



# EMC Test Report

**Product:** Compact VariTime Sync Generator

**Type No:** PT 5201 / LT 428

**Standards:** EN 55103-1  
EN 55103-2

**Report No:** B2002052

**Date and Signature:** \_\_\_\_\_

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**Test object:** Compact VariTime Sync Generator, PT 5201 / LT 428

**Manufacturer:** DK-AUDIO A/S  
Marielundvej 37D  
DK-2730 Herlev  
Denmark

**Test dates:** 17 - 24 June 2002

**Standards:**

Emission:	Product family standards EN 55103-1/1996 Product family standards EN 61000-3-2/1995 and EN 61000-3-3/1995
Immunity:	Product family standards EN 55103-2/1996

**Test engineer:** Kim Boll Jensen

**Test laboratory:** All tests are made in the test laboratories of LK , Industriparken 32, 2750 Ballerup  
All tests are made by Kim Boll Jensen, Bolls Rådgivning.

**Conclusion:** The product has been tested according to the above mentioned standards and has been found to fulfil the requirements.  
This gives presumption of compliance for the protection requirements given in article 4 of the EMC directive 89/336/EEC and the unit can be CE-marked according to this directive.

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## **1. Introduction**

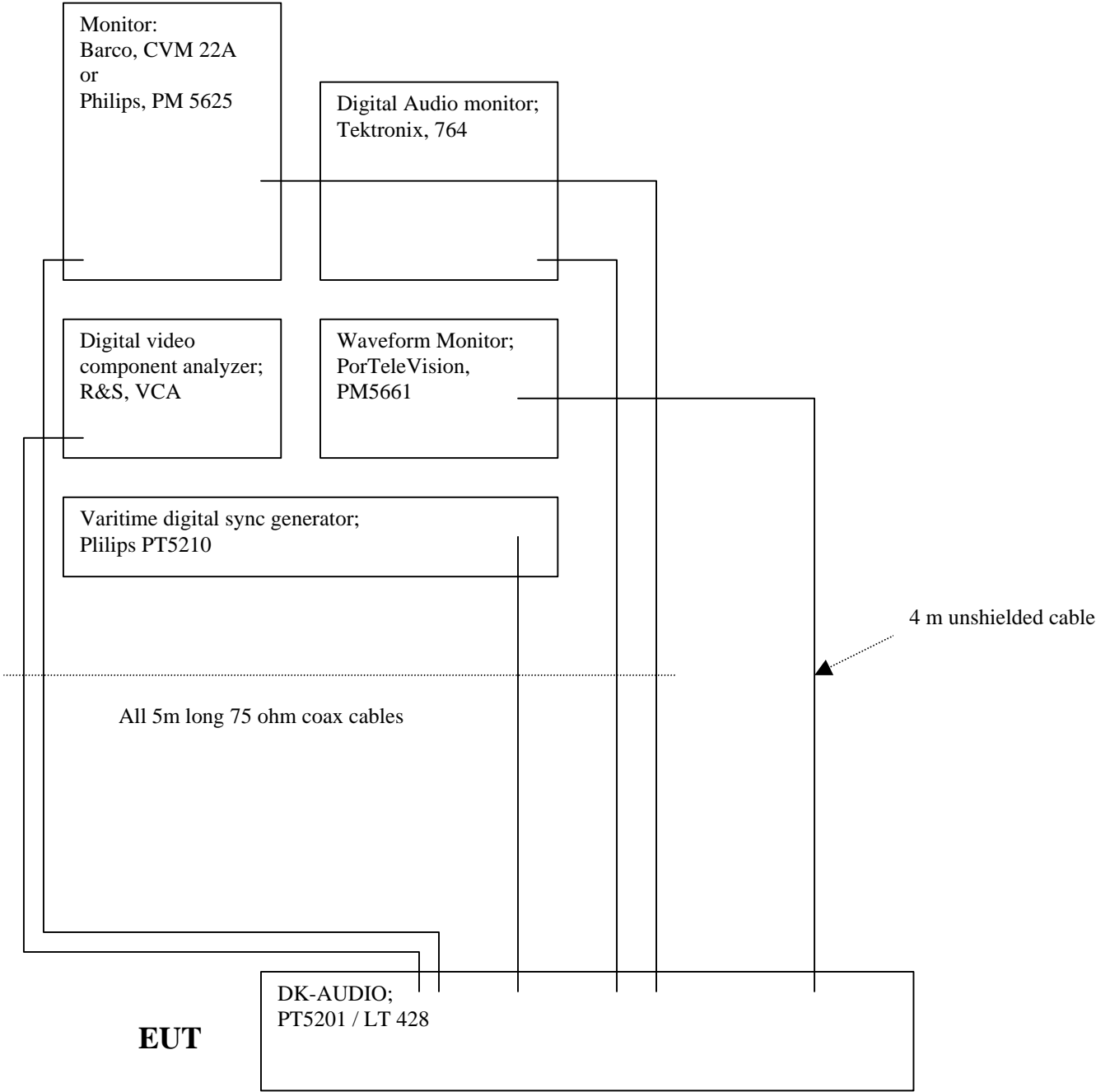
### **1.1 General**

The purpose of this report is to describe the tests that this product has been submitted to. These tests have been performed to verify that EMC requirements for the product are met.

### **1.2 Summery of tests**

<b>Phenomenon</b>	<b>Used Basic standard</b>	<b>Test on</b>	<b>Result</b>
Radiated emission	EN 55022/09.98 CISPR 22/11.97	Enclosure port	requirements fulfilled
Conducted emission	EN 55022/09.98 CISPR 22/11.97	Input AC power port	requirements fulfilled
Harmonic current emission	EN 61000-3-2/04.95 with Amd.1/04.98 and Amd. 2/04.98	Input AC power port	requirements fulfilled
Inrush	EN61000-4-11	Input AC power port	requirements fulfilled
Voltage fluctuation and flicker emission	EN 61000-3-3/ 01.95	Input AC power port	requirements fulfilled
Radiated RF immunity 80-1000 MHz, 80 % 1 kHz AM modulated	IEC 61000-4-3	Enclosure port	requirements fulfilled
Conducted RF immunity	IEC 61000-4-6	Input AC power port Signal ports	requirements fulfilled
Conducted fast transient immunity	IEC 61000-4-4	Input AC power port Signal ports	requirements fulfilled
Conducted surge transient immunity	IEC 61000-4-5	Input AC power port	requirements fulfilled
ESD immunity	IEC 61000-4-2	Enclosure port	requirements fulfilled
Voltage dips and interruptions immunity	IEC 61000-4-11	Input AC power port	requirements fulfilled

1.3 Test set-up



### **Definition of performance criteria for immunity testing :**

#### Performance criterion A :

The apparatus shall continue to operate as intended. No degradation of performance or loss of functions is allowed below a performance level specified by the manufacturer.

#### Performance criterion B:

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of functions is allowed below a performance level specified by the manufacturer.

#### Performance criterion C :

Temporary loss of functions is allowed provided the function is automatically restored when the stimulus is removed, or can be restored by operation of the controls.

Please refer to EN 55103-2 for full details of the performance criterion.

## **2. Environments**

Electromagnetic environment E2 is chosen for this equipment. This covers Commercial and light industrial (including, for example, theatres).

### **3. Emission test: EN 55022 (and FCC)**

Test applicable [ ] Not applicable [ X ]. Comment:

Deviations in test setup:

#### **Measurements (shortform) :**

Test setup shall be normal use with max. load according to standards.

In the TEM-cell, the product shall be measured from three different sides and each measurement is indicated on the test sheets. The corrected limits shall be indicated on the sheets.

Conducted emission can be measured in a shielded room or outside, just remember to use a HF-ground plane according to the standard.

Test sheets shall always be attached to this test.

Test :	OK / not OK	Comments :
TEM Cell :		
Open test site :		
Conducted mains:		
Conducted tele port		
FCC part 15, B		

Comments

Emission is not included in this report

Tested by :

Date :

#### **4. Harmonic Current: EN 61000-3-2**

Test applicable [ ] Not applicable [ X ]. Comment:

Deviations in test setup:

Number of test sheets:      in Attachment No.:

##### **Scope**

Applicable to mains operated equipment ( $\geq 220\text{Vac}$ ) with input current  $\leq 16\text{A}$  per phase.

Not applicable if max. power  $< 75\text{W}$

##### **Measurements (shortform) :**

Test setup shall be normal use with max. load according to standards.

Input Voltage shall a sin. Voltage with minimum distortion.

<b>Class:</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Equipment Class:				
Pass Class:				

Test results shall be attached for this test.

Comments

Mains input power = max 27W

Since mains input power  $< 75\text{ W}$  this standard is not applicable. (See clause 7 of EN 61000-3-2:1995 + A14:2000)

Tested by :

Date :



## 5. Voltage fluctuations and flicker: EN 61000-3-3

Test applicable [ X ] Not applicable [ ]. Comment:

Deviations in test setup:

### Scope

Applicable to mains operated equipment ( $\geq 220\text{Vac}$ ) with input current  $\leq 16\text{A}$  per phase.

According to § 6.1 of this standard, test shall not be made on equipment which is unlikely to produce significant voltage fluctuations or flicker.

Based on statement from DELTA accredited testhouse, small E-type transformer (wall plug) complies without test.

### Measurements (shortform) :

Test setup shall be normal use with max. load according to standards.

Value	Limit	Measured value
*P <sub>st</sub>	1.0	
*P <sub>it</sub>	0.65	
d <sub>c</sub> steady-state	$\leq 3\%$	
d <sub>max</sub>	$\leq 4\%$	
d <sub>(t)</sub> during voltage change	$> 3\%$ in less than 200 ms	

\*If voltage changes are caused by manual switching or occurs less than once per hour this requirements do not apply

### Comments

According to EN 61000-3-3 Clause 6.1 no test is needed if: Inrush  $\leq 20\text{A}$  and after inrush the variation is within 1.5A.

Inrush = 7.4 A

Steady current 0.11 (max. variation 0.05A)

Tested by : Kim Boll Jensen

Date : 2002-06-17

## 6. ESD-Test: EN 61000-4-2

Test applicable [ X ] Not applicable [ ]. Comment:  
Deviations in test setup:

### Test 1 (shortform) :

Discharge on product on typical operator accessible points.

**Contact:** 10 discharges pr. points, min. 1 sec. interval (per polarity) min. different 4 points.

**Air discharges:** at slots, apertures and insulating surfaces. 10 discharges pr. Points

**No discharge to open connectors.**

EN 61000-4-2 level : 3 for air discharge ( 8 kV) and level 2 for contact discharge (4 kV).

Test is performed with increasing voltages 2, 4, 8 kV

Performance criterion B

No	Discharge point	Number of discharges	Voltage Polarity	Air OK	Contact OK
1	Font RS 232	10	±	OK	OK
2	Front LED	10	±	OK	OK
3	Top front at screw	10	±	OK	OK
4	Back connector; Audio L	10	±	OK	*OK
5	Back connector; SDI	10	±	OK	*OK
6	Back connector; Video	10	±	OK	OK
7	Back connector; BB1	10	±	OK	OK
8	Back connector; GENLOCK	10	±	OK	OK
9	Back connector; LOOP	10	±	OK	OK
10					
11					
12					

Comments :

At 4Kv the R&S analyzer detects an error, but all test equipments and PT 5201 continues in normal operation. The PT 5201 pass the performance criterion B

**Test 2 (shortform) :**

Discharges on the horizontal coupling plane (HPC) (ground plane) and vertical coupling plane (VPC) according to standard.

10 discharges on each position min. 1 sec. interval applied to the edge of the plans in center of the equipment.

EN 61000-4-2, level 2 for contact discharge (4 kV).

Performance criterion B

No	Positions	Number of discharges	Voltage Polarity	Contact OK
1	In front of product at HPC	10	+	OK
2	In front of product at HPC	10	-	OK
3	In front of product at VPC	10	+	OK
4	In front of product at VPC	10	-	OK
5	Behind product at VPC	10	+	OK
6	Behind product at VPC	10	-	OK
7	Left side of product at VPC	10	+	OK
8	Left side of product at VPC	10	-	OK
9	Right side of product at VPC	10	+	OK
10	Right side of product at VPC	10	-	OK

Comments:

Tested by : Kim Boll Jensen  
Date : 2002-06-17

## **7. EM Field immunity; EN 61000-4-3**

Test applicable [ X ] Not applicable [ ]. Comment:

Deviations in test setup:

### **Measurements (shortform) :**

Test setup shall be normal use with max. load according to standards.

80 to 1000 MHz 80% AM (1kHz), at minimum 3 Volt/meter.

The product shall be observed during the test and be operating. After test, the product should be tested to be sure that no errors or changes in mode have occurred.

Performance criterion A.

<b>Antenna &amp; product position :</b>	<b>80M-1GHz OK/not OK</b>		<b>Comments:</b>
Vertical & front :	OK		
Vertical & left side :	OK		
Horizontal & front :	OK		
Horizontal & left side :	OK		

Comments

Tested by : Kim Boll Jensen

Date : 2002-06-17

## 8. Burst Test: EN 61000-4-4

Test applicable [ X ] Not applicable [ ]. Comment:

Deviations in test setup:

### Test 1 - immunities on powerport :

Product is in normal operating mode.

1 KVolt on AC and 0.5 KVolt on DC. Both on AC- and DC- port the coupling network shall be used.

Test is performed as 1 min. positive and 1 min. negative pulses.

If product have power outputs AC or DC, they shall also be tested with same procedure.

Performance criterion B

Test applicable [ X ] Not applicable [ ]. Comment:

Port :	0,5 K Volt		1 K Volt		Comments:
	+	-	+	-	
AC-port : CM	OK	OK	OK	OK	
Earth port	OK	OK	OK	OK	

### Test 2 - immunities on signal- and controlport :

(Test is only performed if connection cable is over 3 meter.)

Product is in normal operating mode. Test set-up according to IEC 61000-4-4. Signal or control cables shall be placed in the capacitive coupling clamp.

Test is performed as 1 min. positive and 1 min. negative pulses.

Performance criterion B

Test applicable [ X ] Not applicable [ ]. Comment:

Control cable : Signal :	0.5 k Volt		Comments
	+	-	
Audio L	OK	OK	
SDI	OK	OK	*TRS errors detected by R&S analyzer, nothing else affected, continues after burst test
Video	OK	OK	
BB1	OK	OK	
GENLOCK	OK	OK	

Comments

\* With a reduction of the test level to less than 400V the equipment did still fail. But complies with performance criterion

Tested by : Kim Boll Jensen  
Date : 2002-06-17

## 9. Surge: EN 61000-4-5

Test applicable [ X ] Not applicable [ ]. Comment:

Deviations in test setup:

### Test 1 - immunities on AC/(DC) powerport :

AC:CM1 KVolt.

AC:DM 0.5 KVolt

DC: 0.5 KVolt Line to ground only if DC port can connect directly to outdoor cables.

Couplings network is used, and both positive and negative pulses are used, minimum 1 minute between pulses and at least 5 pulses of each.

Performance criterion B

Test applicable [ X ] Not applicable [ ]. Comment:

Port :	0,5 K Volt		1 K Volt		2 K Volt		Comments
	+	-	+	-	+	-	
CM; L – PE			OK	OK			
CM; N – PE			OK	OK			
DM; L - N	OK	OK					

Comments

Tested by : Kim Boll Jensen

Date : 2002-06-24

## 10. RF immunity on cables: EN 61000-4-6

Test applicable [ X ] Not applicable [ ]. Comment:  
Deviations in test setup:

### Scope

Test applies to AC/DC power ports and signal ports if cable is or can be longer than 3 m.

### Test

0,15 – 80MHz minimum 3V/m 80% AM.

Test setup as pr. standard. Product in normal operating mode.

Performance criterion A

Cable:	0,15 – 80MHz OK/not OK	Comments:
Mains	OK	1) See below
SDI	OK	2)
VIDEO	OK	3)
BB1	OK	4)
GENLOCK	OK	5)
AES	OK	6)

### Comments

1) The picture got some dark stripes from 2MHz to 4.5MHz

At 3.5MHz to 5MHz it got noise all over the picture. Both problems could be solved by connecting the functional earth to the groundplane.

At 20 MHz to 27MHz the dark stripes came back, this time only a ferrite on the mains cord could stop it.  
By using the Philips monitor the problems disappeared.

2) 2.5 to 5MHz the picture got some dark strips, but this time it was the BARCO display unit which was sensible. A better earth connection at the BARCO unit solved the problem.

At 11, 13 and 45MHz the problems came again, it was reduced by better earth connection between all monitoring equipments.

By using the Philips monitor the problems disappeared.

3) At 6 – 6.8MHz the signal was total mess, by earth connection of the video cable between BARCO monitor and DFT the signal was OK.

Some strips at 20-25 and 32-37MHz

By using the Philips monitor the problems disappeared.

4) At 3.8 – 8MHz strips in picture, at 6.6MHz the picture was total mess, all problems solved by earthing as in 3)  
Strips at 45-50MHz couldn't be solved.

By using a new monitor the problems disappeared.

5) Very small strips at 6.6MHz and again from 20-28MHz

By using the Philips monitor the problems disappeared.

6) At 6-7MHz small noise strips in picture and again at 22- 28 MHz

By using the Philips monitor the problems disappeared.

All problems was related to the Barco monitor. By measuring the noise signals in worst case it wasn't over rating of the product. Therefore the problem have nothing to do with the EUT.

Tested by : Kim Boll Jensen

Date : 2002-17-06 and 2002-06-24

## **11.     Power freq. magnetic field: EN 610004-8**

(This test is only applicable to equipment containing devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamics microphones, magnetic field sensors, etc.)

Test applicable [   ] Not applicable [ X ]. Comment:  
Deviations in test setup:

### **Scope**

Test applies to enclosure (including cables)

### **Test**

50Hz 1 A/m (r.m.s.)

Test setup as pr. standard. Product in normal operating mode.

Test is performed in three directions.

Performance criterion A

<b>H-field direction</b>	<b>OK / Not OK</b>	<b>Comments:</b>
Vertical 1		
Vertical 2		
Horizontal		

Comments

Tested by   :  
Date        :



## **12. Voltage dips/interruptions and Inrush: EN 61000-4-11**

Test applicable [ X ] Not applicable [ ]. Comment:  
Deviations in test setup:

The voltage is adjusted to 230 Vac and the following dips/interruptions are introduced:

Reduction in %	Voltage	Time	OK / not OK	Performance criteria	Comment
>95%	>11.5 Vac	5 sec.	OK	C	
60%	92 Vac	100 ms	*OK	C	
100%	0 Vac	20 ms	OK	B	

Max. Inrush current measured at >95% @ 5 sec at 0 crossing = 7.4 A (average inrush = 5.05A)

Comments

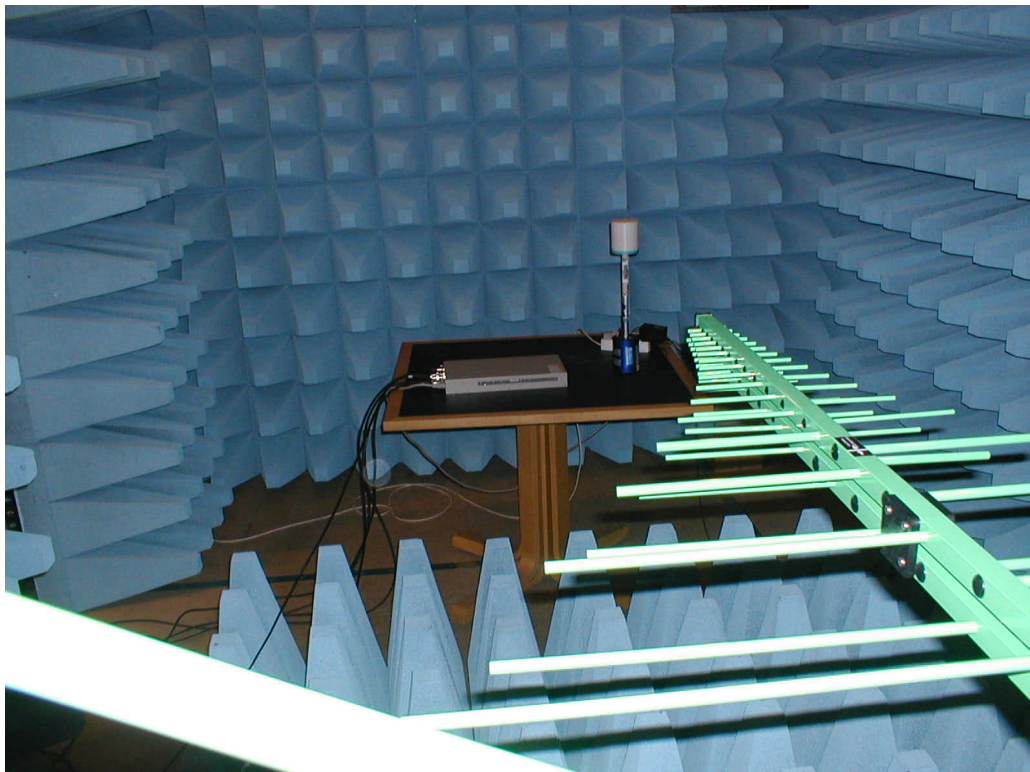
\* It did pass more than 200ms.

Tested by : Kim Boll Jensen  
Date : 2002-06-17

### 13. Attachment



ESD test



HF immunity test



HF conducted immunity test

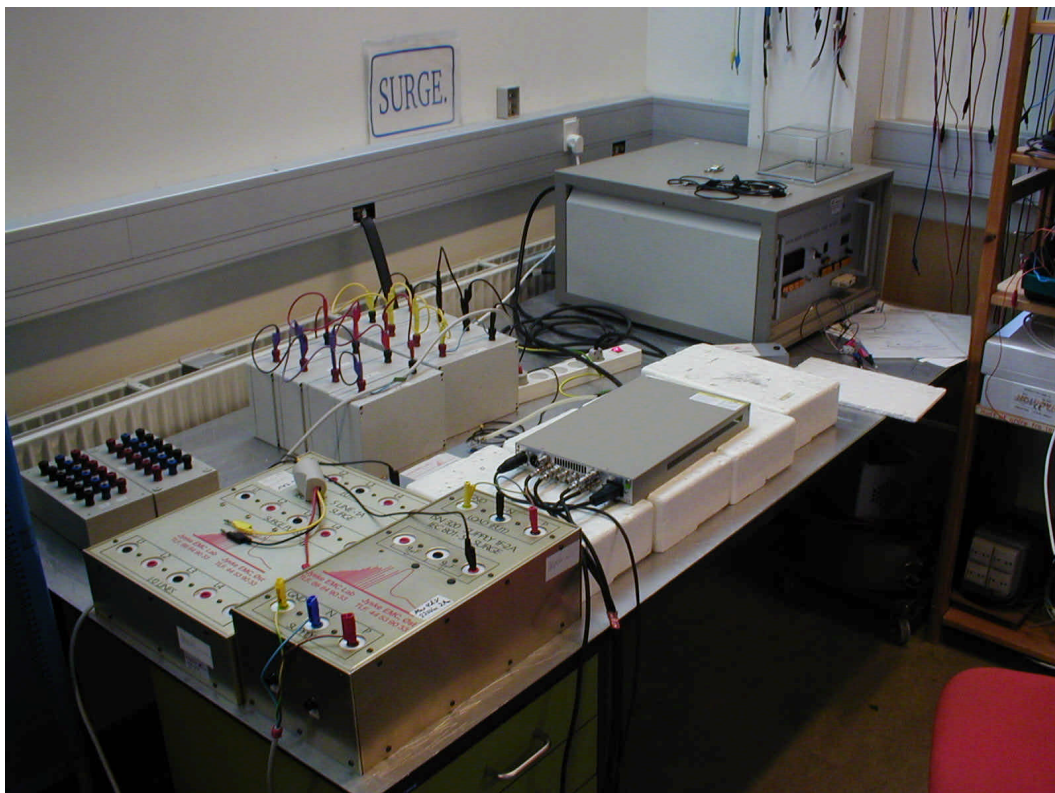


Burst test





Burst test



Surge test

**List of instruments:**

**Radiated emission:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Test receiver	Advantest	3361A		Arepa	12.06.2002	
Antenna	Schaffner	Bi-Log CBL6112B				
Amplifier	HP	8447D	P 62094			
Software	Schaffner- Chase	EMC EMI PAK EPS9980 -1.31				
Shielded room	Lindgren- Rayproof	S81				

**Conducted emission:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Test receiver	Advantest	3361A		Arepa	12.06.2002	
Software	Schaffner- Chase	EMC EMI PAK EPS9980 -1.31				
LISN	Farnell	LSN 30	AN-6			

**Radiated RF immunity:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Generator	Marconi	2023		Arepa	11.06.02	
Amplifier	Amplifier Research	30W1000M 7	AP-3 AFD.117			
Antenna	Schaffner	Bi-Log CBL6112B				
Field meter	PMM	8051		NPL	27.02.02	
Shielded room	Lindgren- Rayproof	S81				

**Conducted RF immunity:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Generator	Marconi	2023		Arepa	11.06.02	
Amplifier	Amplifier Research	75A250	AP-4			
Decoupling ferrite tube	Jyske EMC	DFT 810				
Coupling/De- coupl. network	Jyske EMC	ISN 201				
EM-clamp	Lüthi	EM101	EG-14			
50 V load	HP	11593A 50 V				
50 V load	Lüthi	50 V				

**Conducted fast transient immunity:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Generator	Schaffner	Nsg 200E + NSG 225A	EG-5	Arepa	10.06.02	
Capacitive coupling clamp	Schaffner	CDN 125				
Capacitive coupling clamp	Schaffner	CDN 125	EG-8			

**Conducted surge transient immunity:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Generator	HILO/TEST	CWG 10/503		Arepa	12.06.02	
Coupling/De- coupl. network	Jyske EMC	ISN 320	EG-15			

**Electrostatic Discharge immunity:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Generator	Schaffner	NSG 432 +adapter for contact	EG-18	Arepa	09.10.01	

**Voltage dips and interruptions immunity:**

Instrument	Manu- facturer	Type	Instrument number	Calibrated at	Last calibration	Next calibration
Generator	Schaffner	NSG 200C + 203A	EG-3			
Voltmeter	Fluke	8010A	UV-15	LK	03.2002	
Osc. Scope	Tektronix	TDS220				
Current meter	Voltech	PM1200	W-14	LK	02.2002	