

APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

INVT POWER SYSTEM (SHENZHEN) CO., LTD

Uninterruptible Power Systems

**Model(s): HR1110S, HR1108S, HR1106S, HR1105S, HR1104S,
HR1110L, HR1108L, HR1106L, HR1105L, HR1104L, HT1104L, HT1104S**

**Prepared For : INVT POWER SYSTEM (SHENZHEN) CO., LTD
5# Building, Gaofa Industrial Park, Longjing, Nanshan District,
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TEST REPORT IEC 62040-1 Uninterruptible power systems (UPS) – Part 1: General and safety requirements for UPS	
Report Reference No.....	ES160629004S
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Testing Laboratory	EMTEK (Shenzhen) CO., LTD.
Address	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location / address	Same as above
Applicant's name.....	INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address	5th Floor, 1#Building, Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Test specification:	
Standard	IEC 62040-1:2008 (First Edition) + Am 1:2013
Test procedure	Compliance with IEC 62040-1:2008 (First Edition) + Am 1:2013
Non-standard test method.....	N/A
Test Report Form No.....	IEC62040_1A
Test Report Form(s) Originator	TÜV Rheinland Japan Ltd.
Master TRF	Dated 2014-01
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Test item description	Uninterruptible Power Systems
Trade Mark	INVT
Manufacturer	INVT Power System (Shenzhen) Co., LTD
Address	5th Floor, 1#Building, Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Model/Type reference	HR1110S, HR1108S, HR1106S, HR1105S, HR1104S, HT1104S, HR1110L, HR1108L, HR1106L, HR1105L, HR1104L, HT1104L
Ratings	HR1110S AC Input: 220-240VAC, 1φ+N+PE, 50/60Hz, 47A max Output: 220-240VAC, 1φ+N+PE, 50/60Hz, 10KVA/9KW

Icw: 6KA

HR1108S

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 38A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 8KVA/7.2KW

Icw: 6KA

HR1106S

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 28A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 6KVA/5.4KW

Icw: 6KA

HR1105S

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 24A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 5KVA/4.5KW

Icw: 6KA

HR1110L

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 49A max

Batt. Input: 192VDC, 52A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 10KVA/9KW

Icw: 6KA

HR1108L

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 39A max

Batt. Input: 192VDC, 42A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 8KVA/7.2KW

Icw: 6KA

HR1106L

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 29A max

Batt. Input: 192VDC, 31A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 6KVA/5.4KW

Icw: 6KA

HR1105L

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 24A max

Batt. Input: 192VDC, 26A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 5KVA/4.5KW

Icw: 6KA

HT1104S/HR1104S

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 19A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 4KVA/3.6KW

Icw: 6KA

HT1104L/HR1104L

AC Input: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 20A max

Batt. Input: 192VDC, 21A max

Output: 220-240VAC, 1 ϕ +N+PE, 50/60Hz, 4KVA/3.6KW

Icw: 6KA

Test item particulars	
Equipment mobility	<input checked="" type="checkbox"/> movable <input type="checkbox"/> stationary <input type="checkbox"/> for building-in
Connection to the mains.....	<input type="checkbox"/> pluggable equipment <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord
Operating condition	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
Access location	<input checked="" type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location
Over voltage category (OVC)	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
Mains supply tolerance (%) or absolute mains supply values	220Vac(-10%), 240Vac(+10%) of input voltage considered
Tested for IT power systems	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Not classified
Considered current rating (A)	900A
Pollution degree (PD)	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
IP protection class	IP20
Altitude during operation (m)	Up to 2000
Altitude of test laboratory (m)	below 2000
Mass of equipment (kg)	>7Kg
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A N equal to 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	N/A
Date(s) of performance of tests	N/A
General remarks:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma (point) is used as the decimal separator. Standard EN 62040-1:2008+A1:2013 is to be used in conjunction with EN 60950-1:2006, which is referred to in this TRF as "RD".</p>	
General product information:	
<p>This report is amended from previous report ES111222137S-2, dated September 03, 2013, due to below amendments:</p> <ul style="list-style-type: none"> - Update standard: EN 62040-1:2008+A1:2013 - Updated LVD directive. 	
1. The equipment is an on-line type of uninterruptible power supply for general use with information	

technology equipment.

2. Model difference description:

All models are designed with same control logic, constructions, PSDR PCBs, CNTL PCB, Input EMI PCB, CHAG PCB, Output EMI PCB and Panel PCB. Unless otherwise stated, all tests were performed on model HR1110L which means the typical model.

3. This report was based on original report ES111222137S, issued on April 09, 2012, to change model name from HT1110S, HT1108S, HT1106S, HT1105S, HT1110L, HT1108L, HT1106L, HT1105L to HR1110S, HR1108S, HR1106S, HR1105S, HR1104S, HT1104S, HR1110L, HR1108L, HR1106L, HR1105L, HR1104L, HT1104L. The old models and new models are identical to each other except for different model name.




Summary of testing:

The product has been tested according to standard EN 62040-1: 2008.

- Tests performed on the bench
- Maximum ambient temperature: 40°C
- Tested for moderate conditions
- EUT is designed for altitudes not exceeding 2000 m.



Copy of marking plate:

1. Rating label for model HR1110S:

	INVT	
	UNINTERRUPTIBLE POWER SUPPLY	
	MODEL: HR1110S	
	AC Input: 220-240VAC, 1φ+N+PE, 50/60Hz, 47A max	
	Output: 220-240VAC, 1φ+N+PE, 50/60Hz, 10KVA/9KW	

Icw: 6KA
 Manufacturer: INVT POWER SYSTEM (SHENZHEN) CO., LTD
 Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
 Importer: xxx
 Address: xxx
 Battery must be recycled.
 WARNING! Risk of electric shock.

2. Rating label for model HR1110L:

	INVT	
	UNINTERRUPTIBLE POWER SUPPLY	
	MODEL: HR1110L	
	AC Input: 220-240VAC, 1φ+N+PE, 50/60Hz, 49A max	
	Batt. Input: 192VDC, 52A max	
	Output: 220-240VAC, 1φ+N+PE, 50/60Hz, 10KVA/9KW	

Icw: 6KA
 Manufacturer: INVT POWER SYSTEM (SHENZHEN) CO., LTD
 Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
 Importer: xxx
 Address: xxx
 Battery must be recycled.
 WARNING! Risk of electric shock.

2. Warning label on outer enclosures:

Caution:

- For operation read user manual including safety warnings first!
- This unit may be opened by authorized technicians only!
- Lead acid battery in the inside of the enclosure!
- The battery may present a risk of electric shock and energy hazards.
- Risk of explosion if battery replaced by an incorrect type. For battery information, see user's manual.
- For disposal instructions of the battery, see user's manual.
- See installation instructions before connecting to the supply.

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL CONDITIONS FOR TESTS		P
4.3	Components		P
1.5.1/RD	General		
	Comply with IEC 62040-1 or relevant component standard	(see appended table 4.5)	P
1.5.2/RD	Evaluation and testing of components	Certified components are used in accordance with their ratings, certifications and they comply with applicable parts of this standard. Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 60950-1 and the relevant component standard. Components, for which no relevant IEC-standard exists, have been tested under the conditions occurring in the equipment, using applicable parts of IEC 60950-1.	P
1.5.3/RD	Thermal controls	No thermal control.	N
1.5.4/RD	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard and particularly Annex C/RD.	P
1.5.5/RD	Interconnecting cables		N
1.5.6/RD	Capacitors bridging insulation	Between lines: X2 capacitor according to IEC 60384-14: 1993 with 21 days damp heat test was used.	P
1.5.7/RD	Resistors bridging insulation	Refer to below:	P
1.5.7.1/RD	Resistors bridging functional, basic or supplementary insulation		P
1.5.7.2/RD	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	No resistors bridging double or reinforced insulation.	N
1.5.7.3/RD	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable	No antenna or coaxial cable.	N
1.5.8/RD	Components in equipment for IT power systems	TN power system	N
4.6	Power interface		P
1.6.1/RD	AC power distribution systems	TN power system	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.2/RD	Input current	Highest normal load according to 1.2.2.1/RD for this equipment is the charging of empty battery and operation with the maximum specified output load. (see appended table 4.6)	P
4.6 1.6.4/RD	Neutral conductor	Neutral is insulated from earth with basic insulation throughout the equipment. O/P neutral is not isolated from I/P neutral.	P

4.7	Marking and instructions		P
4.7.1	General	See below.	P
4.7.2 1.7.1/RD	Power rating	The required marking is located on the outside surface of the equipment.	P
	Input rated voltage/range (V)	220-240Vac	P
	Input rated current/range (A).....	See rating labels	P
	Input symbol for nature of supply (d.c.)	Not connected to DC supply.	N
	Input rated frequency/range (Hz)	50/60Hz	P
	Number of Input phases and neutral.....	1Φ+N+E	P
	Output rated voltage/range (V)	200-240Vac	P
	Output rated current/range (A)	Not marked.	N
	Output rated power factor, (if less than unity, or active power and apparent power or active power and rated current)		N
	Number of output phases and neutral.....	1Φ+N+E	P
	Output rated active power (W)	See rating label	P
	Output rated apparent power (VA)	See rating label	P
	Output symbol for nature of supply (d.c.)	No d.c. output.	N
	Output rated frequency/range (Hz)	See rating label	P
	Ambient operating temperature range (°C).....	25°C	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)	Icw: 6KA	P
	Manufacturer's name or trademark or identification mark	See rating label	P
	Type/model or type reference	See rating label	P
	Symbol for Class II equipment only	The equipment is Class I.	N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Other symbols	The additional marking does not give rise to misunderstandings.	P
	Certification marks	CE	P
	Instructions for units with automatic bypass / maintenance bypass, additional input a.c. supply, or external batteries, having text "See installation instructions before connecting to the supply"	See caution label	P
4.7.3	Safety instructions	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
4.7.3.1	General	Considered	P
4.7.3.2	Installation	Installation instructions are available to the user in User's Manual.	P
	Location in a restricted access location only	Instruction manual provided. Not for restricted access location.	P
	Permanent connector UPS	Instruction manual provided.	P
	Pluggable type A or Pluggable type B UPS	Not Pluggable type A or Pluggable type B UPS	N
4.7.3.3	Operation.....	The suitable information list in the user manual when operate the UPS. Not for restricted access location.	P
4.7.3.4	Maintenance.....	The instruction of maintenance is only included in the service manual.	P
4.7.3.5	Distribution related backfeed.....	Backfeed protection provided externally to the UPS.	P
4.7.4 1.7.4/RD	Main voltage adjustment	No voltage selector	N
	Methods and means of adjustment; reference to installation instructions	No voltage selector	N
4.7.5 1.7.5/RD	Power outlets.....	Relevant information provided on the marking that is affixed near the outlets.	P
4.7.6 1.7.6/RD	Fuse identification (marking, special fusing characteristics, cross-reference)	Marking near holders for fuses.	P
4.7.7 1.7.7/RD	Wiring terminals	Refer below:	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.1/RD	Protective earthing and bonding terminals	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors		N
1.7.7.3/RD	Terminals for d.c. mains supply conductors	AC main supplied	N
4.7.8	Battery terminals :	The terminal of batteries is marked with standard symbol (IEC 60417, No. 5005 and No. 5006).	P
4.7.9 1.7.8/RD	Controls and indicators	See below	P
1.7.8.1/RD	Identification, location and marking :	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
1.7.8.2/RD	Colours :	For LED provided, located on the front panel	P
1.7.8.3/RD	Symbols according to IEC 60417 :	The function switch is marked " " (IEC 60417-1 No. 5010).	P
1.7.8.4/RD	Markings using figures :	No controls affecting safety are using figures.	N
4.7.10 1.7.9/RD	Isolation of multiple power sources :	Only one external supply of hazardous voltage of energy (via appliance inlet).	N
4.7.11 1.7.2.4/RD	IT power systems	TN power system.	N
4.7.12	Protection in building installation	The protection does rely upon building installation.	P
	Rated short-time withstand current (/cw)		N
	Rated conditional short circuit current (/cc)		N
	a) If higher Icp stated ≤ 10 kA		N
	a) If higher Icp stated > 10 kA		N
4.7.13 5.1/RD	High leakage current (mA)	Leakage current of the equipment does not exceed 3.5mA. However due to the connected load has influence on the overall earth leakage current, a corresponding statement was provided in the User's Manual.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	No thermostats or other regulating devices.	N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s)	Instructions and markings shall be in a language acceptable for the country where the equipment is to be used. English user manual provided.	P
4.7.16 1.7.11/RD	Durability of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15s and then again for 15s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking of the label did not fade. There was neither curling nor lifting of the label edge.	P
4.7.17 1.7.12/RD	Removable parts	No required markings placed on removable parts.	P
4.7.18 1.7.13/RD	Replaceable batteries	The battery is not placed in an operator access area. The required warning is in the safety manual.	P
	Language(s)	Instructions and markings are in English.	
4.7.19 1.7.2.5/RD	Operator access with a tool.....	All areas containing hazard(s) are inaccessible to the operator.	P
4.7.20	Battery	Pluggable equipment type A UPS with integral batteries.	P
	Clearly legible information	Warning label attached on the outside surface of External battery pack. Information clearly legible	P
	Battery type	Lead-Acid	P
	Nominal voltage of total battery (V)	Stated on rating user's manual.	P
	Nominal capacity of total battery (optional)	Stated on rating user's manual.	P
	Warning label	Warning language with information: Caution: Lead-acid battery inside the enclosure, it may cause chemical hazard. The battery may presents a risk of electric shock and energy hazards. For disposal instructions for the battery, see user's manual.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Instructions	The sufficient information about the battery was given in the user's manual.	P
2.1.1.5/RD	Protection against energy hazards	No energy hazard in operator access area. Checked by means of the test finger.	P
4.7.21 1.7.2.4/RD	Installation instructions	Detailed information regarding external interfaces (TNV circuit, TVSS port) and modem / phonenumber connection) provided in the User's Manual.	P

5	FUNDAMENTAL DESIGN REQUIREMENTS		P
5.1	Protection against electric shock and energy hazards		P
5.1.1 2.1.1/RD	Protection for UPS intended to be used in operator access areas	Refer below:	P
2.1.1.1/RD	Access to energized parts	There is adequate protection against operator contact with bare parts at ELV or hazardous voltage or parts separated from these with basic or functional insulation only (except protective earth). No hazardous voltages exceeding 1000V a.c. or 1500V d.c. Checked by test finger, test probe and test pin.	P
	Test by inspection :	Complies	P
	Test with test finger (Figure 2A) :	Complies	P
	Test with test pin (Figure 2B) :	Complies	P
	Test with test probe (Figure 2C) :	No TNV circuits	N
2.1.1.2/RD	Battery compartments	Inside the battery compartment only primary circuits.	N
2.1.1.3/RD	Access to ELV wiring	No internal wiring at ELV accessible to the operator.	N
	Working voltage (V_{peak} or V_{rms}); minimum distance through insulation (mm)		
2.1.1.4/RD	Access to hazardous voltage circuit wiring	No operator accessible hazardous voltage circuit wiring.	N
2.1.1.5/RD	Energy hazards :	The user accessible TVSS and TNV phonenumber ports are isolated from the hazardous energy level of the battery inside the UPS.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.1.1.6/RD	Manual controls	No shafts of knobs etc. at ELV or hazardous voltage.	P
2.1.1.7/RD	Discharge of capacitors in equipment	The capacitance of the input circuits > 0.1 μF, refer to list of critical components.	P
	Measured voltage (V); time-constant (s) :	(See appended table 5.1.1)	--
2.1.1.8/RD	Energy hazards – d.c. mains supply	The equipment is not connected to d.c. mains supply	N
	a) Capacitor connected to the d.c. mains supply :		N
	b) Internal battery connected to the d.c. mains supply :		N
2.1.1.9/RD	Audio amplifiers :	No such parts.	N
5.1.2 2.1.1.5 c) /RD	Protection for UPS intended to be used in service access areas	Checked by inspection, unintentional contact is unlikely during service operations.	N
	Hazardous energy level		N
5.1.3 2.1.1.5 c) /RD	Protection for UPS intended to be used in restricted access areas		N
	Hazardous energy level		N
5.1.4	Backfeed protection		—
	Shock hazard after de-energization of a.c. input for UPS	No shock hazard	P
	Measured voltage (V); time-constant (s) :	(see appended table 5.8)	P
	Description of the construction:	The backfeed protection is achieved through the backfeed relay RY1, the current transformer CT3, and the converter transformer which provides reinforce insulation between the primary and secondary circuits.	P
	Air gap is employed for backfeed protection	Not mandatory for pluggable UPS.	N
5.1.5	Emergency switching device	Not mandatory for pluggable UPS.	N
5.2	Requirements for auxiliary circuits		P
5.2.1 2.2/RD	Safety extra low voltage circuit - SELV	See below:	P
2.2.1/RD	General requirements	SELV limits are not exceeded under normal condition.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.2.2/RD	Voltages under normal conditions (V)	Within SELV limits. (See appended table 5.2.1)	P
2.2.3/RD	Voltages under fault conditions (V)	Within SELV limits. (See appended table 5.2.1)	P
2.2.4/RD	Connection of SELV circuits to other circuits ..	SELV circuits are only connected to other SELV and protective earth.	P
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	Refer below:	N
2.3.1/RD	Limits	No TNV circuits, cl. 2.3/RD	N
	Type of TNV circuits :		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions :		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed :		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed :		
2.3.5/RD	Test for operating voltages generated externally		N
5.2.3 2.4/RD	Limited current circuits	No limited current circuits, cl. 2.4/RD.	N
2.4.1/RD	General requirements		N
2.4.2/RD	Limit values		
	Frequency (Hz) :		
	Measured current (mA) :		
	Measured voltage (V) :		
	Measured circuit capacitance (nF or μ F) :		
2.4.3/RD	Connection of limited current circuits to other circuits		N
5.2.4 3.5/RD	External signalling circuits		N
3.5.1/RD	General requirements		N
3.5.2/RD	Types of interconnection circuits :		N
3.5.3/RD	ELV circuits as interconnection circuits	No ELV interconnections.	N
3.5.4/RD	Data ports for additional equipment	Data ports (TNV circuit, TVSS port) are signal port only, no test required.	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.5 2.5/RD	Limited power source		N
	a) Inherently limited output		N
	b) Impedance limited output		N
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA)		N
	Current rating of overcurrent protective device (A)		N
	Use of integrated circuit (IC) current limiters		N

5.3	Protective earthing and bonding		P
5.3.1	General	See below.	P
2.6/RD	Provisions for earthing and bonding	See below.	P
2.6.1/RD	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal (via green/yellow insulated wires).	P
2.6.2/RD	Functional earthing	No functional earthing.	N
2.6.3/RD	Protective earthing and protective bonding conductors		P
2.6.3.1/RD	General	Compliance checked.	P
2.6.3.2/RD	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm ²), AWG :	(see appended tabel 4.5)	P
2.6.3.3/RD	Size of protective bonding conductors	Refer to 2.6.3.4/RD.	P
	Rated current (A), cross-sectional area (mm ²), AWG :	Refer to 2.6.3.4/RD.	—
	Protective current rating (A), cross-sectional area (mm ²), AWG :	Refer to 2.6.3.4/RD.	—
2.6.3.4/RD	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) :	(See appended table 5.3.1)	P
2.6.3.5/RD	Colour of insulation :	All insulated protective earth conductors are used colored green and yellow.	P
2.6.4/RD	Terminals	See below.	P
2.6.4.1/RD	General	See below.	P
2.6.4.2/RD	Protective earthing and bonding terminals	Adequate protective earth connection, see also Sub-clause 2.6.3.4/RD and 3.3/RD	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated current (A), type, nominal thread diameter (mm) :		—
2.6.4.3/RD	Separation of the protective earthing conductor from protective bonding conductors	Separate PE and protective bonding conductor used.	N
2.6.5/RD	Integrity of protective earthing	See below.	P
2.6.5.1/RD	Interconnection of equipment	Interconnected equipment is properly earthed.	P
2.6.5.2/RD	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3/RD	Disconnection of protective earth	It is not possible to disconnect protective earth without disconnecting mains	P
2.6.5.4/RD	Parts that can be removed by an operator	No operator removable parts with protective earth connection except supply cord.	P
2.6.5.5/RD	Parts removed during servicing	It is not necessary to disconnect earthing except for the removal of the earthed part itself.	P
2.6.5.6/RD	Corrosion resistance	No risk of corrosion	P
2.6.5.7/RD	Screws for protective bonding	No such screw	N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system	Protective earthing does not rely on a telecommunication network.	N
5.3.2 2.6.1/RD	Protective earthing	Accessible conductive parts are reliably connected to protective earth terminal	P
2.10/RD	Clearances, creepage distances and distances through insulation	See clause 5.7	P
4.2/RD	Mechanical strength	See clause 7.3	P
5.2/RD	Electric strength	See clause 8.2	P
5.3.3	Protective bonding	Refer also to 2.6.3.4/RD	P
5.4	AC and d.c. power isolation		P
5.4.1	General	See below.	P
3.4/RD	Disconnection from the mains supply	See below.	P
3.4.1/RD	General requirement	Considered	P
3.4.2/RD	Disconnect devices		P
3.4.3/RD	Permanently connected equipment		N

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Clause	Requirement + Test	Result - Remark	Verdict
3.4.4/RD	Parts which remain energized	No parts remain energized after the disconnect device is pull out.	N
3.4.5/RD	Switches in flexible cords	No such construction.	N
3.4.6/RD	Number of poles - single-phase and d.c. equipment	three-phase equipment	N
3.4.7/RD	Number of poles - three-phase equipment	Single-phase only.	N
3.4.8/RD	Switches as disconnect devices		N
3.4.9/RD	Plugs as disconnect devices		P
3.4.10/RD	Interconnected equipment		N
3.4.11/RD	Multiple power sources		N
5.4.2	Disconnect devices	Refer to cl. 3.4.2/RD.	N
5.5	Overcurrent and earth fault protection		P
5.5.1	General	See below.	P
2.7.3/RD	Short-circuit backup protection	Pluggable equipment with type A. Building installation is considered as providing short circuit backup protection.	P
2.7.4/RD	Number and location of protective devices	Over current protection by one built-in input fuse. Protection devices in the building installation considered as providing sufficient protection against earth faults.	P
2.7.5/RD	Protection by several devices	Only one protective device provided.	P
2.7.6/RD	Warning to service personnel :	Hazard may be still present in the equipment after the input circuit breaker opens. However, as it is considered that the plug to the mains will be disconnected during service work. No markings were needed.	N
5.5.2	Basic requirements	Equipment relies on circuit breaker of the wall outlet installation protection of the building installation in regard to L, N short circuit and for L to PE earth fault. Over current protection is provided by the built-in device breaker.	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.3	Battery circuit protection	Ungrounded battery inside the UPS. Required fuses against - overcurrent: 1 - earth fault: 1 Protection against overcurrent by DC fuses in the positive pole of the battery. However earth faults will be covered by devices in the building installation.	P
5.5.3.1	Overcurrent and earth fault protection	See below.	P
5.5.3.2	Location of protective device	The fuses are directly located behind the supply wire of the battery. The charger circuit is located in the battery circuit before the fuses. For the charger circuit there are no hazardous conditions under any simulated fault conditions. See appended table.	P
5.5.3.3	Rating of protective device	The rating of the fuses inside the UPS provides adequate safety protection during abnormal and/or fault conditions.	P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.5.4	Short-time withstand current		P
5.5.4.1	General		P
5.5.4.2	Modes of operation		P
5.5.4.3	Test procedure		P
5.5.4.3.1	General application		P
	Rated UPS output current/(r.m.s) (A)	See product specification	P
	Prospective test current/(r.m.s) (A)	See product specification	P
	Typical power factor	See product specification	P
	Initial asymmetric peak current ration (I_{pk} / I_{cw}) ..	I_{cw} : 6KA	P
	Minimum duration of prospective test current (cycles 50/60 Hz)	50Hz	P
5.5.4.3.2	Exemption from testing		P
5.6	Protection of personnel – Safety interlocks <i>(No safety interlock provided for operator protection since there are no liable hazards capable of harming the operator during operation).</i>		P
5.6.1	Operator protection	See below	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.8/RD	Safety interlocks	No safety interlocks.	N
2.8.1/RD	General principles		N
2.8.2/RD	Protection requirements		N
2.8.3/RD	Inadvertent reactivation		N
2.8.4/RD	Fail-safe operation		N
2.8.5/RD	Moving parts		N
2.8.6/RD	Overriding		N
2.8.7/RD	Switches and relays		N
2.8.7.1/RD	Contact gaps (mm) :		N
2.8.7.2/RD	Overload test		N
2.8.7.3/RD	Endurance test		N
2.8.7.4/RD	Electric strength test	(see appended table 8.2)	N
2.8.8/RD	Mechanical actuators		N
5.6.2	Service person protection	See below.	P
5.6.2.1	Introduction	Considered	P
5.6.2.2	Covers	It is unlikely that during the removal of any covers service personnel may touch hazardous voltage or energy.	P
5.6.2.3	Location and guarding of parts	Only the exchange of the battery is considered as possible servicing. A risk of injury is unlikely for the service personnel.	P
5.6.2.4	Parts on doors	The UPS is designed with only screwed enclosure parts.	P
5.6.2.5	Component access	No component access during operation mode necessary.	N
2.8.3/RD	Inadvertent reactivation	No servicing in operation mode necessary.	N
5.6.2.6	Moving parts	No hazardous moving parts.	N
5.6.2.7	Capacitor banks	The capacitors provided can produce energy level way below 20 joules.	P
5.6.2.8	Internal batteries	The terminals of the battery connections are isolated and covered so that it is unlikely to bridge the terminals of the battery during servicing or its replacement.	P
5.7 2.10/RD	Clearances, creepage distances and distances through insulation		P

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.1/RD	General	See below.	P
2.10.1.1/RD	Frequency	Considered.	P
2.10.1.2/RD	Pollution degrees	II	P
2.10.1.3/RD	Reduced values for functional insulation	The functional insulations comply with 5.3.4/RD a) and c)	P
2.10.1.4/RD	Intervening unconnected conductive parts	Considered.	P
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used.	P
2.10.1.6/RD	Special separation requirements	Special separation is not used.	N
2.10.1.7/RD	Insulation in circuits generating starting pulses	No such circuit generating starting pulses.	N
2.10.2/RD	Determination of working voltage	(See appended table 5.7)	P
2.10.2.1/RD	General	See below.	P
2.10.2.2/RD	RMS working voltage	(See appended table 5.7)	P
2.10.2.3/RD	Peak working voltage	(See appended table 5.7)	P
2.10.3/RD	Clearances	See below.	P
2.10.3.1/RD	General	See below.	P
2.10.3.2/RD	Mains transient voltages	See below.	P
	a) AC mains supply	Equipment is Overvoltage Category II.	P
	b) Earthed d.c. mains supplies	Not intended for d.c. mains supplies	N
	c) Unearthed d.c. mains supplies :	Not intended for d.c. mains supplies	N
	d) Battery operation :	Dedicated battery used.	P
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.3.5/RD	Clearances in circuits having starting pulses	No such circuit generating starting pulses.	N
2.10.3.6/RD	Transients from a.c. mains supply :	Considered.	P
2.10.3.7/RD	Transients from d.c. mains supply :	Not connected to d.c. mains supply.	N
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems :	No TNV circuits	N
2.10.3.9/RD	Measurement of transient voltage levels	Measurement not relevant	N
	a) Transients from a mains supply		N
	For an a.c. mains supply :		N
	For a d.c. mains supply :		N
	b) Transients from a telecommunication network :		N
2.10.4/RD	Creepage distances	(see appended table 5.7)	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P
	CTI tests	CTI rating for all material of min. 100.	
2.10.4.3/RD	Minimum creepage distances	(see appended table 5.7)	P
2.10.5 /RD	Solid insulation	Considered.	P
2.10.5.1/RD	General	See below.	P
2.10.5.2/RD	Distances through insulation	(see appended table 5.8)	P
2.10.5.3/RD	Insulating compound as solid insulation	Approved opto-couplers, see appended table 4.5	P
2.10.5.4/RD	Semiconductor devices	No semiconductor devices.	N
2.10.5.5/RD	Cemented joints	No cemented joint.	N
2.10.5.6/RD	Thin sheet material – General	See below.	P
2.10.5.7/RD	Separable thin sheet material		N
	Number of layers (pcs).		—
2.10.5.8/RD	Non-separable thin sheet material	Not used.	N
2.10.5.9/RD	Thin sheet material – standard test procedure		N
2.10.5.10 /RD	Thin sheet material – (Alternative) test procedure		—
	Electric strength test		N
2.10.5.11 /RD	Insulation in wound components		—
2.10.5.12 /RD	Wire in wound components	See cl. 2.10.5.12/RD	N
	Working voltage :	No wound components.	N
	a) Basic insulation not under stress :		—
	b) Basic, supplementary, reinforced insulation :		N
	c) Compliance with Annex U :		N
	Two wires in contact inside wound component; angle between 45° and 90° :		N
2.10.5.13 /RD	Wire with solvent-based enamel in wound components		N
	Electric strength test	No wire with solvent-based enamel in wound components.	N
	Routine test	(see appended table 8.2)	—
2.10.5.14 /RD	Additional insulation in wound components		N
	Working voltage :	No additional insulation used.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	- Basic insulation not under stress :		—
	- Supplementary, reinforced insulation :		N
2.10.6/RD	Construction of printed boards	See below.	P
2.10.6.1/RD	Uncoated printed boards	(see appended table 5.7)	P
2.10.6.2/RD	Coated printed boards	(see appended table 5.7)	P
2.10.6.3/RD	Insulation between conductors on the same inner surface of a printed board	No such part.	N
2.10.6.4/RD	Insulation between conductors on different layers of a printed board	No such part.	N
	Distance through insulation	PCB layout does not serve as insulation barrier.	N
	Number of insulation layers (pcs) :		N
2.10.7/RD	Component external terminations	No such part.	N
2.10.8/RD	Tests on coated printed boards and coated components	No such part.	N
2.10.8.1/RD	Sample preparation and preliminary inspection	No such part.	N
2.10.8.2/RD	Thermal conditioning		N
2.10.8.3/RD	Electric strength test		N
2.10.8.4/RD	Abrasion resistance test		—
2.10.9/RD	Thermal cycling		N
2.10.10/RD	Test for Pollution Degree 1 environment and insulating compound	Approved opto-couplers, see appended table 4.5	P
2.10.11/RD	Tests for semiconductor devices and cemented joints	No such device used.	N
2.10.12/RD	Enclosed and sealed parts	Approved opto-couplers, see appended table 4.5	P
6	Wiring, connections and supply		P
6.1	General	Considered.	P
6.1.1	Introduction	Considered.	P
3.1/RD	General	See below.	P
3.1.1/RD	Current rating and overcurrent protection	Adequate cross sectional areas on internal wiring and interconnecting cables.	P
3.1.2/RD	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.3/RD	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4/RD	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5/RD	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N
3.1.6/RD	Screws for electrical contact pressure	Electrical and earthing connections screwed two or more complete threads into metal. No screws of insulating material for electrical and earthing connections, or where supplementary or reinforced insulation could be impaired by a metal replacement.	P
3.1.7/RD	Insulating materials in electrical connections	All current carrying and safety earthing connections are metal to metal.	P
3.1.8/RD	Self-tapping and spaced thread screws	Self-tapping screws provided in inverter circuit and earthing bonding.	P
3.1.9/RD	Termination of conductors	All conductors are reliably secured by the use of solder pins or glue or other mechanical fixing means. No risk of stranded conductors coming loose.	P
	10 N pull test	Considered	P
3.1.10/RD	Sleeving on wiring	Sleeves can only be removed by breaking or cutting.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		P

6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections	Only one supply connections.	P
3.2.3/RD	Permanently connected equipment		N
	Number of conductors, diameter of cable and conduits (mm) :		—
3.2.4/RD	Appliance inlets	No appliance inlet.	N
3.2.5/RD	Power supply cords	See below.	P

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.5.1/RD	AC power supply cords	Approved power cord set with suitable electrical ratings for use in the UPS.	P
	Type		—
	Rated current (A), cross-sectional area (mm ²), AWG		—
3.2.5.2/RD	DC power supply cords	Not used.	N
3.2.6/RD	Cord anchorages and strain relief		P
	Mass of equipment (kg), pull (N)		—
	Longitudinal displacement (mm)		—
3.2.7/RD	Protection against mechanical damage	No parts under this unit likely to damage the power supply cord. Enclosure without sharp edges.	P
3.2.8/RD	Cord guards		N
	Diameter or minor dimension D (mm); test mass (g)		—
	Radius of curvature of cord (mm).....		—
6.2.2	Means of connection :	Screw terminal used.	P
	More than one supply connection :		N
6.3	Wiring terminals for external power conductors <i>(No wiring terminals for external power conductors)</i>		N
3.3/RD	Wiring terminals for connection of external conductors		N
3.3.1/RD	Wiring terminals		N
3.3.2/RD	Connection of non-detachable power supply cords		N
3.3.3/RD	Screw terminals		N
3.3.4/RD	Conductor sizes to be connected		N
	Rated current (A), cord/cable type, cross-sectional area (mm ²)		N
3.3.5/RD	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm)		—
3.3.6/RD	Wiring terminal design		N
3.3.7/RD	Grouping of wiring terminals		N
3.3.8/RD	Stranded wire		N
7	Physical requirements		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.1	Enclosure	Adequate protection against risk of fire, electric shock, injury to persons and hazardous energy level.	P
7.2 4.1/RD	Stability		P
	Angle of 10	All models of the UPS do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) :	250N	P
7.3 4.2/RD	Mechanical strength		P
4.2.1/RD	General	Complies with the requirement also after tests described below are applied.	P
4.2.2/RD	Steady force test, 10 N	No hazard, ref. comment in appended table 5.7, 2.10.4/RD.	—
4.2.3/RD	Steady force test, 30 N	30 N applied to parts inside the UPS.	P
4.2.4/RD	Steady force test, 250 N	No hazard. The test is performed on all sides of enclosure.	P
4.2.5/RD	Impact test	See below.	P
	Fall test	No hazard as result from the steel sphere fall test.	P
	Swing test	No hazard as result from the steel sphere swing test.	P
4.2.6/RD	Drop test; height (mm):	Drop test not applicable	N
4.2.7/RD	Stress relief test	Test is carried out at 70°C / 7h. No risk of shrinkage or distortion on enclosures due to release of internal stresses.	P
4.2.8/RD	Cathode ray tubes	CRT(s) not used in the equipment.	N
	Picture tube separately certified :		—
4.2.9/RD	High pressure lamps	No high pressure lamps in the equipment.	N
4.2.10/RD	Wall or ceiling mounted equipment; force (N) :	No wall or ceiling mounted equipment	N
7.4	Construction details		P
7.4.1	Introduction	Considered.	P
4.3.1/RD	Edges and corners	All edges and corners are rounded and/or smoothed.	P

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.2/RD	Handles and manual controls; force (N) :	No handles	N
4.3.3/RD	Adjustable controls	No adjustable controls.	N
4.3.4/RD	Securing of parts	No loosening of parts impairing creepage distances or clearances is likely to occur.	P
4.3.5/RD	Connection by plugs and sockets	No mismatch of connectors, plugs or sockets possible.	P
4.3.7/RD	Heating elements in earthed equipment	No heating elements provided.	N
4.3.11/RD	Containers for liquids or gases	The equipment does not contain flammable liquids or gases.	N
4.4/RD	Protection against hazardous moving parts	No moving parts.	N
4.4.1/RD	General	DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2/RD	Protection in operator access areas :	See 4.4.1	P
4.4.3/RD	Protection in restricted access locations :	Not for restricted access locations.	P
4.4.4/RD	Protection in service access areas	See 4.4.1	P
4.4.5/RD	Protection against moving fan blades	Considered	P
4.4.5.1/RD	General	See below.	P
	Not considered to cause pain or injury. a) :		N
	Is considered to cause pain, not injury. b) :		N
	Considered to cause injury. c) :		N
4.4.5.2	Protection for users	(See appended table 7.7)	P
	Use of symbol or warning :		N
4.4.5.3	Protection for service persons		N
	Use of symbol or warning :		N
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L :		
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat :		P
7.4.2	Openings	(See appended table 7.4.2)	P
7.4.3	Gas Concentration	The ventilation by openings exceeds the required airflow. Refer to Annex M.	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.4.4	Equipment movement		P
7.5 4.7/RD	Resistance to fire		P
4.7.1/RD	Reducing the risk of ignition and spread of flame	Use of materials with the required flammability classes	P
	Method 1, selection and application of components wiring and materials	Method 1 is used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits.	P
	Method 2, application of all of simulated fault condition tests		N
4.7.2/RD	Conditions for a fire enclosure	See below.	P
4.7.2.1/RD	Parts requiring a fire enclosure	With having the following components: - Components in primary circuits - Insulated wiring - Semiconductor devices, transistors, diodes, integrated circuits - Resistors, capacitors, inductors The fire enclosure is required.	P
4.7.2.2/RD	Parts not requiring a fire enclosure	The fire enclosure is required to cover all parts.	N
4.7.3/RD	Materials	See below.	P
4.7.3.1/RD	General	PCB rated V-0. See appended table.	P
4.7.3.2/RD	Materials for fire enclosures	Metal enclosure. (See appended table 4.3)	P
4.7.3.3/RD	Materials for components and other parts outside fire enclosures	No parts outside the fire enclosure.	N
4.7.3.4/RD	Materials for components and other parts inside fire enclosures	Internal components except small parts are V-2, HF-2 or better.	P
4.7.3.5/RD	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6/RD	Materials used in high-voltage components	No parts exceeding 4kV.	N
7.6	Battery location		P
7.6.1	Battery location and installation	Batteries are located inside the UPS enclosure.	P

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Clause	Requirement + Test	Result - Remark	Verdict

7.6.2	Accessibility and maintainability	Maintenance free battery. The battery is connected by quick connect terminals (no necessary tightening).	P
7.6.3	Distance	The temperature of the electrolyte and the gas emission are within the limits of this standard.	P
7.6.4	Case insulation	No Ni-Cd battery used inside.	N
7.6.5	Wiring	The protection of connecting wiring complies with subclause 6, details see there.	P
7.6.6	Electrolyte spillage	Sealed maintenance free battery, the emission of electrolyte is unlikely.	P
7.6.7	Ventilation	Comply with Annex M.2	P
7.6.8	Charging voltage	Protective circuit to prevent excessive charging voltages occurring under any single fault condition. See sub-clause 8.3	P

7.7	Temperature rise		P
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L :		—
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat :	(See appended table 7.4)	P

8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General	Test conducted in accordance with Sub-clause 8.1	P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		P

8.2 5.2/RD	Electric strength		P
5.2.1/RD	General	(see appended table 8.2)	P
5.2.2/RD	Test procedure	(see appended table 8.2)	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3	Abnormal operating and fault conditions		P
8.3.1	General	Considered.	P
5.3.1/RD	Protection against overload and abnormal operation	(See appended table 8.3)	P
5.3.2/RD	Motors	No motors	N
5.3.3/RD	Transformers	(See appended Annex C)	P
5.3.4/RD	Functional insulation :	Complies with a) and c).	P
5.3.5/RD	Electromechanical components	No electromechanical components in secondary circuits.	N
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions	No fire or molten metal occurred and no deformation of enclosure during the tests. No reduction of clearance and creepage distances. Electric strength test is made on basic, supplementary and reinforced insulation.	P
5.3.9.1/RD	During the tests		P
5.3.9.2/RD	After the tests		P
8.3.2	Simulation of faults	(See appended table 8.3)	P
8.3.3	Conditions for tests	(See appended table 8.3)	P
9 6/RD	Connection to telecommunication networks		P
6.1/RD	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		P
6.1.1/RD	Protection from hazardous voltages		P
6.1.2/RD	Separation of the telecommunication network from earth		P
6.1.2.1/RD	Requirements	No bridging components between TNV circuit and earth, only creepage and clearance distance applied.	P
	Supply voltage (V) :		
	Current in the test circuit (mA) :		
6.1.2.2/RD	Exclusions :		N
6.2/RD	Protection of equipment users from overvoltages on telecommunication networks		P
6.2.1/RD	Separation requirements	Basic insulation between TNV-3 circuit and accessible parts and SELV interfaces and earthing.	P
6.2.2/RD	Electric strength test procedure	See subclause 6.2.2.2/RD	P

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.1/RD	Impulse test		N
6.2.2.2/RD	Steady-state test	For details see sub-clause 6.1.2.1/RD	P
6.2.2.3/RD	Compliance criteria	Complied for test of subclause 6.2.2.2/RD	P
6.3/RD	Protection of the telecommunication wiring system from overheating		N
	Max. output current (A)		
3.5/RD	Interconnection of equipment		N
3.5.1/RD	General requirements		N
3.5.2/RD	Types of interconnection circuits		N
3.5.3/RD	ELV circuits as interconnection circuits		N
3.5.4/RD	Data ports for additional equipment		N
2.1.3/RD	Protection in restricted access locations		N
2.3.1/RD	Limits		N
	Type of TNV circuits		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed		
2.3.5/RD	Test for operating voltages generated externally		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	N
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	N
2.10.4/RD	Creepage distances		N
2.10.4.1/RD	General		N
2.10.4.2/RD	Material group and comparative tracking index		N
	CTI tests		
2.10.4.3/RD	Minimum creepage distances		N
M/RD	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD)		N
M.1/RD	Introduction		N
M.2 /RD	Method A		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
M.3/RD	Method B		N
M.3.1/RD	Ringling signal		N
M.3.1.1/RD	Frequency (Hz) :		
M.3.1.2/RD	Voltage (V) :		
M.3.1.3/RD	Cadence; time (s), voltage (V) :		
M.3.1.4/RD	Single fault current (mA) :		
M.3.2/RD	Tripping device and monitoring voltage :		N
M.3.2.1/RD	Conditions for use of a tripping device or a monitoring voltage		
M.3.2.2/RD	Tripping device		N
M.3.2.3/RD	Monitoring voltage (V) :		N

A/RD	Annex A, Tests for resistance to heat and fire		N
A.1/RD	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2/RD)		N
A.1.1/RD	Samples :		
	Wall thickness (mm)..... :		
A.1.2/RD	Conditioning of samples; temperature (°C) :		N
A.1.3/RD	Mounting of samples :		N
A.1.4/RD	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D :		
A.1.5/RD	Test procedure		N
A.1.6/RD	Compliance criteria		N
	Sample 1 burning time (s)..... :		
	Sample 2 burning time (s)..... :		
	Sample 3 burning time (s)..... :		
A.2/RD	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2/RD and 4.7.3.4/RD)		N
A.2.1/RD	Samples, material..... :		
	Wall thickness (mm)..... :		
A.2.2/RD	Conditioning of samples; temperature (°C) :		N
A.2.3/RD	Mounting of samples :		N
A.2.4/RD	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C :		
A.2.5/RD	Test procedure		N
A.2.6/RD	Compliance criteria		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Sample 1 burning time (s)		
	Sample 2 burning time (s)		
	Sample 3 burning time (s)		
A.2.7/RD	(Alternative) test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s)		
	Sample 2 burning time (s)		
	Sample 3 burning time (s)		
A.3/RD	Hot flaming oil test (see 4.6.2/RD)		N
A.3.1/RD	Mounting of samples		N
A.3.2/RD	Test procedure		N
A.3.3/RD	Compliance criterion		N

B/RD	Annex B, Motor tests under abnormal conditions (see 4.7.2.2/RD and 5.3.2/RD)		N
B.1/RD	General requirements	No motors	N
	Position		N
	Manufacturer		N
	Type		N
	Rated values		N
B.2/RD	Test conditions		N
B.3/RD	Maximum temperatures		N
B.4/RD	Running overload test		N
B.5/RD	Locked-rotor overload test		N
	Test duration (days)		N
	Electric strength test: test voltage (V)		N
B.6/RD	Running overload test for d.c. motors in secondary circuits		N
B.6.1/RD	General		N
B.6.2/RD	Test procedure		N
B.6.3/RD	(Alternative) test procedure		N
B.6.4/RD	Electric strength test; test voltage (V)		N
B.7/RD	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1/RD	General		N
B.7.2/RD	Test procedure		N
B.7.3/RD	(Alternative) test procedure		N
B.7.4/RD	Electric strength test; test voltage (V)		N
B.8/RD	Test for motors with capacitors		N

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Clause	Requirement + Test	Result - Remark	Verdict
B.9/RD	Test for three-phase motors		N
B.10/RD	Test for series motors		N
	Operating voltage (V) :		N
C/RD	Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD)		N
	Position :	No isolating transformer.	N
	Manufacturer :		N
	Type :		N
	Rated values :		N
	Method of protection :		N
C.1/RD	Overload test		N
C.2/RD	Insulation		N
	Protection from displacement of windings :		N
D/RD	Annex D, Measuring instruments for touch current tests (see 5.1.4/RD)		P
D.1/RD	Measuring instrument		P
D.2/RD	(Alternative) measuring instrument		N
E/RD	Annex E, Temperature rise of a winding (see 1.4.13/RD)		N
F/RD	Annex F, Measurements of clearances and creepage distance (see 2.10/RD and Annex G/RD)		P
G/RD	Annex G, (Alternative) method for determining minimum clearances		N
G.1/RD	Clearances		N
G.1.1/RD	General		N
G.1.2/RD	Summary of the procedure for determining minimum clearances		N
G.2/RD	Determination of mains transient voltage (V)		N
G.2.1/RD	AC mains supply :		N
G.2.2/RD	Earthed d.c. mains supplies :		N
G.2.3/RD	Unearthed d.c. mains supplies :		N
G.2.4/RD	Battery operation :		N
G.3/RD	Determination of telecommunication network transient voltage (V) :		N
G.4/RD	Determination of required withstand voltage (V)		N
G.4.1/RD	Mains transients and internal repetitive peaks :		N
G.4.2/RD	Transients from telecommunication networks . :		N

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Clause	Requirement + Test	Result - Remark	Verdict
G.4.3/RD	Combination of transients		N
G.4.4/RD	Transients from cable distribution systems		N
G.5/RD	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		N
	For an a.c. mains supply		N
	For a d.c. mains supply		N
	b) Transients from a telecommunication network		N
G.6/RD	Determination of minimum clearances :		N
H	Annex H, Guidance on protection against ingress of water and foreign objects (see IEC 60529)		N
I	Annex I, Backfeed protection test		P
I.1	General		P
I.2	Test for pluggable UPS	Backfeed relay provided.	P
I.3	Test for permanently connected UPS		N
I.4	Load-induced change of reference potential		N
I.5	Solid-state backfeed protection (see clause 7.1-7.5 of IEC 62040-2 and clause 7.1-7.2 of IEC 62040-3)		N
J/RD	Annex J, Table of electrochemical potentials (see 2.6.5.6/RD)		P
	Metal(s) used :	Copper plated with tin and soldering lead.	
K/RD	Annex K, Thermal controls (see 1.5.3/RD and 5.3.8/RD)		N
K.1/RD	Making and breaking capacity		N
K.2 /RD	Thermostat reliability; operating voltage (V) ... :		N
K.3/RD	Thermostat endurance test; operating voltage (V) :		N
K.4/RD	Temperature limiter endurance; operating voltage (V) :		N
K.5/RD	Thermal cut-out reliability		N
K.6/RD	Stability of operation		N
L	Annex L, Reference loads		P
L.1	General		P
L.2	Reference resistive load		N
L.3	Reference inductive-resistive load		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
L.4	Reference capacitive-resistive loads	Worst case power factors as specified by the manufacturer maintained during the relevant tests.	P
L.5	Reference non-linear load		N
L.5.1	Test method		N
L.5.2	Connection of the non-linear reference load		
L.5.3	Connection of the non-linear reference load		N
M	Annex M, Ventilation of battery compartments		P
M.1	General	Sufficient openings and a suitable arrangement of components (relays) are provided in such a way that a local concentration of hydrogen and oxygen is not possible. No requirement regarding the separation of operational arcing parts from battery vents/valves.	P
M.2	Normal conditions	See M.1 above.	P
M.3	Blocked conditions	See appended table 8.3.	P
M.4	Overcharge conditions		N
N	Annex N, Minimum and maximum cross-sections of copper conductors suitable for connection (see 6.3)		N
U/RD	Annex U, Insulated winding wires for use without interleaved insulation (see 2.10.5.4/RD)		N
V/RD	Annex V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1/RD)		P
V.1/RD	Introduction		P
V.2/RD	TN power distribution systems	See sub-clause 1.6.1/RD.	P
V.3/RD	TT power distribution systems		P
V.4/RD	IT power distribution systems		P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.5	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾
Material of Front panel	Chi-Mei	PA-757	105°C	--	UL: E56070
All PCB	Various	Various	V-0, 130°C	--	UL
DC FAN	NMB-MAT	3115RL04WB79	12V, 1.15A	--	UL: E89936 VDE: 1507300
CONNECTOR	OULU ELECTRONICS	TR-10N-01-7P-T(f)	AC600V, 65A	--	UL: E313040
Circuit Breaker	Nader	NDM1-63C63/1	AC 400V, 63A	--	TUV:R 50202070
FUSE	BUSSMANN	100L09CB	AC600V, 100A		VDE
BATTERY	ORIMA	UN9-12	12V,9AH		UL: MH29838
On SNT_PCB_PS110310_GL					
Input Relay	SONGCHUAN	832A-1C-F-C	AC250V,20A	--	CSA:1429333(LR 90143) UL:E88991 VDE: 6615
INDUCTOR	BAOCHENG	USS1110L1	CLASS F	--	Test with appliance
Current transformer (T3-T6)	SIDNA	USS11CT2	CLASS F	--	Test with appliance
Y2 capacitor	TAMURA	CD16-E2GA472MYG S	250VAC/ 4700pf	IEC 60384-14	VDE:124321
Optocouplers (U1)	NEC	PS2501L-1-L	5000V,rms	--	UL: E72422 VDE: 40008862
On SNT_PCB_PS1103_DY					
T1	SIDNA	USS11T2	CLASS F	--	Test with appliance
Optocouplers (U11-U14)	NEC	PS2501L-1-L	5000V,rms	--	UL: E72422 VDE: 40008862
Y2 capacitor	TAMURA	CS11-E2GA222MYN S	250VAC/ 2200pf	--	VDE 40029781 UL: E37861
FUSE	HOLLYLAND	30TS-025H1	350V,2.5A	--	VDE
Insulation heat sink	BORNSUN	TO-3P	19*25	--	UL:E153203
Insulation sheet	QIANDAITIAN	IW-06	M3	--	UL:E41938
On SNT_PCB_PS110310_FG					

IEC 62040-1					
Clause	Requirement + Test	Result - Remark			Verdict

Current Sensor	TAMURA	L18P060D15	60A,4V	--	UL:E243511
OUTPUT RELAY	SONGCHUAN	735H-2C-F-C	250V,25A	--	CSA:LR 90143-46 UL: E88991 VDE
INDUCTOR	BAOCHENG	US1110L2	CLASS F	--	Test with appliance
Y2 capacitor	TAMURA	CD16-E2GA472MYG S	250VAC/ 4700pf	IEC 60384-14	VDE: 124321
Insulation heat sink	BORNSUN	TO-3P	19*25	--	UL:E153203

On SNT_PCB_PS1103_ZQ

Optocoupler	AVAGO	ACPL-T350	AC 5000V	--	UL: E55361 VDE: 40009430
T1	SIDNA	USS11T3	CLASS F	--	Test with appliance

On SNT_PCB_PS1103_ZK

Y2 capacitor	Various	CD16-E2GA472MYG S	250VAC/ 4700pf	IEC 60384-14	VDE: 124321
Optocouplers	NEC	PS2501L-1-L	5000V,rms	--	UL: E72422 VDE: 40008862
T1	SIDNA	USS11T5	CLASS F	--	Test with appliance

¹⁾ an asterisk indicates a mark which assures the agreed level of surveillance.

4.6	TABLE: electrical data (in normal conditions)					P
Fuse#	Irated(A)	U(V)	P(W)	I(A)	P(VA)	Condition/status
For model: HR1110S,HR1110						

IEC 62040-1						
Clause	Requirement + Test				Result - Remark	Verdict
Circuit breaker	63A	198/50Hz	9585	48.9	9682	Charging of empty batteries and rated output load
Circuit breaker	63A	198/60Hz	9585	48.9	9682	Ditto
Circuit breaker	63A	220/50Hz	9582	44	9680	Ditto
Circuit breaker	63A	220/60Hz	9582	44	9680	Ditto
Circuit breaker	63A	240/50Hz	9540	40.3	9659	Ditto
Circuit breaker	63A	240/60Hz	9550	40.3	9659	Ditto
Circuit breaker	63A	264/50Hz	9548	36.7	9652	Ditto
Circuit breaker	63A	264/60Hz	9548	36.7	9652	Ditto
For model: HR1108S,HR1108						
Circuit breaker	63A	198/50Hz	7667	39.1	7745	Charging of empty batteries and rated output load.
Circuit breaker	63A	198/60Hz	7667	39,.1	7745	Ditto
Circuit breaker	63A	220/50Hz	7658	35.2	7735	Ditto
Circuit breaker	63A	220/60Hz	7658	35.2	7735	Ditto
Circuit breaker	63A	240/50Hz	7635	32.2	7720	Ditto
Circuit breaker	63A	240/60Hz	7635	32.2	7720	Ditto
Circuit breaker	63A	264/50Hz	7625	29.3	7715	Ditto
Circuit breaker	63A	264/60Hz	7625	29.3	7715	Ditto
For model: HR1106S,HR1106						

IEC 62040-1						
Clause	Requirement + Test				Result - Remark	Verdict
Circuit breaker	40A	198/50Hz	5710	29.3	5809	Charging of empty batteries and rated output load.
Circuit breaker	40A	198/60Hz	5710	29.3	5809	Ditto
Circuit breaker	40A	220/50Hz	5695	26.4	5789	Ditto
Circuit breaker	40A	220/60Hz	5695	26.4	5789	Ditto
Circuit breaker	40A	240/50Hz	5690	24.2	5768	Ditto
Circuit breaker	40A	240/60Hz	5690	24.2	5768	Ditto
Circuit breaker	40A	264/50Hz	5679	22	5760	Ditto
Circuit breaker	40A	264/60Hz	5679	22	5760	Ditto
For model: HR1105S,HR1105						
Circuit breaker	40A	198/50Hz	4792	24.5	4841	Charging of empty batteries and rated output load.
Circuit breaker	40A	198/60Hz	4792	24.5	4841	Ditto
Circuit breaker	40A	220/50Hz	4782	22	4830	Ditto
Circuit breaker	40A	220/60Hz	4782	22	4830	Ditto
Circuit breaker	40A	240/50Hz	4766	20	4821	Ditto
Circuit breaker	40A	240/60Hz	4766	20	4821	Ditto
Circuit breaker	40A	264/50Hz	4749	18.4	4809	Ditto
Circuit breaker	40A	264/60Hz	4749	18.4	4809	Ditto
Note(s): Please measure the input currents with normal load.						

5.1.3	TABLE: discharge of capacitors in the primary circuit				P
Condition	t _{calculated} (s)	t _{measured} (s)	t _{u→0V} (s)	Comments	

IEC 62040-1				
Clause	Requirement + Test	Result	Remark	Verdict
Power switch on (L-N)	--	0.82	1.32	Vi=388V, 37% of Vi=143.56V, No load applied
Power switch off (L-N)	--	0.82	1.32	Ditto
Note(s): 1. Relevant discharge resistance: discharged through circuit				

5.1.4	TABLE: Backfeed protection test				P
Condition	Voltage measured (V)/current (mA)				Comments
	L1-N	L1-G	N-G		
No load	0.017mA	0.022 mA	0.021 mA	Battery mode, Normal	
Full load	0.018mA	0.104 mA	0.102 mA	Ditto	
No load	0.016mA	0.021 mA	0.019 mA	Battery mode, Abnormal condition (Q2 c-e short circuit)	
Full load	0.016mA	0.102 mA	0.101 mA	Battery mode, Abnormal condition (Q37 c-e short circuit)	
Note(s): 1). Approved component. For details refer to table 4.3. Tested on model RM600/30X					

5.2.1 and 2.2.3/RD	TABLE: insulation / SELV voltage measurement			N
Location	Voltage measured (V)		Comments	
Note(s): No any voltage in RS232 circuit side exceeding SELV limits during normal / abnormal operation. No test necessary.				

5.2.3and 2.4.2/RD	TABLE: limited current circuit measurement			N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

condition	Location	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments

Note(s): test during battery mode. Output measured with a 2 kΩ resistor as load.

5.2.5 and 2.5/RD	TABLE: Limited power source measurement					N
		Limits		Measured		Verdict

5.3.1 and 2.6.3.4/RD	TABLE: provisions for protective earthing					P
Location		Resistance measured(mΩ) / voltage drop(V)		Comments		
Tested on model RM600/30X						
I/P earth (inlet)→O/P earth (outlet)		4		Test current of 32A for 120s		
I/P earth (inlet)→metal enclosure		7		Test current of 32A for 120s		
Note:						

5.5 and 8.3	TABLE: Abnormal operating and fault conditions					P
ambient temperature (°C)		See below				
model/type of power supply		Integral part of equipment.				
manufacturer of power supply		See below				
rated markings of power supply		See page 4				

No.	component No.	fault	test voltage (V)	test time	fuse no.	fuse current (A)	Result
On SNT_ASY_PS110310_GL_01							
1	Q1, Q2 (PIN1-3)	S-C	240V	1s		0	UPS shutdown immediately. Fuse opened. No hazards.
2	Q3-Q8 (PIN2-3)	S-C	240V	1s		0	UPS shutdown immediately. Fuse opened. No hazards.
3	Q3-Q8 (PIN2-3)	O-C	240V	1s		0	UPS shutdown immediately. No hazards.
4	U1(PIN2-3)	S-C	240	10min		0	Work normally.
On SNT_ASY_PS110310_FG_01							
5	Q2, Q4, Q5, Q6 (PIN2-3)	S-C	240V	1s		0	UPS shutdown immediately. Fuse opened. No hazards.
6	Q2, Q4, Q5, Q6 (PIN2-3)	O-C	240V	1s		0	UPS shutdown immediately. No hazards.

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

No.	component No.	fault	test voltage (V)	test time	fuse no.	fuse current (A)	Result
7	Q9, Q10 (PIN1-3)	S-C	240V	1s		0	UPS shutdown immediately. No hazards.
On SNT_ASY_PS1103_DY_01							
8	U12 (PIN1-4)	S-C	240V	1s		0	UPS shutdown immediately. No hazards.
9	U13 (PIN1-4)	S-C	240V	1s		0	UPS shutdown immediately. No hazards.
10	T1 (PIN5-7)	S-C	240V	1s		0	UPS shutdown immediately. No hazards.
11	Q10 (PIN2-3)	S-C	240V	10ms		0	UPS shutdown immediately. Fuse opened. No hazards.
On SNT_ASY_PS1103_ZQ_01							
12	T1 (PIN(2-8)	S-C	240V	10ms		0	UPS shutdown immediately. No hazards.
13	U1 (PIN1-4)	S-C	240V	10ms		0	UPS shutdown immediately. No hazards.
On SNT_ASY01_PS1103_FCD							
14	Q1 (PIN2-3)	S-C	240V	10ms		0	UPS shutdown immediately. Fuse opened. No hazards.
Note(s): s-c means short circuit. o-l means overload. o-c means open circuit.							

5.7 2.10.2/ RD	TABLE: working voltage measurement			P
Location	RMS voltage (V)	Peak voltage (V)	comments	
Tested on model HR1110L, On CNTL PCB				
T1 Pin 1-6	208	314	Line mode and rated output load.	
T1 Pin 1-7	206	346	Ditto	
T1 Pin 1-8	209	313	Ditto	
T1 PIN 1-9	209	318	Ditto	
T1 Pin 1-10	207	344	Ditto	
T1 Pin 1-11	210	350	Ditto	
T1 Pin 1-12	208	310	Ditto	
T1 Pin 1-13	210	353	Ditto	
T1 Pin 2-6	215	346	Ditto	
T1 Pin 2-7	213	390	Ditto	
T1 Pin 2-8	209	323	Ditto	
T1 PIN 2-9	208	348	Ditto	

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
T1 Pin 2-10	216	375	Ditto
T1 Pin 2-11	201	322	Ditto
T1 Pin 2-12	217	391	Ditto
T1 Pin 2-13	219	397	Ditto
T1 Pin 3-6	199	308	Ditto
T1 Pin 3-7	207	346	Ditto
T1 Pin 3-8	206	312	Ditto
T1 PIN 3-9	209	308	Ditto
T1 Pin 3-10	200	318	Ditto
T1 Pin 3-11	206	335	Ditto
T1 Pin 3-12	205	302	Ditto
T1 Pin 3-13	207	364	Ditto
T1 Pin 4-6	199	324	Ditto
T1 Pin 4-7	210	382	Ditto
T1 Pin 4-8	205	317	Ditto
T1 PIN 4-9	205	338	Ditto
T1 Pin 4-10	209	375	Ditto
T1 Pin 4-11	208	313	Ditto
T1 Pin 4-12	195	297	Ditto
T1 Pin 4-13	216	404	Ditto
U1 Pin 1-3	217	316	Ditto
U1 Pin 1-4	219	323	Ditto
U1 Pin 2-3	220	331	Ditto
U1 Pin 2-4	210	318	Ditto
U1 Pin 1-3	185	295	Ditto
U1 Pin 1-4	177	304	Ditto
U1 Pin 2-3	199	300	Ditto
U1 Pin 2-4	170	292	Ditto
U1 Pin 1-3	196	308	Ditto
U1 Pin 1-4	207	312	Ditto
U1 Pin 2-3	199	308	Ditto
U1 Pin 2-4	201	306	Ditto
U1 Pin 1-3	201	304	Ditto
U1 Pin 1-4	202	308	Ditto
U1 Pin 2-3	224	332	Ditto

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
U1 Pin 2-4	224	336	Ditto
Note:			

5.7 and 2.10.4/RD	TABLE: clearance and creepage distance measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Whole unit for Tower case models						
Metal enclosure to bare pin of battery terminal	<420	<250V	2.0	12.2	2.5	>12.2
Heatsink on PSDR board to earthed enclosure after 250N force	<420	<250V	2.0	8.2	2.5	>8.2
Primary trace to earthed metal plate on PSDR PCB	<420	<250V	2.0	5.8	2.5	>5.8
Primary pin to earthed metal plate on PSDR board	<420	<250V	2.0	9.7	2.5	>9.7
Primary pin to earthed metal plate on Input EMI PCB	<420	<250V	2.0	5.1	2.5	>5.1
Primary pin to earthed metal enclosure on Output EMI PCB	<420	<250V	2.0	8.9	2.5	>8.9
Whole unit for Rack case models						
Heatsink on PSDR board to earthed enclosure after 250N force	<420	<250V	2.0	16.0	2.5	>16.0
Primary trace to earthed metal plate on PSDR PCB	<420	<250V	2.0	4.7	2.5	>4.7
Primary pin to earthed metal plate on PSDR board	<420	<250V	2.0	10.2	2.5	>10.2
Primary pin to earthed metal plate on Input EMI PCB	<420	<250V	2.0	6.1	2.5	>6.1
Primary pin to earthed metal enclosure on Output EMI PCB	<420	<250V	2.0	7.8	2.5	>7.8
PSDR board						
Primary trace to earthed traces	<420	<250V	2.0	>2.6	2.5	>2.6
Input EMI PCB						
Primary traces to earthed traces	<420	<250	2.0	2.6	2.5	2.6
Primary traces to earthed traces under Y2-cap	<420	<250	2.0	2.6	2.5	2.6
Line traces to neutral under X2-cap	<420	<250	2.0	3.5	2.5	3.5
Output EMI PCB						

IEC 62040-1						
Clause	Requirement + Test		Result - Remark			Verdict
Primary traces to earthed traces	<420	<250	2.0	2.6	2.5	2.6
CNTL PCB						
Primary trace to secondary trace under (U1)	<420	<250	4.0	6.2	5.0	6.2
Primary trace to secondary trace under T1	<420	<250	4.0	5.1	5.0	5.1
Primary winding to secondary winding of T1	<420	<250	4.0	5.0	5.0	5.0
Primary winding to core of T1	<420	<250	2.0	2.5	2.5	2.5
Secondary winding to core of T1	<420	<250	2.0	2.5	2.5	2.5
External battery pack						
Metal enclosure to bare pin of battery terminal	<420	<250V	2.0	7.7	2.5	>7.7
TVSS PCB						
TNV trace to earthed trace	<420	<250	2.0	2.5	2.5	2.5
CHAG PCB						
Primary traces to earthed traces	<420	<250V	2.0	2.7	2.5	2.7
Note(s):						

5.8, 2.1.1.3/R Dand 2.10.5.1 /RD	TABLE: electric strength tests, impulse tests and voltage surge tests	P
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IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

test voltage applied between:	test voltage (V)	Breakdown Yes / No
Primary to Secondary (mains inlet&outlet conductor to RS232 port)	3000Va.c.	No
Primary to TNV circuits (mains inlet&outlet conductor to TNV phoneline connector)	3000Va.c.	No
TNV circuits and RS232 port	1500Va.c.	No
Primary to earth (mains inlet&outlet conductor to earth)	1500Va.c.	No
Primary winding to secondary winding of transformer T1 on CNTL PCB	3000Va.c.	No
Primary winding to core of transformer TX1 on CNTL PCB	1500Va.c.	No
Secondary winding to core of transformer TX1 on CNTL PCB	1500Va.c.	No
1 layer insulation tape used in transformer TX1 on CNTL PCB	3000Va.c.	No
Supplementary information: All model		

7.4, 4.5.5/RD	TABLE: Ball pressure test of thermoplastic parts		P
	Allowed impression diameter (mm)	≤ 2 mm	—
Part	Test temperature (°C)	Impression diameter (mm)	
Bobbin of converter transformer	125	0.9	
Note(s):			

7.4.2 4.6.1/RD and 4.6.2/RD	TABLE: openings		P
Location	Size (mm)	Comments	
For TOWER case models			
Top	None	No openings.	
Bottom	None	No openings.	
Side	3.0mm round openings	358 provided.	
Front	None	No openings.	
Back	--	Only DC fan ventilation openings provided on back. Metal net provide as fan guard.	
For RACK case models			

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
Top	None	No openings.	
Bottom	None	No openings.	
Side	None	No openings.	
Front	Rectangle 1.0X82mm openings (6x2 provided), rectangle 1.0X170 mm openings (6x2 provided)	--	
Back	--	Only DC fan ventilation openings provided on back. Metal net provide as fan guard.	
Note(s):			

7.5	TABLE: resistance to fire	P		
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class
Front panel	Chi-Mei	PA-757	HB, 85°C	--

7.7	TABLE A: maximum temperature rises		P
	test voltage (V) :	See below.	--
	T1 (°C) :	25	--
	T2 (°C) :	--	--

Temperature rise T of part/at:	T(°C) :			required T
	198V/50Hz	264V/50Hz	Battery mode	
INPUT CABLE	55	53		70
OUTPUT CABLE	40	40	40	70
BATTERY body			28	80
On SNT_PCB_PS110310_GL				
L1, L2	55	53	80	130
INPUT RELAY	50	48		130
DC CAPACITOR	35	35	38	105
PCB near IGBT Q2	48	46	78	130
PCB near Q1	59	57		130
Y2 capacitor	29	29	29	85
PCB near L1	40	38	70	130
T4	35	35	35	150
On SNT_PCB_PS110310_FG				
L1	79	79	80	130

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Temperature rise T of part/at:	T(°C) :			required T			
	198V/50Hz	264V/50Hz	Battery mode				
OUTPUT RELAY	50	50	50	130			
PCB near IGBT Q2	83	83	85	130			
Y2 capacitor	29	29	29	85			
DC CAPACITOR	37	37	37	105			
CT T1	30	30	30	150			
AC CAPACITOR C34	35	35	35	105			
On SNT_PCB_PS1103_DY							
T1	40	40	40	150			
Y2 capacitor	28	28	28	85			
PCB near MOS (Q10)	50	50	50	130			
PCB near DIODE(D9)	45	45	45	130			
Supplementary information:							
Temperature T of winding:	t1 (°C)	R1 (Ω)	t2 (°C)	R2 (Ω)	T (°C)	Allowed Tmax (°C)	Insulation class
--	--	--	--	--	--	--	--
Supplementary information: The temperatures were measured under worst case normal mode defined in 1.2.2.1/RD and as described in sub-clause 1.6.2/RD and at voltages as described above.							

8.1, 5.1.1/RD	TABLE: Touch current measurement					P
Condition	L→terminal A	N→terminal A	Freq. (Hz)	Limit (mA)	Comments	
Unit on	2.45	3.4	3.5	Switch "e" open, L/N to PE, no load	Switch "e" open, L to PE, no load	
Unit on	0.005	0.005	0.25	Switch "e" close, L/N to front panel (with foil)	Switch "e" open, N to PE, no load	
Unit on	0.01	0.01	0.25	Switch "e" close, L/N to TVSS port	Switch "e" close, L to RS232 port	
Unit on	0.001	0.001	0.25	Switch "e" close, L/N to TNV port	Switch "e" close, N to RS232 port.	

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Note(s) : Supply with 302.5V/50Hz.

C.2	Safety isolation transformer		N
Construction details:			
Transformer part name: T1 on CNTL board			
Manufacturer: See appended table 1.5.1			
Type: See appended table 1.5.1			
Recurring peak voltage			
Required clearance for reinforced insulation (from table 2H and 2J)			
Effective voltage rms			
Required creepage distance for reinforced insulation (from table 2L)			
Measured min. creepage distance			
Location		inside (mm)	outside (mm)
Primary winding/pin to secondary winding/pin			
Primary winding/pin to core			
Secondary winding/pin to core			
Measured min. clearances			
Location		inside (mm)	outside (mm)
Primary winding/pin to secondary winding/pin			
Primary winding/pin to core			
Secondary winding/pin to core			
Construction:			
Concentrically wound transformer design, core size EE-16. N1, N2 are primary winding which is wound around the internal side of the bobbin. 3 layers of mylar tapes are used to separate primary and secondary windings. N3, N4, N5 are secondary windings on outer side of bobbin. Margin tape with width of 2.8mm is used on both side of bobbin and each winding layer. Tubing is used on every winding exits to the bare pins on bobbin.			
Pin numbers			
Prim.			
Sec.			
Bobbin			
Material			
Thickness			

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Electric strength test	
With 4242Vdc. after humidity treatment	
Result	

M	Ventilation of battery compartments	P
	The required dimension for the ventilation will be calculated with the following formula:	
	$A > K1 * Q$ with $Q = (0.054 \text{ m}^3/\text{Ah}) * n * I * C$ where: K1 : constant factor of $28 \text{ h} * \text{cm}^2/\text{m}^3$ Q : airflow in m^3/h n : number of battery cells I : constant factor (0.2A/100Ah for valve regulated lead acid batteries) C : nominal capacity of the battery	
	Model: n : C : $A > 28 * \text{cm}^2/\text{m}^3 * (0.054\text{m}^3/\text{Ah}) * n * (0.2 \text{ A}/100\text{Ah}) * C = \text{cm}^2$	
	Verdict	
	The size of the ventilation openings exceeds the required airflow by far (as well as the UPS).	

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ZA	<p>NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS</p> <p>The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.</p> <p>Note: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD Applies.</p> <table border="1"> <thead> <tr> <th>Publication</th> <th>Year</th> <th>Title</th> <th>EN/HD</th> <th>Year</th> </tr> </thead> <tbody> <tr> <td>IEC 60364-4-42</td> <td>-¹⁾</td> <td>Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects</td> <td>-</td> <td>-</td> </tr> <tr> <td>IEC 60417</td> <td>Data-base</td> <td>Graphical symbols for use on equipment</td> <td>-</td> <td>-</td> </tr> <tr> <td>IEC 60529</td> <td>-¹⁾</td> <td>Degrees of protection provided by enclosures (IP Code)</td> <td>EN 60529 + corr. May</td> <td>1991²⁾ 1993</td> </tr> <tr> <td>IEC 60664</td> <td>Series</td> <td>Insulation coordination for equipment within low-voltage systems</td> <td>EN 60664</td> <td>Series</td> </tr> <tr> <td>IEC/TR 60755</td> <td>-¹⁾</td> <td>General requirements for residual current operated protective devices</td> <td>-</td> <td>-</td> </tr> <tr> <td>IEC 60950-1 (mod)</td> <td>2005</td> <td>Information technology equipment - Safety - Part 1: General requirements</td> <td>EN 60950-1</td> <td>2006</td> </tr> <tr> <td>IEC 61000-2-2</td> <td>-¹⁾</td> <td>Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems</td> <td>EN 61000-2-2</td> <td>2002²⁾</td> </tr> <tr> <td>IEC 61008-1 (mod)</td> <td>-¹⁾</td> <td>Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules</td> <td>EN 61008-1 + A11</td> <td>2004²⁾ 2007</td> </tr> <tr> <td>IEC 61009-1 (mod)</td> <td>-¹⁾</td> <td>Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules</td> <td>EN 61009-1 + corr. July + A11</td> <td>2004²⁾ 2006 2008</td> </tr> <tr> <td>IEC 62040-2</td> <td>2005</td> <td>Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements</td> <td>EN 62040-2 + corr. November</td> <td>2006 2006</td> </tr> <tr> <td>IEC 62040-3 (mod)</td> <td>1999</td> <td>Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements</td> <td>EN 62040-3</td> <td>2001</td> </tr> </tbody> </table> <p>¹⁾ Undated reference. ²⁾ Valid edition at date of issue.</p>	Publication	Year	Title	EN/HD	Year	IEC 60364-4-42	- ¹⁾	Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects	-	-	IEC 60417	Data-base	Graphical symbols for use on equipment	-	-	IEC 60529	- ¹⁾	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 ²⁾ 1993	IEC 60664	Series	Insulation coordination for equipment within low-voltage systems	EN 60664	Series	IEC/TR 60755	- ¹⁾	General requirements for residual current operated protective devices	-	-	IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006	IEC 61000-2-2	- ¹⁾	Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems	EN 61000-2-2	2002 ²⁾	IEC 61008-1 (mod)	- ¹⁾	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules	EN 61008-1 + A11	2004 ²⁾ 2007	IEC 61009-1 (mod)	- ¹⁾	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules	EN 61009-1 + corr. July + A11	2004 ²⁾ 2006 2008	IEC 62040-2	2005	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements	EN 62040-2 + corr. November	2006 2006	IEC 62040-3 (mod)	1999	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements	EN 62040-3	2001		—
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European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
ZB ANNEX (normative)			
SPECIAL NATIONAL CONDITIONS (EN)			
<p>The FI, NO and SE - SNCs originate from IEC 60950-1 2nd Edition, which is the reference document (RD) for IEC 62040-1. The national requirements are included in IEC 62040-1 through the following statement in the scope of the standard: <i>"National requirements additional to those in IEC 60950-1 apply and are found as notes under relevant clauses of the RD."</i></p> <p>The national requirements have not been specifically listed in the EN 62040-1:2008. If demanded, CLC/TC 22X will be requested to take proper measures to complete EN 62040-1 with Annexes ZB containing the SNCs as presented below.</p> <p>EN 62040-1:2008 supersedes EN 62040-1-1:2003. As a reference, see also SNCs for Finland, Norway and Sweden as included in the earlier EN 62040-1-1:2003</p>			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	<p>In Finland, Norway and Sweden, when safety relies upon connection to the safety earth (see 5.3), a pluggable equipment type A UPS shall have a marking on the equipment, stating that the UPS must be connected to an earthed mains socket-outlet.</p> <p>The marking text in the applicable countries shall be as follows:</p> <p>In Finland: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"</p> <p>In Norway: "Apparatet må tilkoples jordet stikkontakt"</p> <p>In Sweden: "Apparaten skall anslutas till jordat uttag"</p>		P
4.7.11	<p>In Norway, because of a widely used IT power system, equipment shall be designed or modified for connection to such a system and shall be marked by a label with the following wording in Norwegian: "Apparatet er egnet for tilkøpling til et IT forsyningsnett"</p>		P
9	<p>In Finland, Norway and Sweden requirements of 6.1.2.1 and 6.1.2.2 in Annex ZB of EN 60950-1:2001 apply.</p>		P

Pictures



Fig. 1 – Overview (I)



Fig. 2 – Overview (II)

Pictures



Fig. 3 –Inside view I



Fig. 4 – Power board view