EX-P, V1-com, input 250Vac) (for MS2203)	<1s	Fuse open immediately, no hazards	Yes
4.4.1	4	Short RT2 (for MS2203)	5 min	Input power no change, no hazards	Yes
4.4.1	5	Short R93 (for MS2203)	5 min	Input power no change, no hazards	Yes
4.4.1	6	Short input resistance of TP1 / TP2 / TP3 (1M) (for MS2205)	5 min	Normal operation, no hazards	Yes
13.2.2	7	Battery short circuit	5 min	Max. 1,1 W, no hazards	Yes
13.2.2	8	Battery reverse	5 min	No hazards	Yes

NOTE Td = Test duration in h:min:s
 Record dielectric strength test on Form A.14 and temperature tests on Form A.20.
 Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.



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Clause	Requirement + Test	Result - Remark	Verdict

5.1.3c)	TABLE: Mains supply	Form A.3	N/A
	Marked rating.....:	V	—
	Phase.....:		—
	Frequency.....:	Hz	—
	Current.....:	A	—
	Power.....:	W	—
	Power.....:	VA	—

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

Note: Measurements are only required for marked ratings.

Supplementary information:



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Clause	Requirement + Test	Result - Remark	Verdict

5.3	TABLE: Durability of markings	Form A.4	P
Marking method (see NOTE)		Agent	
1) Silk screen print		A Water	
2) Molding		B Isopropyl alcohol	
3)		C (specify agent)	
4)		D (specify agent)	
5)		E (specify agent)	

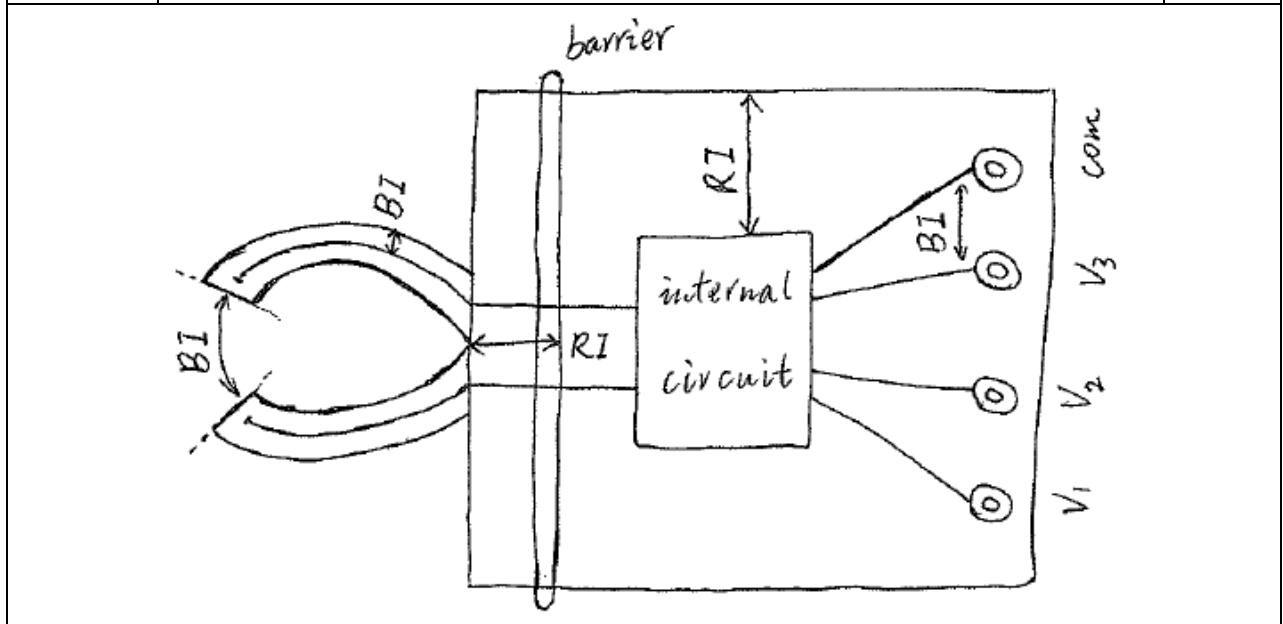
NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

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 (5.1.5.1)	--
Measuring circuit TERMINALS (5.1.5.2)	1)
Switches and circuit breakers (5.1.6)	--
DOUBLE/REINFORCED equipment (5.1.7)	2)
Field wiring TERMINAL boxes (5.1.8)	--
Warning marking (5.2)	2)
Battery charging (13.2.2)	--

Method	Test agent	Remains legible Verdict	Label loose Verdict	Curled edges Verdict	Comments
1)	B	P	P	P	Remain visible

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Clause	Requirement + Test	Result - Remark	Verdict

6 **TABLE: Protection against electric shock - Block diagram of system Form A.5** **P**



Pollution degree : 2 Installation category (overvoltage category) : III P

Location or description	Insulation type (NOTE 1)	Maximum working voltage (NOTE 2)	CREEPAGE DISTANCE (NOTE 3)				CLEARANCE (NOTE 3) mm	Test voltage (NOTE 2) V	Comments
			PWB mm	CTI	Other mm	CTI			
Internal live part to hand held part	RI	600 Vrms	--	--	12,82	≥250 V	12,82	5312 Vrms (3320 × 1,6)	Pass
Internal live part and iron core to jaw surface	BI	600 Vrms	--	--	8,9	≥250 V	8,9	3320 Vrms	EN 61010-2-032 required
Barrier to hazardous live part	RI	600 Vrms	--	--	34,4	≥250 V	41	5312 Vrms (3320 × 1,6)	Pass
Two sides of jaws	BI	600 Vrms	--	--	--	--	--	3320 Vrms	EN 61010-2-032 required
V1/V2/V3 to COM	BI	600 Vrms	5,91	--	--	--	5,91	3320 Vrms	Pass

NOTE 1 – Type of insulation:
 BI = BASIC INSULATION
 DI = DOUBLE INSULATION

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

NOTE 3 - INSTALLATION CATEGORIES (OVERVOLTAGE CATEGORIES) or POLLUTION DEGREES which differ from these should be shown under "Comments".



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Clause	Requirement + Test	Result - Remark	Verdict

6	TABLE: Protection against electric shock - Block diagram of system Form A.5		P
PI = PROTECTIVE IMPEDANCE RI = Reinforced INSULATION SI = Supplementary INSULATION	d.c. peak		
<p>Supplementary Information:</p> <p>Limit:</p> <p>Clearance: (CAT III 600 V)</p> <p>BI: 5,5 mm</p> <p>RI: 10,5 mm</p> <p>Creepage distance: (600 V, 400 V> CTI > 100 V)</p> <p>BI: 6,0 mm</p> <p>RI: 12,0 mm</p> <p>Creepage distance: (600 V, on printed wiring board, pollution degree: 2)</p> <p>BI: 5,5 mm (3,2 mm)</p> <p>Since enclosure of MS2203 are the same size and similar construction as MS2205, there are 4 input terminals in MS2203, and 3 input terminals in MS2205, there are two PCB and 4 pieces of wire in MS2203, and there is one PCB in MS2205 only, construction of MS2203 is more severe than MS2205, construction check are performed in MS2203.</p>			

6.2	TABLE: List of ACCESSIBLE parts		Form A.6	P
6.1.2	Exceptions	Battery cover was fasten with one screw and warning "TO AVOID ELECTRIC SHOCK, DISCONNECT MEASURING CIRCUIT BEFORE REMOVING BATTERY COVER" is marked;		—
6.2	Determination of accessible parts	See below		—
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)	
1	Enclosure	Test finger	--	
<p>NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.1)</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 note to paragraph 1 of 6.4).</p> <p>NOTE 4 – Capacitor test may be required (see Form A.7).</p> <p>NOTE 5 – The determination methods are: visual; rigid test finger; jointed test finger; pin 3 mm diameter; pin 4 mm diameter.</p>				
Supplementary information				



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

6	TABLE: Values in NORMAL CONDITION							Form A.7			P		
6.1.1	Exceptions							11.2 Cleaning and decontamination			—		
6.3.1	Values in NORMAL CONDITION (see NOTE 1)							11.3 Spillage			—		
6.6.2	Terminals for external circuit							11.4 Overflow			—		
6.10.3	Plugs and connections										—		
Item (see Form A.6)	Voltage			Current				Capacitance		10 s test (NOTE 2)			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	8,52	12,05	--	--	--	--	--	--	--	--	--	--	--
Enclosure to refer earth for MS2205	29,1	41,1	--	--	--	--	--	--	--	--	--	--	--

NOTE 1 – The requirements of 6.3.1 include drying out (if specified). For permanently connected equipment, the current values are 1,5 times the specified values.
 NOTE 2 – A 5 s test is specified in 6.10.3c).



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Clause	Requirement + Test	Result – Remark	Verdict

6.3.2	TABLE: Values in SINGLE FAULT CONDITION											Form A.8	P
Item (See Form A.6)	Subclause and fault No. (see FormA.2)	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 (NOTE)		
Enclosure to refer earth for MS2203	See form A.2	25,61	33,17	--	--	--	--	--	--	--	--	No transient voltage	
Enclosure to refer earth for MS2205	See form A.2	40,82	53,14	--	--	--	--	--	--	--	--	No transient voltage	

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

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Clause	Requirement + Test	Result – Remark	Verdict

6.5.1.1	TABLE: Cross-sectional area of bonding conductors		Form A.9	N/A
	Conductor location	Cross-sectional area mm ²		Verdict
6.5.1.2	TABLE: Tighting torque test			N/A
	Conductor location	Size of Screw	Tighting torque Nm	Verdict

6.5.1.3	TABLE: Bonding impedance of plug connected equipment		Form A.10	N/A	
	ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V	Calculated resistance (maximum allowed 0,1 Ω) Ω	Verdict

Supplementary information:

6.5.1.4	TABLE: Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT			N/A
	ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict

Supplementary information:

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Clause	Requirement + Test	Result – Remark	Verdict

6.5.1.5	TABLE: Indirect bonding for measuring and test equipment		Form A.11	N/A
ACCESSIBLE part under test		Voltage attained s	Time for voltage to drop to allowable levels s	Verdict
a) Voltage limiting device		—	—	—
Supplementary Information:				
ACCESSIBLE part under test		Voltage applied V	Time for device to trip s	Verdict
b) Voltage-sensitive tripping device				
Supplementary Information:				

6.5.3	TABLE: PROTECTIVE IMPEDANCE		Form A.12	N/A
A high INTEGRITY single component				
Component		Location	Comments	
A combination of components				
Component		Location	Comments	
A combination of BASIC INSULATION and a current or voltage limiting device				
Component		Location	Comments	
Supplementary information:				



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Clause	Requirement + Test	Result – Remark	Verdict

6.7	TABLE: CLEARANCES and CREEPAGE DISTANCES										Form A.13	P
8	Mechanical resistance to shock and impact											P
10.5.1	Integrity of CLEARANCES and CREEPAGE DISTANCES											P
Location (see Form A.5)	Measured (initial – 6.7)		Verdict	Mechanical tests (note)				Test at max. RATED ambient (10.5.1)	Measured after test (if required)		Verdict	Comments
	CREEPAGE DISTANCE mm	CLEARANCE mm		Applied force (6.7) N	Rigidity (8.1)		Drop (8.2)		CREEPAGE DISTANCE mm	CLEARANCE mm		
See Form A.5	12,82	12,82	P	30N	P	P	P	70°C	12,82	12,82	P	--
	8,9	8,9	P		P	P	P		8,9	8,9	P	--
	34,4	41	P		P	P	P		34,4	41	P	--
	5,91	5,91	P		P	P	P		5,91	5,91	P	--
NOTE – Refer to Form A.12 for dielectric strength tests following the above tests.												



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Clause	Requirement + Test	Result – Remark	Verdict

6.8	TABLE: Dielectric strength tests	Form A.14	P
4.4.4.1 b)	Conformity after application of fault conditions ¹		P
6.4	Protection in NORMAL CONDITION		P
6.5.2	DOUBLE INSULATION and REINFORCED INSULATION		P
6.6.1	Connections to external circuits		P
6.7.3.1 c)	CLEARANCE values – General: reduced CLEARANCES for homogeneous construction		N/A
6.10.2.5	Fitting of non-detachable MAINS SUPPLY cords ¹		N/A
8	Mechanical resistance to shock and impact		P
9.1 a) 2)	Eliminating or reducing the sources of ignition within the equipment		N/A
9.3 c)	Limited-energy circuit		N/A
11.2	Cleaning ¹		N/A
11.3	Spillage ¹		N/A
11.4	Overflow ¹		N/A
11.6	Specially protected equipment ¹		N/A

¹ Record the fault, test or treatment applied before the dielectric strength test

Test site altitude	Up to 2000 m	—
Test voltage correction factor (see Table 10).....	--	—

Location or references from Forms A.2 and A.5	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/d.c. V	Comments	Verdict
Inner live part to hand held part	6.4	Yes	600	5312 Vr.m.s	RI	P
	6.5.2			(3320X1,6)		
	4.4.4.1 b), 8	No	600	3320 Vrms 5312 Vr.m.s (3320X1,6)	BI	P
Inner live part and iron core to jaws surface	6.4	Yes	600	3320 Vr.m.s	BI	P
	4.4.4.1 b), 8	No	600	3320 Vrms	BI	P
	6.4	Yes	600	3320 Vr.m.s	BI	P
V1/V2/V3 to COM	4.4.4.1 b), 8	No	600	3320 Vrms	BI	P

Supplementary information: no breakdown



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Clause	Requirement + Test	Result – Remark	Verdict

6.10.2	TABLE: Cord anchorage					Form A.15	N/A
Location	Mass kg	Pull N	Verdict	Torque Nm	Verdict	Comment	
Supplementary information:							

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Clause	Requirement + Test	Result – Remark	Verdict

9	TABLE: Protection against the spread of fire			Form A.16	P
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9a, 9b or 9c)	Protection details	Verdict	
1	Testing in single fault condition (see form A.2 and form A.32)	9a	All of fault conditions which are liable to result in hazards are applied, no hazards.	P	
2	Plastic enclosure and PCB	9c	Flammability of V- 0	P	

Supplementary information:



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Clause	Requirement + Test	Result – Remark	Verdict

9.2.1	TABLE: Constructional requirements			Form A.17	N/A
14.8	Printed circuit boards	Recognized PCB			N/A
Material tested..... :					
Generic name..... :					
Material manufacturer					
Type					
Colour..... :					
Conditioning details..... :					
		Sample 1	Sample 2	Sample 3	
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:					



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Clause	Requirement + Test	Result – Remark	Verdict

9.3	TABLE: Limited-energy circuit					Form A.18	N/A
Item or Location (see Form A.16)	9.3 a) Maximum potential in circuit voltage r.m.s./d.c. V	9.3 b) Current and power limitation			9.3 c) Circuit separation	Decision Yes/No	Comments
		Maximum available current A	Maximum available power VA	Overload protection after 120 s A			
Supplementary information:							

9.4	TABLE: Requirements for equipment containing or using flammable liquids				Form A.19	N/A
Type of liquid	9.4 Flammable liquids			Verdict		
	b) quantity	c) Containment				
Supplementary information:						



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Clause	Requirement + Test	Result – Remark	Verdict

10.	TABLE : Temperature Measurements	Form A.20A	P
10.1	Surface temperature limits - NORMAL CONDITION		P
10.2	Temperature of windings- NORMAL CONDITION		N/A
10.3	Other temperature measurements		P

Operating conditions:		Measure voltage (MS2203)			
Frequency	- Hz	Test room ambient temperature (t_a)		25 °C	
Voltage	- V	Test duration		3 h 6 min	
Part / Location	t_m °C	t_c °C	t_{max} °C	Verdict	Comments
Transformer winding	30,5	45,5	105	Pass	
Internal wire	53,6	68,6	80	Pass	
Knob	28,3	43,3	70	Pass	
Key	27,9	42,9	70	Pass	
Front surface of enclosure	27,3	42,3	80	Pass	
Back surface of enclosure	30,4	45,4	80	Pass	

Operating conditions:		Measure voltage (MS2205)			
Frequency	- Hz	Test room ambient temperature (t_a)		25 °C	
Voltage	- V	Test duration		2 h 54 min	
Part / Location	t_m °C	t_c °C	t_{max} °C	Verdict	Comments
Front surface of enclosure	25,6	40,6	80	Pass	
Back surface of enclosure	26,3	41,3	80	Pass	
Knob	25,8	40,8	70	Pass	
Button	25,8	40,8	70	Pass	
PCB	26,2	41,2	--	Pass	For reference

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.20B for details of winding temperature measurements

1. Supplementary information:



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Clause	Requirement + Test	Result – Remark	Verdict

10.	TABLE : Temperature Measurements	Form A.20A	P
10.1	Surface temperature limits - SINGLE FAULT CONDITION		P
10.2	Temperature of windings- SINGLE FAULT CONDITION		N/A
10.3	Other temperature measurements		P

Operating conditions:		Measure voltage, short R93 (MS2203)				
Frequency	- Hz	Test room ambient temperature (t_a).....:		25 °C		
Voltage	- V	Test duration		3 h 16 min		
Part / Location		t_m °C	t_c °C	t_{max} °C	Verdict	Comments
Transformer winding		30,0	45,0	150	Pass	
Internal wire		53,3	68,3	110	Pass	
Knob		27,5	42,5	105	Pass	
Key		27,4	42,4	105	Pass	
Front surface of enclosure		26,5	41,5	105	Pass	
Back surface of enclosure		29,5	44,5	105	Pass	

Operating conditions:		Battery reverse (MS2205)				
Frequency	- Hz	Test room ambient temperature (t_a).....:		25 °C		
Voltage	- V	Test duration		2 h 54 min		
Part / Location		t_m °C	t_c °C	t_{max} °C	Verdict	Comments
Front surface of enclosure		27,4	42,4	105	Pass	
Back surface of enclosure		26,2	41,2	105	Pass	
Knob		26,7	41,7	105	Pass	
Button		26,1	41,1	105	Pass	
PCB		26,5	41,5	--	Pass	For reference

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.20B for details of winding temperature measurements

1. Supplementary information:



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Clause	Requirement + Test	Result – Remark	Verdict

10.2	TABLE: Temperature of windings Resistance method Temperature Measurements					Form A.20B	N/A	
4.4.2.6	MAINS Transformers						N/A	
14.2.1	Motor temperatures						N/A	
Operating conditions:								
Frequency	Hz	Test room ambient temperature (t_{a1}/t_{a2}) ...:				/	°C (initial / final)	
Voltage	V	Test duration				h	min	
Part / Designation	R_{cold} Ω	R_{warm} Ω	Current A	t_r K	t_c °C	t_{max} °C	Verdict	Comments
NOTE 1- R_{cold} = initial resistance t_r = temperature rise t_{max} = maximum permitted temperature NOTE 2 - Indicate insulation class (IEC 85) under comments (optional) NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary								
Supplementary information:								

10.5.2	TABLE: Resistance to heat of non-metallic enclosures					Form A.21	P
	Test method used:	a)				—	
	Non operative treatment.....:	[V]				P	
	Empty ENCLOSURE.....:	[]				N/A	
	Operative treatment.....:	[]				N/A	
	Temperature during tests	70 °C				—	
	ENCLOSURE samples tested were	--				—	
	Description	Material		Comments		Verdict	
	Plastic enclosure	ABS, flammability of V- 0		No damage		Pass	
	Dielectric strength test (6.8).....:	5312	V	r.m.s.		P	
Supplementary information: Dielectric strength test, no breakdown.							



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Clause	Requirement + Test	Result – Remark	Verdict
10.5.3	TABLE: Insulating Materials	Form A.22	N/A
10.5.3a)	Ballpressure test		N/A
	Max. allowed impression diameter	2 mm	—
Part	Test temperature °C	Impression Diameter (mm)	Verdict
Supplementary information:			
10.5.3b)	Vicat softening test (ISO 306)		N/A
Part	Vicat softening temperature °C	Thickness of sample (mm)	Verdict
Supplementary information:			



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Clause	Requirement + Test	Result – Remark	Verdict

8	TABLE: Mechanical resistance to shock and impact	Form A.23	P
11	Protection against hazards from fluids		N/A

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

Location (see form A.5)	Clause 8 tests				Clause 11 tests				Working voltage V	Test voltage V	Verdict	Comments
	Static	Dynamic	Normal	Handheld Plug-in	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)				
See form A.5	√	√	--	√	--	--	--	--	600	5312 Vr.m.s	P	RI
	√	√	--	√	--	--	--	3320Vr ms		P	BI	
	√	√	--	√	--	--	--	5312 Vr.m.s		P	RI	
	√	√	--	√	--	--	--	3320 Vr.m.s		P	BI	
	√	√	--	√	--	--	--	3320 Vr.m.s		P	BI	

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



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Clause	Requirement + Test	Result – Remark	Verdict

11.7.2	TABLE: Leakage and rupture at high pressure				Form A.24	N/A
Part	Maximum permissible working pressure MPa	Test pressure MPa	Leakage YES / NO	Burst YES / NO	Comments	
Supplementary information:						
11.7.3	Leakage from low-pressure parts					N/A
Part	Test pressure MPa	Leakage YES / NO	Comments			
Supplementary information:						



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Clause	Requirement + Test	Result – Remark	Verdict

12.2.1	TABLE: Ionizing radiation	Form A 25	N/A
Locations tested	Measured values μSv/h	Verdict	Comments
Supplementary information:			

12.5.1	TABLE: Sound level	Form A.26	N/A
Locations tested	Measured values dBA	Calculated maximum sound pressure level	
At operator's normal position and at bystanders' positions			
a)			
b)			
c)			
d)			
e)			
Supplementary information:			

12.5.2	Ultrasonic pressure		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:			



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Clause	Requirement + Test	Result – Remark	Verdict

13.2.2	TABLE: Batteries	Form A.27	P
	Battery load and charging circuit diagram:	No rechargeable battery	
	Battery type.....:	AA	—
	Battery manufacturer/model/catalogue No.....:	No specified	—
	Battery ratings	DC 4 × 1,5V	—
	Reverse polarity instalment test	No hazard	P
Single component failures		Verdict	
Component		Open circuit	Short circuit
Supplementary information:			

14.3	TABLE: Overtemperature protection devices	Form A.28	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:			



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Clause	Requirement + Test	Result – Remark	Verdict

4.4.2.6	TABLE: Mains transformer		Form A.29	N/A
4.4.2.6.1	Short circuit			N/A
14.7.1	MAINS transformers tested outside equipment			N/A
Type				—
Manufacturer				—
Test in equipment				
Test on bench				
Test repeated inside equipment (see 14.7)				
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.20B!			
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:				



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Clause	Requirement + Test	Result – Remark	Verdict

4.4.2.6	TABLE: Mains transformer		Form A.30	N/A
14.7.2	Overload tests (for mains transformers)			N/A
Type				—
Manufacturer				—
Test in equipment				
Test on bench				
Test repeated inside equipment (see 14.7)				
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.20B!			
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:				

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Clause	Requirement + Test	Result – Remark	Verdict

16.1	TABLE: Current measuring circuits				Form A.31	N/A
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						
a) Current transformers						
Type/Model	RATED current A	Test current A	Interrupt Yes / No	Verdict	Comments	
Supplementary information:						
b) Range changing switches						
Type / Model	Maximum rated current of switch A	Cycling test Verdict	Comments			
Supplementary information:						
No such switches.						



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16.2	TABLE: Multifunctional meters and similar equipment		Form A. 32	P
	Operating conditions.....:	Power test		—
	Maximum RATED voltage applied (V).....:	600 Vac		—
	Measurement category.....:	CAT III 600 V		—
	Test source limit (KVA).....:	30 KVA		—
	Function	Range		Verdict
Supplementary information:				

Knob Mode	Test Probe	Operation	Result
EX-Ⓟ for MS2203	V1 - COM	CAT III 600Vac	Normal operation, no hazard
MR for MS2203	V1 - COM	CAT III 600Vac	Display “- - - -“, no hazard
MR for MS2203	V2 - COM	CAT III 600Vac	Display “- - - -“, no hazard
MR for MS2203	V3 - COM	CAT III 600Vac	Display “- - - -“, no hazard
KW 1 phase for MS2205	V1 - V3	CAT III 600Vac	Voltage value decrease 50% than real value, display “300 V”, no hazard
Ø 1 phase for MS2205	V2 - V3	CAT III 600Vac	Voltage value decrease 50% than real value, display “300 V”, no hazard

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Clause	Requirement + Test	Result – Remark	Verdict

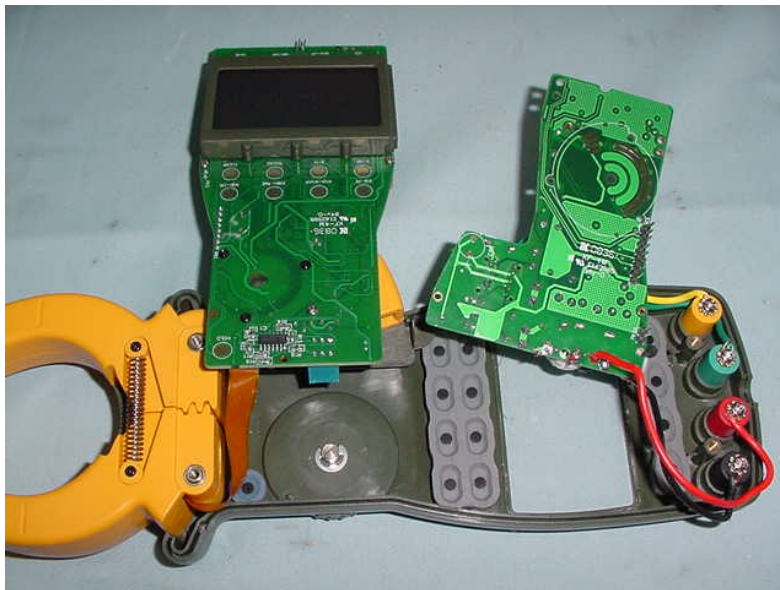
Appendix: 1

Photos: MS2203



For marking of jaws refer to page 5

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Clause	Requirement + Test	Result – Remark	Verdict



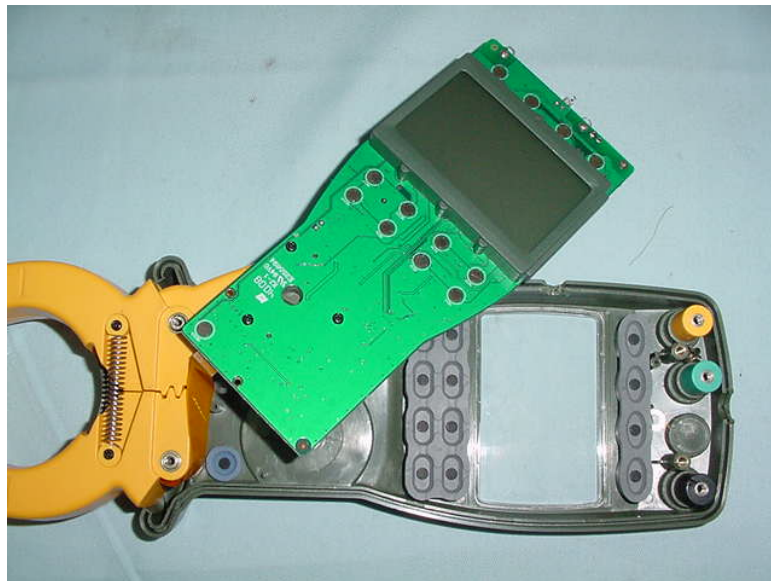
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Photos: MS2205



For marking of jaws refer to page 5

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Clause	Requirement + Test	Result – Remark	Verdict

Photos: JAW

