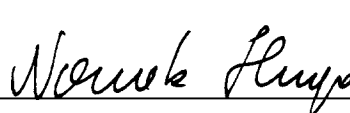
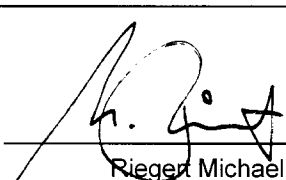


TEST REPORT IEC 60950 Safety of information technology equipment	
Report reference No.....	1.004
Date of issue.....	18.12.02
Testing laboratory.....	Kontron Embedded Computers GmbH
Address.....	Oskar-von-Miller Str.1, 85386 Eching
Testing location.....	as above
Applicant.....	Kontron Embedded Computers GmbH
Address.....	Oskar-von-Miller Str.1, 85386 Eching
Standard.....	IEC 60950:1991 + A1:1992 + A2:1993 + A3:1995 + A4:1996
Test Report Form No.....	E00680.00
TRF modified by.....	Kontron Embedded Computers GmbH
Copyright blank test report.....	This report is based on a blank test report prepared by KEMA using information obtained from the TRF originator. Copyright reserved to the bodies participating in the Committee of Certification Bodies (CCB) and/or the CENELEC Certification Agreement (CCA). This report is not valid as a CB Test Report unless appended to a CB Test Certificate issued by a NCB, in accordance with IECEE 02.
Test procedure.....	CB – Scheme
Procedure deviation.....	EN 60950 and UL 1950
Non-standard test method.....	--
National deviations.....	No.1, National Deviations
Number of pages (Report).....	33
Number of pages (Attachments).....	46
Compiled by..... (+ signature)	 Novak Hugo
Approved by..... (+ signature)	 Rieger Michael

Type of test object	Industrial Display 15"
Trademark	Kontron
Model and/or type reference	Kontron KFM15_e
Manufacturer.....	Kontron Embedded Computers GmbH, Oskar-von-Miller-Straße 1, 85386 Eching
Rating(s)	Please refer to section " General Description "
Test item particulars:	
Equipment mobility	fixed
Operating condition.....	continuous
Tested for IT power systems.....	No
IT testing, phase-phase voltage (V)	--
Class of equipment.....	Class I
Mass of equipment (kg).....	KFM15_e – A 6,5 kg (full equipped)
Protection against ingress of water	--/ ordinary
Possible test case verdicts:	
Test case does not apply to the test object.....	N(.A.)
Test object does meet the requirement	P(ass)
Test object does not meet the requirement	F(ail)
Attachments: No.1, National Deviations	
General remarks:	
"(see remark #)" refers to a remark appended to the report.	
"(see appended table)" refers to a table appended to the report.	
Throughout this report a comma is used as the decimal separator.	
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 testing laboratory.	

General product information:

LCD Monitor KFM15_e – A

Kontron's Industrial LCD Monitors are specially designed for 24-hour use in rough industrial environment. The robust mechanical design guarantees long-term operation under harsh environmental conditions, such as temperature, vibration and shock, electro-magnetic immunity. Due to in-house development and production.

The relevant part for safety is the power supply. The power supply has certificates from TÜV Rheinland Product Safety GmbH R 50008528 dated 2001.12.21 and from UL File E207942 dated 2001.12.27.

The inside temperature is 65°C at ambient temperature 50°C.

That means, that the power supply and the power entry module works correctly at max. power consumption (measured max. 45 W).

The Type character – X represents the type of used PSU and can be any number from A to Z. The list of critical components show all types of already tested PSU's and includes a reference list of number A to Z and belonging PSU!

Ratings:

- Type KFM15_e – A

Input: 100 – 240 VAC

50 – 60 Hz

0,3 – 0,2 A

Class: I

The KFM15_e – A are not allowed to be opened by the operator !!

Following is an overview of the unit under test configurations later found as test basis in chapters like input ratings, heating tests, e.g.. Those configurations are representative for the worst test behaviour.

Summary of testing:

- The Flat monitor KFM15_e – A is in accordance with the standards.

Labeling:

KONTRON ELEKTRONIK *Made in Germany*
1B401B002 F0F 
Typ: KFM15_e-A
Hz: 50-80 V: 100-240 A: 0,3' -0,2'
P/Nr: 2-ACD8-2002


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Clause	Requirement - Test	Result - Remark	Verdict
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1. GENERAL

1.5	Components		P
1.5.1	Comply with IEC 950 or relevant component standard	(see appended table)	P
1.5.2	Evaluation and testing of components		P
1.5.3	Transformers	Only used within certified PSU	P
1.5.4	High voltage components (component; manufacturer; flammability)		N
1.5.5	Interconnecting cables		N
1.5.6	Mains capacitors	Only used within certified mains supplied PSU	P

1.6	Power interface		P
1.6.1	Steady state input current	(see appended table)	P
	Current deviation during normal operating cycle		P
1.6.2	Voltage limit of hand-held equipment		N
1.6.3	Neutral conductor insulated from earth and body		P
1.6.4	Components in equipment intended for IT power system		N
1.6.5	Mains supply tolerance (V)	$\pm 10 \%$	P

Clause	Requirement - Test	Result - Remark	Verdict
1.7	Marking and instructions		P
1.7.1	Rated voltage (V)	Please refer to chapter General description!	P
	Symbol of nature of supply for dc.	Only DC-Supplies	N
	Rated frequency (Hz)	Please refer to chapter General description!	P
	Rated current (A)	Please refer to chapter General description!	P
	Rated power (P)	Please refer to chapter General description!	P
	Manufacturer	Kontron embedded computers	P
	Trademark	Kontron embedded computers	P
	Type/model	Please refer to chapter General description!	P
	Symbol of Class II		N
	Certification marks	TÜV, UL	P
1.7.2	Safety instructions	Safety instructions sufficient explained in operation manual	P
1.7.3	Short duty cycles		N
1.7.4	Marking for voltage setting/frequency setting		N
1.7.5	Marking at power outlets		N
1.7.6	Marking at fuse holders	<ul style="list-style-type: none"> Operator replaceable: No operator replaceable fuse General: Technical unit documentation provided with sufficient information 	P
1.7.7.1	Protective earthing terminals	Only applicable for class I units: within certified PSU	P
1.7.7.2	Terminal for external primary power supply conductors		N
1.7.8.1	Identification and location of switches and controls :	No relevant for safety	P
1.7.8.2	Colours of controls and indicators		N
1.7.8.3	Symbols according to IEC 60417	Power ON/OFF key. Technical unit documentation provided	P

Clause	Requirement - Test	Result - Remark	Verdict
		with sufficient information	
1.7.8.4	Figures used for marking	5009 /IEC 60417	P
1.7.8.5	Location of markings and indications for switches and controls	Controls and LED indicator at the right side of the front plate.	P
1.7.9	Isolation of multiple power sources		N
1.7.10	Instructions for installation to IT power system		N
1.7.11	Instructions when protection relies on building installation		N
1.7.12	Marking when leakage current exceeds 3,5 mA		N
1.7.13	Indication at thermostats and regulating devices		N
1.7.14	Language of safety markings/instructions	Operation Manual	P
	Language	German, English	—
1.7.15	Durability and legibility		P
1.7.16	Removable parts		P
1.7.17	Warning text for replaceable lithium batteries		N
	Language		—
1.7.18	Operator access with a tool		N
1.7.19	Equipment for restricted access locations		N

Clause	Requirement - Test	Result - Remark	Verdict
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2. PROTECTION FROM HAZARDS

2.1	Protection against electric shock and energy hazards		P
2.1.1	Access to energized parts		P
2.1.2	Protection in operator access areas	Power supply approved General: the operator has only access to SELV-Area	P
	Test by inspection	Fulfilled by the use of certified PSU	P
	Test with test finger		P
	Test with test pin		P
2.1.3.1	Insulation of internal wiring in an ELV circuit accessible to operator		N
	Working voltage (V); distance (mm) through insulation		N
2.1.3.2	Operator accessible insulation of internal wiring at hazardous voltage	(see appended table 2.9.4 and 5.3)	P
2.1.4.1	Protection in service access areas		P
2.1.4.2	Protection in restricted access locations		N
2.1.5	Energy hazard in operator access area		P
2.1.6	Clearances behind conductive enclosures	Please refer also to chapter 4.2	N
2.1.7	Shafts of manual controls		N
2.1.8	Isolation of manual controls		N
2.1.9	Conductive casings of capacitors		N
2.1.10	Risk of electric shock from stored charge on capacitors connected to mains circuit	< 0,1µF	P
	Time-constant (s); measured voltage (V)		--

Clause	Requirement - Test	Result - Remark	Verdict
2.2	Insulation		P
2.2.1	Methods of insulation	Power supply approved	P
2.2.2	Properties of insulating materials		P
2.2.3	Humidity treatment		P
	Humidity (%)		—
	Temperature (°C)		—
2.2.4	Requirements for insulation	(see appended table 2.9, 5.1 and 5.3)	P
2.2.5	Insulation parameters		P
2.2.6	Categories of insulation: Overcurrent, basic, reinforced	RI and OP <ul style="list-style-type: none"> • RI (Mains to SELV): Fulfilled by to use of a certified PSU • BI (Mains to PE): Fulfilled by to use of a certified PSU • OP: Compliance of OP checked by SFC Please refer to belonging insulation tables. 	P
2.2.7.1	General rules for working voltages	Fulfilled by to use of a certified PSU	P
2.2.7.2	Clearances in primary circuits	Power supply approved	P
2.2.7.3	Clearances in secondary circuits	Power supply approved	P
2.2.7.4	Cree page distances	Power supply approved	P
2.2.7.5	Electric strength tests	Power supply approved	P
2.2.8.1	Bridging capacitors		N
2.2.8.2	Bridging resistors		N
2.2.8.3	Accessible parts		N

Clause	Requirement - Test	Result - Remark	Verdict
2.3	Safety extra-low voltage (SELV) circuits		P
2.3.1	Voltage (V) of SELV circuits under normal operating conditions and after a single fault		--
2.3.2	Voltage (V) between any two conductors of SELV circuit(s) and for Class I equipment between any conductor of SELV circuit and equipment protective earthing terminal under normal operating conditions		P
2.3.3	Voltage (V) of SELV in the event of a single failure of basic or supplementary insulation or of a component		—
2.3.3.1	Method 1) Separation by double or reinforced insulation	Power supply approved	P
2.3.3.2	Method 2) Separation by earthed screen		N
2.3.3.3	Method 3) Protection by earthing of SELV circuit		N
2.3.4	Additional constructional requirements		P
2.3.5	Connection of SELV circuits to other circuits	SELV-Circuits only connected with SELV-Circuits	P

2.4	Limited current circuits: DC/AC-Backlight-Converter of KFM LCD - Display. Please refer also to the sections list of critical components and SFC-Table		P
2.4.2	Frequency (Hz)		—
	Measured current (mA)		N
2.4.3	Measured voltage (V)		—
	Measured capacitance (μ F)		
2.4.4	Measured voltage (V)		—
	Measured charge (μ C)		N
2.4.5	Measured voltage (V)		—
	Measured energy (mJ)		N
2.4.6	Limited current circuit supplied from or connected to other circuits		N

Clause	Requirement - Test	Result - Remark	Verdict
2.5	Provisions for earthing		P
2.5.1	Class I equipment		P
	Warning label for service personnel	5036/ IEC 60417	P
2.5.2	Protective earthing in Class II equipment		N
2.5.3	Switches/fuses in earthing conductors		N
2.5.4	Assured earthing connection for Class I equipment in systems comprising Class I and Class II equipment		N
2.5.5	Green/yellow insulation	Only within certified PSU's	P
2.5.6	Continuity of earth connections		P
2.5.7	Making and breaking of protective earthing connections	Fulfilled by the use of certified PSU's	P
2.5.8	Disconnection protective earthing connections		N
2.5.9	Protective earthing terminals for fixed supply conductors or for non-detachable power supply cords		N
2.5.10	Corrosion resistance		P
2.5.11	Resistance (Ω) of protective earthing conductors $\leq 0,1 \Omega$	< 0,08 Ohm	P
	Test current (A)	20 A	—

Clause	Requirement - Test	Result - Remark	Verdict
2.6	Disconnection from primary power		P
2.6.1	General requirements	This chapter only concerns Class II computer types	N
2.6.2	Type of disconnect device	Plug of power supply cord	P
2.6.3	Disconnect device in permanently connected equipment		P
2.6.4	Parts of disconnect device which remain energized		N
2.6.5	Switches in flexible cords		N
2.6.6	Disconnection of both poles simultaneously in single-phase equipment		P
2.6.7	Disconnection of all phase conductors of supply in three-phase equipment		N
2.6.8	Marking of switch acting as disconnect device		N
2.6.9	Installation instructions if plug on power supply cord acts as disconnect device	Safety instruction is within operation manual	P
	Language	German, English	—
2.6.11	Interconnected equipment		N
2.6.12	Multiple power sources		N

2.7	Overcurrent and earth fault protection in primary circuits		P
2.7.1	Basic requirements		N
2.7.2	Protection against faults not covered in 5.4	Please refer to SFC-Tests Table	P
2.7.3	Short-circuit backup protection		N
2.7.4	Number and location of protective devices	Power supply 3,15 A/ 250VAC intern	P
2.7.5	Protection by several devices		N
2.7.6	Warning to service personnel		N

Clause	Requirement - Test	Result - Remark	Verdict
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2.8	Safety interlocks		N
2.8.2	Design		N
2.8.3	Protection against inadvertent reactivation		N
2.8.4	Reliability		N
2.8.5	Overriding an interlock		N
2.8.6.1	Contact gap (mm)		N
2.8.6.2	Switch performing 50 cycles		N
2.8.6.3	Electric strength test: test voltage (V)		N
2.8.7	Protection against overstress		N

2.9	Clearances, Cree page distances and distances through insulation		P
	Nominal voltage (V)	Please refer to belonging tables of chapter 2.9	—
	General	Fulfilled by the use of certified PSU's	P
2.9.2	Clearances		P
2.9.2.1	Clearances in primary circuits	(see appended table 2.9.2 and 2.9.3)	P
2.9.2.2	Clearances in secondary circuits	(see appended table 2.9.2 and 2.9.3)	P
2.9.3	Cree page distances	(see appended table 2.9.2 and 2.9.3)	P
	CTI tests		—
2.9.4.1	Minimum distances through insulation	Fulfilled by the use of certified PSU's	P
2.9.4.2	Thin sheet material		N
	Number of layers (pcs)		N
	Electrical strength test: test voltage (V)		N

Clause	Requirement - Test	Result - Remark	Verdict
2.9.4.3	Printed boards		N
	Distance through insulation	(see appended table 2.9.4)	N
	Electric strength test at voltage for thin sheet insulating material	(see appended table 5.3)	N
	Number of layers (pcs)		N
2.9.4.4	Wound components without interleaved insulation	(see appended table 2.9.4 and 5.3 and Annex U)	N
	Number of layers (pcs)		N
	Two wires in contact inside component; angle between 45° and 90°		N
	Routine testing for finished component		N
2.9.5	Distances on coated printed boards	(see appended table 2.9.4)	N
	Routine testing for electric strength		N
2.9.6	Enclosed and sealed parts	Fulfilled by the use of certified PSU's	N
	Temperature T1 (°C)		N
	Humidity %		N
2.9.7	Spacings filled by insulating compound	(see appended table 2.9.4 and 5.3)	N
	Temperature T1 (°C)		N
	Humidity %		N
2.9.8	Component external terminations	(see appended table 2.9.2 and 2.9.3)	N
2.9.9	Insulation with varying dimensions	(see appended table 2.9.2 and 2.9.3 and 2.9.4)	N

2.10	Interconnection of equipment		P
2.10.1	General requirements	SELV-Circuits are only allowed to be connected with SELV-Circuits	P
2.10.2	Type of interconnection circuits	IT-Interfaces like RS232, USB, Video, ..	P
2.10.3	ELV circuits as interconnection circuits		N

Clause	Requirement - Test	Result - Remark	Verdict
2.11	Limited power source	This chapter was taken into consideration because of USA National Deviations regarding external interface requirements	N
	Use of limited power source	For more information please refer to table 5.4	N

3. WIRING, CONNECTIONS AND SUPPLY

3.1	General		P
3.1.1	Cross-sectional area of internal wiring/interconnecting cables	(see appended table 5.1)	P
	Protection of internal wiring and interconnecting cables		P
3.1.2	Wire ways		P
3.1.3	Fixing of internal wiring	by cable binders and shrinking tubes	P
3.1.4	Fixing of un insulated conductors		N
3.1.5	Insulation of internal wiring	Part of certified PSU's (see appended table 5.3)	P
3.1.6	Wires coloured green/yellow only for protective earth connection		N
3.1.7	Fixing of beads and similar ceramic insulators		N
3.1.8	Required electrical contact pressure		N
3.1.9	Reliable electrical connections		P
3.1.10	End of stranded conductor		N
3.1.11	Use of spaced thread screws/thread-cutting screws		N

Clause	Requirement - Test	Result - Remark	Verdict
3.2	Connection to primary power		P
3.2.1	Type of connection	IEC approved appliance Inlet	P
	Design of product with more than one supply connection		N
3.2.2	Provision for permanent connection		N
	Size (mm) of cables and conduits		N
3.2.3	Appliance inlet	IEC approved appliance Inlet	P
3.2.4	Type and cross-sectional area (mm ²) of power supply cord	Certified power cords EU/USA see list of critical components	P
3.2.5	Cord anchorage		N
	Test: 25 times; 1 s; pull (N)		—
	Longitudinal displacement \square 2 mm		N
3.2.6	Protection of power supply cord		N
3.2.7	Cord guard		N
	D (mm)		—
	Test: mass (g)		—
	Radius of curvature of the cord \leq 1,5 D		N
3.2.8	Supply wiring space		N
3.3	Wiring terminals for external power supply conductors		N
3.3.1	Terminals		N
3.3.2	Special non-detachable cord		N
	Type of connection		—
	Pull test at 5 N		N
3.3.3	Screws and nuts		N
3.3.4	Fixing of conductors	Binders, tubing	P
3.3.5	Connection of connectors		N
3.3.6	Size of terminals		N
	Nominal thread diameter (mm)		N
3.3.7	Protection against damage of conductors	Bushing	N
3.3.8	Terminal location		N

Clause	Requirement - Test	Result - Remark	Verdict
3.3.9	Test with 8 mm stranded wire	no creep ages are reduced under their allowed values	N

4. PHYSICAL REQUIREMENTS

4.1	Stability and mechanical hazards	Test conducted with KFM	P
4.1.1	Stability tests		P
	Angle of 10°		P
	Test: force (N)		N
4.1.2	Protection against personal injury		N
4.1.3	Warning and means provided for stopping the moving part	No hazardous moving parts	N
4.1.4	Edges and corners		P
4.1.5	Enclosure of a high pressure lamp		N

4.2	Mechanical strength and stress relief		P
4.2.1	General		P
4.2.2	Internal enclosures 30 N ± 3 N; 5 s		P
4.2.3	External enclosures 250 N ± 10 N; 5 s		P
4.2.4	Steel ball tests		N
	Fall test		N
	Swing test	Screen	P
4.2.5	Drop test		N
4.2.6	Heat test for enclosures of moulded or formed thermoplastic materials: 7 h; T (°C)	This chapter belongs only to the already certified PSU's and Display	P
4.2.7	Compliance criteria		P
4.2.8	Mechanical strength of cathode ray tubes		N

4.3	Construction details		P
4.3.1	Changing of setting for different power supply voltages		N
4.3.2	Adjustment of accessible control devices		N
4.3.4	Prevention of dangerous concentration of dust,		N

Clause	Requirement - Test	Result - Remark	Verdict
	powder, liquid and gas		
4.3.5	Fixing of knobs, grips*, handles, levers		N
	Test: force (N)		N
4.3.6	Driving belts/couplings shall not ensure electrical insulation		N
4.3.7	Retaining of sleeves	ties or shrinking	P
4.3.9	Protection of loosening parts	Enclosure of KFM fulfil all requirements of this chapter	P
4.3.11	Resistance to oil and grease		N
4.3.12	Protection against harmful concentration of ionizing radiation, ultraviolet light, laser or flammable gases (for laser see IEC 825-1)		N
4.3.13	Securing of screwed connections		P
4.3.15	Openings in the top of enclosure		N
	Dimensions (mm)		—
4.3.16	Openings in the sides of enclosure	1x opening on the right side The opening are located that way, that a bare part falling down at unit inner side can't get in contact with parts under hazardous live.	P
	Dimensions (mm)	25 x 4	—
4.3.17	Interchangeable plugs and sockets	Plugs and sockets are only in SELV-Area	N
4.3.18	Torque test for direct plug-in equipment		N
	Additional torque (Nm)		N
4.3.19	Protection against excessive pressure		N
4.3.20	Protection of heating elements in Class I equipment		N
4.3.21	Protection of lithium batteries		N
	Construction of protection circuit	Please refer to table 5.4. (SFC-Tests)	N
4.3.22	Ageing of barrier/screen secured with adhesive		N
	Day 1: temperature (°C); time (weeks)		N
	Day 8/22/57: a) temperature (°C) for 1 h b) temperature (°C) for 4 h		N

Clause	Requirement - Test	Result - Remark	Verdict
	c) temperature (°C) over 8 h		
	Day 9/23/58: a) relative humidity (%) for 72 h b) temperature (°C) for 1 h c) temperature (°C) for 4 h d) temperature (°C) over 8 h		N

4.4	Resistance to fire		P
4.4.1	Methods of achieving resistance to fire		P
4.4.2	Minimizing the risk of ignition		P
	Printed board: manufacturer; type; flammability	All PWB's, min. UL94V-1	P
4.4.3	Flammability of materials and components	<ul style="list-style-type: none"> • Inner plastic parts, min. UL94V-2 • Enclosures, either made of metal • PWBs, Min. UL94V-1 *For more information please refer to table, list of critical components	P
4.4.3.2	Material and component: manufacturer; type; flammability	See 4.4.3 and list of critical components	P
4.4.3.3	Exemptions		P
4.4.3.4	Wiring harnesses: manufacturer; flammability		N
4.4.3.5	Cord anchorage bushings: manufacturer; flammability		N
4.4.3.6	Air filter assemblies: manufacturer; flammability		N
4.4.4	Enclosures and decorative parts: manufacturer; type; flammability	The enclosure, except the front panel is made of metal.	P
4.4.5	Conditions for fire enclosures		P
4.4.5.1	Components requiring fire enclosure: manufacturer; flammability		P
4.4.5.2	Components not requiring fire enclosure		P
4.4.6	Fire enclosure construction		P
4.4.7	Doors or covers in fire enclosures	No doors	P
4.4.8	Flammable liquids		N

Clause	Requirement - Test	Result - Remark	Verdict
--------	--------------------	-----------------	---------

5. THERMAL AND ELECTRICAL REQUIREMENTS

5.1	Heating		P
	Heating tests	(see appended table 5.4.)	P

5.2	Earth leakage current		P
5.2.1	General		P
5.2.2	Leakage current		P
5.2.3	Single-phase equipment		P
	Test voltage (V)	KFM15_e – A, 250 VAC	—
	Measured current (mA)	50 Hz: max. 1,5 mA 60 Hz: max. 1,7 mA	—
	Max. allowed current (mA)	3,5 mA	—
5.2.4	Three-phase equipment		N
	Test voltage (V)		—
	Measured current (mA)		—
	Max. allowed current (mA)		—
5.2.5	Equipment with earth leakage current exceeding 3,5 mA		N
	Test voltage (V)		—
	Measured current (mA)		—
	Max. allowed current (mA)		—
	Cross-sectional area (mm ²) of internal protective earthing conductor		—
	Warning label		N

5.3	Electric strength		P
5.3.1	General	(see appended table)	P

Clause	Requirement - Test	Result - Remark	Verdict
5.4	Abnormal operating and fault conditions		P
5.4.2	Motors	(see appended table and Annex B)	N
5.4.3	Transformers	(see appended table and Annex C)	P
5.4.4	Compliance of operational insulation		P
	Method used	Short circuit test	P
5.4.5	Electromechanical components in secondary circuits	(see appended table)	N
5.4.6	Other components and circuits	(see appended table)	P
5.4.7	Test in any expected condition and foreseeable misuse	(see appended table)	P
5.4.8	Unattended use of equipment having thermostats, temperature limiters etc.	(see appended table 5.4.)	N
5.4.9	Compliance	(see appended table 5.4.)	P
5.4.10	Ball-pressure test of thermoplastic parts; impression shall not exceed 2 mm	(see appended table 5.4.10)	N

6. CONNECTION TO TELECOMMUNICATION NETWORKS

6.1	General		N
6.2	TNV circuits		N
6.2.1.1	Limits of the TNV circuits		N
6.2.1.1 a)	TNV-1 circuits		N
6.2.1.1 b)	TNV-2 and TNV-3 circuits		N
6.2.1.2	Separation from other circuits and from accessible parts	(see appended table 2.9.2, 2.9.3 and 2.9.4)	N
	Voltage (V) in SELV circuits, TNV-1 circuits and accessible conductive parts in event of single insulation fault or component failure		N
6.2.1.3	Operating voltages generated externally		N
	Voltage (V) in SELV circuit, TNV-1 circuit or accessible conductive part		N

Clause	Requirement - Test	Result - Remark	Verdict
6.2.1.4	Separation from hazardous voltages		N
	Insulation between TNV circuit and circuit at hazardous voltage	(see appended table 2.9.2, 2.9.3 and 2.9.4)	N
	Method used		N
6.2.1.5	Connection of TNV circuits to other circuits	(see appended table 5.4)	N
	Insulation (mm) between TNV circuit supplied conductively from secondary circuit and hazardous voltage circuit		N
6.2.2.1	Protection against contact with bare conductive parts of TNV-2 and TNV-3 circuits		N
	Test with test finger		N
	Test with test probe		N
6.2.2.2	Battery compartments		N
	Marking next to door/on door		N

6.3	Protection of telecommunication network service personnel, and users of other equipment connected to the telecommunication network, from hazards in the equipment		N
6.3.1	Protection from hazardous voltages		N
6.3.2	Use of protective earthing		N
	Language of installation instructions		N
6.3.3.1	Insulation between TNV circuit and parts or circuitry that may be earthed	(see appended table 5.3)	N
6.3.3.2	Exclusions		N
6.3.4.1	Limitation of leakage current (mA) to telecommunication network		N
6.3.4.2	Summation of leakage currents from telecommunication network		N

6.4	Protection of equipment users from voltages on the telecommunication networks		N
6.4.1	Separation requirements		N
6.4.2	Test procedure		N
6.4.2.1	Impulse test: separation between TNV-1 circuits/TNV-3 circuits and:		N
6.4.2.1 a)	unearthed conductive parts/non-conductive parts of the equipment expected to be held or touched		N

Clause	Requirement - Test	Result - Remark	Verdict
	during normal use; test at 2,5 kV		
6.4.2.1 b)	parts and circuitry that can be touched by the test finger except contacts of connectors that cannot be touched by test probe; test at 1,5 kV		N
6.4.2.1 c)	circuitry which is provided for connection of other equipment; test at 1,5 kV		N
6.4.2.2	Electric strength test: separation between TNV-1 circuits/TNV-3 circuits and:		N
6.4.2.2 a)	unearthed conductive parts/non-conductive parts of the equipment expected to be held or touched during normal use; test at 1,5 kV		N
6.4.2.2 b)	parts and circuitry that can be touched by the test finger except contacts of connectors that cannot be touched by test probe; test at 1,0 kV		N
6.4.2.2 c)	circuitry which is provided for connection of other equipment; test at 1,0 kV		N
6.4.2.3	Compliance criteria		N

6.5	Protection of telecommunication wiring system from overheating		N
	Maximum continuous output current (A)		N

Clause	Requirement - Test	Result - Remark	Verdict
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7. ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE

A.1	Flammability test for fire enclosures of moveable equipment having a total mass exceeding 18 kg, and of stationary equipment		N
A.2	Flammability test for fire enclosures of moveable equipment having a total mass not exceeding 18 kg, and for materials located within fire enclosures		N
A.3	High current arcing ignition test		N
A.3.6	Number of arcs		N
A.4	Hot wire ignition test		N
A.4.6	Ignition time (s)		N
A.5	Hot flaming oil test		N
A.6	Flammability test for classifying materials V-0, V-1 or V-2		N
A.7	Flammability test for classifying foamed materials HF-1, HF-2 or HBF		N
A.8	Flammability test for classifying materials HB		N
A.9	Flammability test for classifying materials 5V		N
A	Tested material		N
	Preconditioning: 7 days (168 h); temperature (°C) ..	70	—
	Mounting of samples during test	Horizontal	—
	Wall thickness	Please refer to table list of critical components	—
	Sample 1 burning time	39 seconds	N
	Sample 2 burning time	14 seconds	N
	Sample 3 burning time	27 seconds	N
	Material: compliance with the requirements		N
	Manufacturer of tested material	Please refer to table list of critical components	—
	Type of tested material	Please refer to table list of critical components	—
	Additional information		—

Clause	Requirement - Test	Result - Remark	Verdict
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8. ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS

B.1	General requirements	The only motors are certified fans or used in certified system components (like drives).	N
	Position		—
	Manufacturer		—
	Type		—
	Rated voltage (V) or current (A)		—
B.2	Test conditions	All fans, drives are certified	N
B.3	Maximum temperatures	(see appended table 5.4)	N
B.4	Running overload test		N
B.5	Locked-rotor overload test		N
	Test duration (days)		—
	Electric strength test: test voltage (V)		—
B.6	Running overload test for DC motor in secondary circuits		N
B.7	Locked-rotor overload test for DC motor in secondary circuits		N
B.7.2	Test time (h)		--
B.7.3	Test time (h)		--
B.8	Test for motors with capacitors		N
B.9	Test for three-phase motors		N
B.10	Test for series motors		N
	Test voltage (V)		—

Clause	Requirement - Test	Result - Remark	Verdict
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9. ANNEX C, TRANSFORMERS

	Position	The only transformers used are within certified PSU's	—
	Manufacturer	please refer to the table " list of critical components "	—
	Type	- " -	—
	Rated values	- " -	—
	Temperatures	(see appended table 5.4)	P
	Thermal cut-out	(see appended table 5.1)	N
C.1	Overload test	Certified PSU	P
	Conventional transformer		N
C.2	Insulation		P
	Precautions		P
	Retaining of end turns of all windings		N
	Earthing test at 25 A		N
C.3	Electric strength test	(see appended table 5.3)	P

10. ANNEX H, IONIZING RADIATION

H	ANNEX H, IONIZING RADIATION		N
	Ionizing radiation		N
	Measured radiation		—
	Measured high-voltage (kV)		—
	Measured focus voltage (kV)		—
	CRT markings		—
	Certified by		—
	Standard used		—

11. ANNEX U, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION

	See separate test report		N
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Clause	Requirement - Test	Result - Remark	Verdict
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12. TABLE: list of critical components

object/part No.	manufac- turer/trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾
1.5.1	TABLE: list of critical components KFM15_e – A				P
Compact power entry module	Schaffner	FN 321-1/05	250 V, 50/60 Hz 1 A	IEC 950	VDE, UL, CSA
Power Supply (PSU)	Skynet	SNP-Z107	100-250 VAC; 47-63 Hz 12 VDC; 9 A	IEC 60950	CE, TÜV, UL (E207942)
Alternative Power Supply (PSU)	EOS Corp.	VLT100	90-264 VAC 47-63 Hz 12 VDC; 7,5 A	IEC 60950	VDE, TÜV, UL, CUL (E150565)
Inner plastic (RI) 0,4 mm of layer thickness	Bayer AG	Makrolon DE(b)	-100 to 120°C UL94V-2	UL 94	UL plastic Component (E41613)
Power cord (EU)	Feller	VII G	250 VAC; 16 A H05VVF3G1,00	IEC/UL	VDE
Power cord (USA)	Feller	498 G	125 VAC ; 16 A SJT, 3x18AWG	IEC/UL	UL, CSA
PCBs	Various	Various	UL94V-0	UL94	UL
LCD-Display	Philips	LM151X05	12VDC; 0,45A	UL	UL, CSA (E200909)
Inverter	Green C&C Tech Co., Ltd	GH001	11,5 to 12,5 VDC 4,9 to 5,1 VDC; 2,6 A	--	evaluated while testing

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

Clause	Requirement - Test	Result - Remark	Verdict
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13. TABLE: electrical data (in normal conditions)

1.6	TABLE: electrical data (in normal conditions) Test Basis: controlled with notebook, screensaver running					P
fuse #	I _{rated} (A)	U (V) input voltage	P (W) input power	I (mA) input current	Ifuse (mA)	condition/status
*	0,30	90	23,4	260	*	Analog input Screensaver running
*	0,30	118	24,2	205	*	Analog input Screensaver running
*	0,20	132	24,7	187	*	Analog input Screensaver running
*	0,20	171	31,2	182	*	Analog input Screensaver running
fuse #	I _{rated} (A)	U (V)	P (W)	I (mA)	Ifuse (mA)	condition/status
*	0,20	203	37,8	185	*	Analog input Screensaver running
*	0,20	220	41,6	189	*	Analog input Screensaver running
*	0,20	240	41,3	172	*	Analog input Screensaver running
*	0,20	252	44,1	175	*	Analog input Screensaver running

Clause	Requirement - Test	Result - Remark	Verdict
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14. TABLE: clearance and creepage distance measurements

2.9.2 and 2.9.3	TABLE: clearance and creepage distance measurements KFM in combination with PSU and full equipped. #Clearance is defined as the shortest distance between two conductive parts or between a conductive part and the outer surface of an enclosure, when the distance is measured through air. # Creepage is the shortest path between the two conductive parts or between the conductive part and the outer surface of an enclosure, when the path is measured along the surface of the insulation.					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)
RI and BI:						
The PSU is <u>already</u> IEC 60950 certified						
RI and BI general (unit inside):						
Mains to PE (BI)	325	230	2,0	< 2,0*	2,3	< 2,3*
Mains to SELV (RI)	510	360	6,4	< 6,4*	7,4	< 7,4*
OP:						
SELV-Parts.						
* The Clearance and Creepage is fulfilled only by the use of a Makrolon Reinforced Isolation (RI) between Mains and metal Enclosure (PE), min. 0,4 mm of layer thickness. For more information (Flammability, Hot Wire Ignition) please refer to table list of critical components.						

15. TABLE: distance through insulation measurements

2.9.4	TABLE: distance through insulation measurements				P
distance through insulation di at/of:	U r.m.s. (V)	test voltage (V)	required di (mm)	di (mm)	
Outside power supply:					
Metal – ground /PCB	250		2	2	
Only applicable for IEC/UL.-Certified PSU's					

Clause	Requirement - Test	Result - Remark	Verdict
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16. TABLE: temperature rise measurements

5.1	TABLE: temperature rise measurements Test Basis: notebook (VGA), display running analog, screen saver Described Test Basis is the version with the most representative heating test behaviour !		P
	test voltage (V)	90 / 252	—
	T _{amb1} (°C)	22,6	—
	T _{amb2} (°C)	22,4	—
temperature rise ΔT of part/at:		ΔT (K)	required ΔT max.(K)
No.	Part	Location	/
1	Power entry module (enclosure)	inside	13 / 12
2	Hot point Power supply (M1)	inside	32 / 28
3	Hot point Power supply (T1)	inside	42 / 42
4	Hot point TM'501 (Inverter)	inside	37 / 37
5	Hot point Prisma-I, Coil L17	inside	34 / 33
6	RI makrolon	inside	28 / 28
7	Hot point PSU Main coller	inside	32 / 32
8	Hot point PSU SELV coller	inside	43 / 40
9	Controls/Keypad	enclosure outside	6 / 6
<p>This heating test shows the most critical PSU temp. behaviour in case it is loaded with max. load (90VAC/ 0,26 A ; 251VAC – 0,175 A). The running KFM15_e – A , input ratings (please refer to belonging table) are much down permitted PSU-Output values. General: electronic components are compared with max. valid temperatures according to data sheet. Temperatures measured with thermocouples. Temperature rise reduction of 10°C included.</p> <p>* System allowed to be run at an surroundings temperature of max. T_{msur} +50 °C.</p>			
temperature rise ΔT of winding:		R ₁ (W)	R ₂ (W)
		ΔT (°C)	required ΔT (°C)
			insulation class
General:			
* System allowed to be run at an ambient temperature of max. 50 °C			
Min. Temp. classes or temp. resistance taken under consideration			
Not applied			

Clause	Requirement - Test	Result - Remark	Verdict
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17. TABLE: electric strength measurements

5.3	TABLE: electric strength measurements		P
test voltage applied between:		test voltage (V)	breakdown
			Yes / No
All PSUs: Power supplies are already IEC 60950 certified			

18. TABLE: fault condition tests

5.4	TABLE: Fault condition tests performed with unit Envoy. The SFC-Tests were done with a 12 and 24 VDC external Power Supply and unlimited current source (Worst applicable practice use).		P				
	ambient temperature (°C)	22	—				
	model/type of power supply	Certified PSUs. Please refer to list of critical components	—				
	manufacturer of power supply		—				
	rated markings of power supply		—				
SFC-Tests on PSU:							
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
1	PSU (12V)	short	253	< 1sec.	--	--	PSU shuts output down

19. TABLE: ball pressure test of thermoplastics

5.4.10	TABLE: ball pressure test of thermoplastics		N
	required impression diameter (mm)	± 2 mm	—
part		test temperature (°C)	impression diameter (mm)
Not applied – no plastic enclosure			

Clause	Requirement - Test	Result - Remark	Verdict
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Measuring Device List

Check	Instrument	Applicant	Type	Test Equipment number	Remark
✓	Hybrid Recorder	Yokogawa	DR 230	PM-EM-6190-1	
✓	Dig. Oscilloscope	Yokogawa	DL 1540	PM-EM-6188-1	
	Probe 1000:1 15kV	Yokogawa	HV15HF	PM-EM-6186-16	
	Probe 100:1 for PM-EM-6188-1	Yokogawa	YGE3121	PM-EM-6186-15	
	Current probe_10mA - 100A for PM-EM-6188-1	Yokogawa	2345-1	PM-EM-6188-17	
	Current probe_50mA-300A for PM-EM-6188-1	Chauvin Arnoux	E3N	PM-EM-6188-18	
✓	Digital Multimeter TRUE RMS	Beckmann	RMS225	PM-EM-4145-1	
	DC High voltage probe 0 to 50000 VDC	Beckman	HV-211	--	
✓	Digital Multimeter	Fluke	45	PM-EM-6174-1	
✓	Digital Multimeter	Voltcraft	M-46660A	--	
✓	Protective Earth resistance tester	Elabo	2GA27 90-2A	PM-EM-3316-1	
	High Voltage tester, 5kVAC, 7kV DC	Elabo	90-1F/C	PM-EM-3317-1	
✓	Earth leakage current measurement instrument	KE		PM-EM-6197-1	
✓	Adjustable Isolation Transformer 2200VA	Block	BR2200	PM-EM-6180-1	
	DC-SOURCE 750W/150VDC/5A	ET System electronic	LAB/SP	--	
	Power Supply 70VDC/45ADC	Delta Elektronika	SM 70-45D	--	
✓	Temperature/Humidity Chamber	Heraeus	VEM 03 / 500	PM-EM-6156-1	

(check mark in 1st column) = tested