

Document No: DD+DIS042.13E

**DX-D 400**

Type 5420 / 100/101

## ► Purpose of this Document

This document:

- Describes the electrical test according to IEC 62353:2007 for a DX-D 400 system.
- Can be used to record the results.

## ► Document History

Edition. Revision	Release Date	Changes
1.1	02-2015	Added Microsoft Word form to the PDF file.

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Edition 1, Revision 1

02-2015 printed in Germany

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## ► Manufacturer

Agfa HealthCare N.V.

### Published by

Agfa-Gevaert HealthCare GmbH  
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### WARNING:

**Improper operation or service activities may cause damage or injuries.**



### INSTRUCTION:

- (1) Read the "Generic Safety Directions" prior to attempting any operation, repair or maintenance task on the equipment.  
Refer to Document ID 11849633, [Agfa Intranet](#) / [Agfa Portal via Internet](#).
- (2) Strictly observe all safety directions within the "Generic Safety Directions" and on the product.



### IMPORTANT:

The installation and service of the product(s) described herein is to be performed by qualified personnel who are employed by Agfa HealthCare N.V or one of its affiliates or who are otherwise authorized by Agfa HealthCare N.V. or one of its affiliates to provide such services.

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## 1 Required tools

Following tools are required to perform the test:

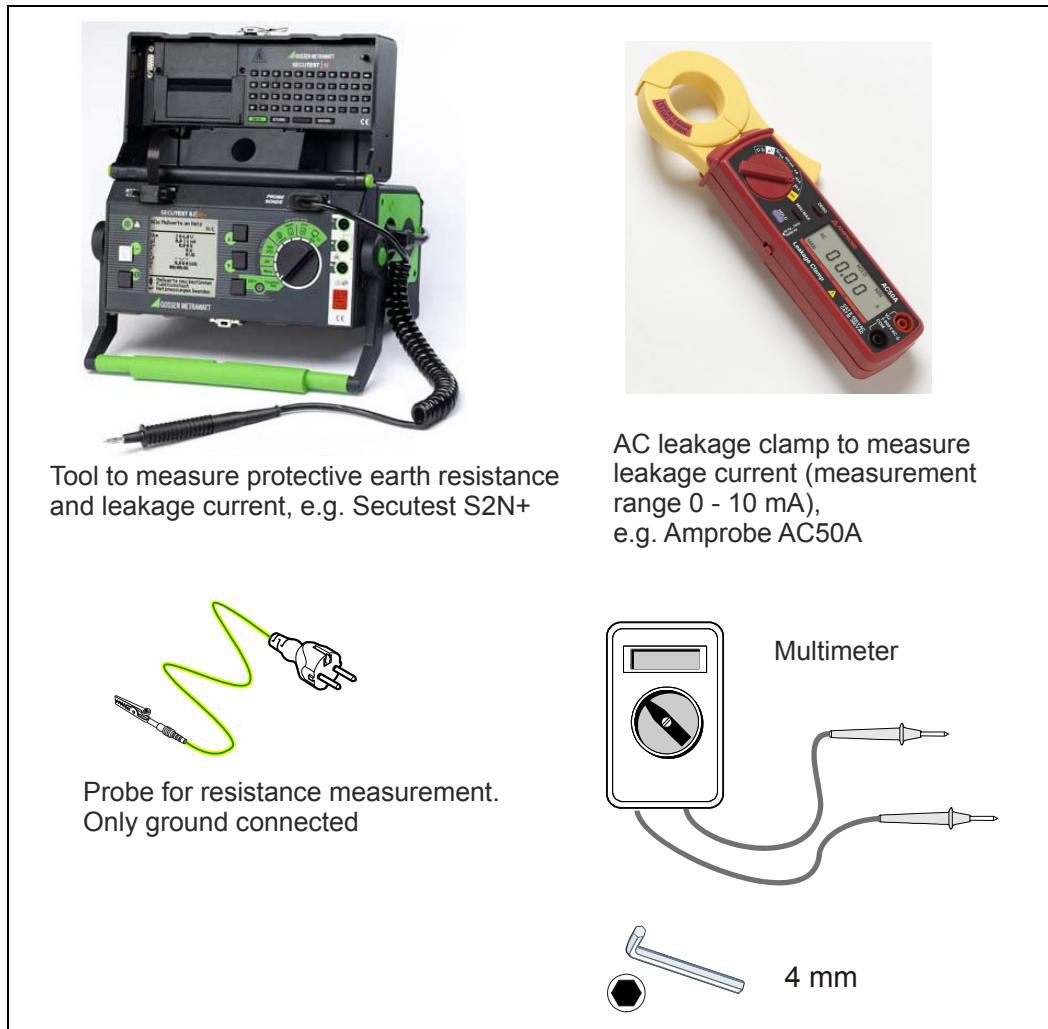


Figure 1

## 2 Test details

Testing organization:  Name of testing person:	Reason for test: Testing before putting into service (ref. value) Recurrent test after        months* Test after repair	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Test measurement equipment:		

\*Recurrent test intervals for this type of equipment according to IEC 62353: Max. 36 months

## 3 Equipment details

Manufacturer: AGFA HealthCare N.V.	Operator of the equipment:
Equipment Name: DX-D 400	Equipment Type Number:
Serial Numbers: System: Generator:	Class of protection: I (according to IEC 60601-1: 2005, definition 3.13) Applied part type: B
Mains connection of generator:      Permanent installed equipment <input checked="" type="checkbox"/>	
Mains connection of table:      Permanent installed equipment <input type="checkbox"/> Detachable power supply cord <input type="checkbox"/>	

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## 4 Test instructions and results

### 4.1 Visual inspection

Test Description	Complies:	
	YES	NO
<ul style="list-style-type: none"> <li>Safety related marking, labels and labeling is legible and complete. See Figure 2.</li> <li>All covers are in good condition.</li> <li>No damage or contamination is visible.</li> <li>All cables not covered by cable ducts are in good condition.</li> <li>User manual is available and reflects the current revision of the equipment.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

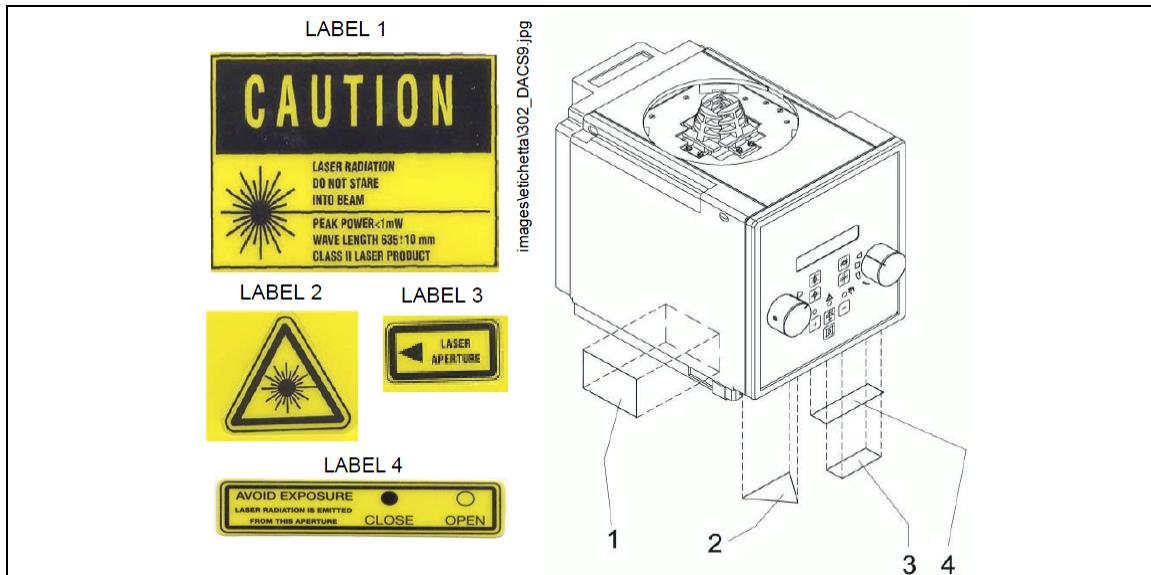


Figure 2: Example of safety labels

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## 4.2 Protective earth resistance

### 4.2.1 Introduction

For measurement of the protective earth resistance, one probe of the earth resistance measurement device is connected to the chassis (ground) of the generator ①. The other probe is used to measure the earth resistance at several locations ② at the generator. The same proceeding for the table. Refer to Figure 3.

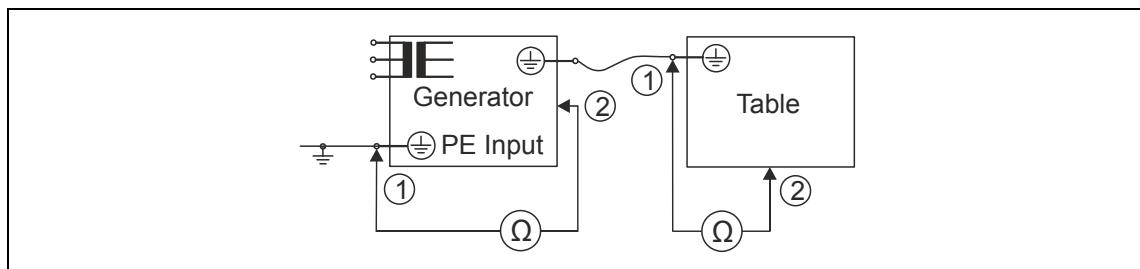


Figure 3



Figure 4

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#### 4.2.2     Switching off the system

- (1) Switch off the system at the main switch.
- (2) Put a sign "Don't switch on" in local language to the main switch.

**DANGER:**

**Generator can be switched on by a person not involved in the measurements.**

**Risk of life.**

Take appropriate measures to prevent activation of the main switch.

#### 4.2.3     Preparing the generator for measurements

- (1) Wait approx. 1 minute after switch-off of the generator to let the capacitors inside the generator discharge.

**DANGER:****High voltage. Risk of life.**

- Ensure that the device is switched off at the main switch.
- Wait 1 minute after switch-off to let the capacitors discharge.

- (2) Remove the generator housing.

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- (3) Use a voltmeter to confirm that the power input is potential-free. Measure e.g. between the three main fuses at the input side of the fuses.

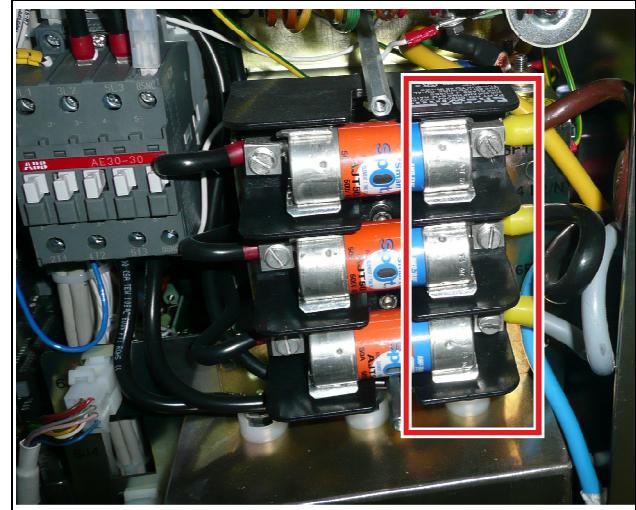


Figure 5

#### 4.2.4 Checking the system protective earth connection

- (1) Connect one probe to the ground of the installation room e.g. at a mains socket (A).
- (2) Put the measurement probe at a generator ground connector (B).
- (3) Check the protective earth resistance:  
It must be  $< 0,2 \text{ Ohm}$ .

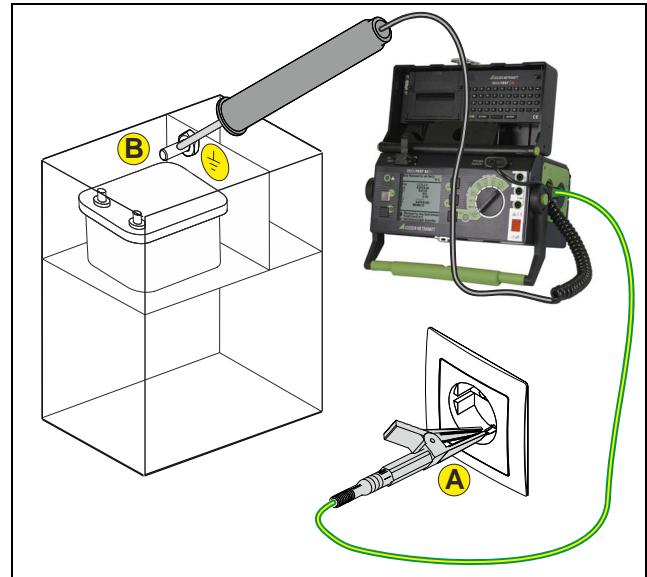


Figure 6

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#### 4.2.5 Performing "Zero Balancing" at the measurement tool

- (1) Connect one probe to a ground connection in the generator (A).
- (2) Put the measurement probe at the generator chassis (B).
- (3) Perform a "zero balancing".

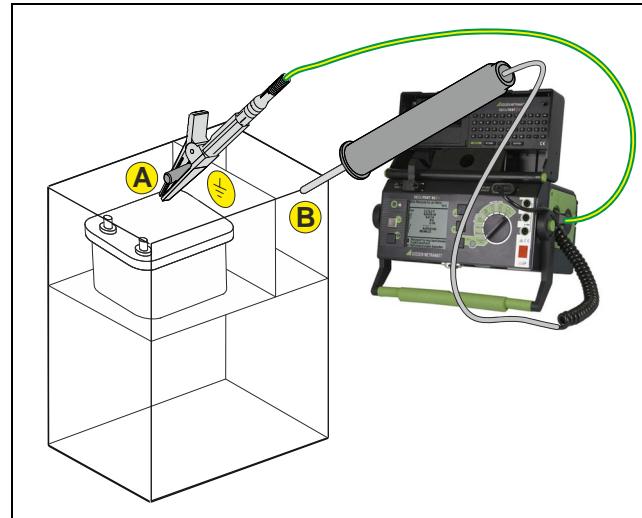


Figure 7

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#### 4.2.6 Protective earth measurements at the generator

- (1) Keep the probe connected to the generator chassis ground.

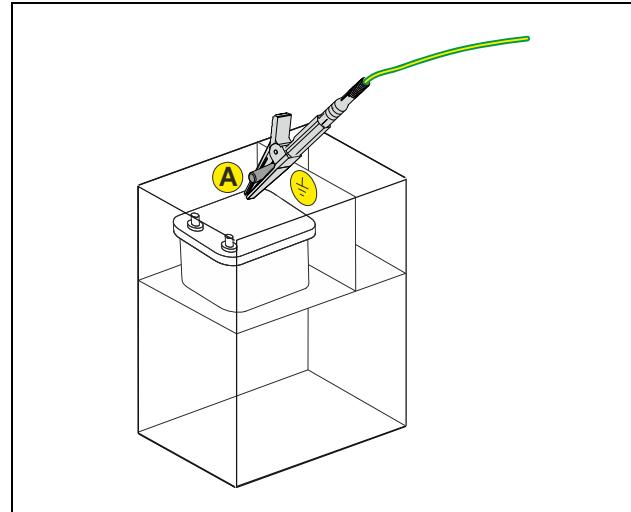


Figure 8

- (2) Connect the earth cable to the generator housing.  
This cable was removed when removing the generator housing.



Figure 9

- (3) Measure the protective earth resistance at the locations described on next page.



NOTE:

All PE (protective earth) resistance measurements should be made at metallic conductive parts (e.g. screws or lacquer free edges of the housing).

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PE resistance test at Generator (see Figure 10)			Complies:	
Test point	Measured value	Limit value	YES	NO
Test point 1 - Chassis left	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 2 - Chassis right	$\Omega$	0,1 $\Omega$		
Test point 3 - Chassis bottom	$\Omega$	0,1 $\Omega$		
Test point 4 - Cover left	$\Omega$	0,1 $\Omega$		
Test point 5 - Cover right	$\Omega$	0,1 $\Omega$		

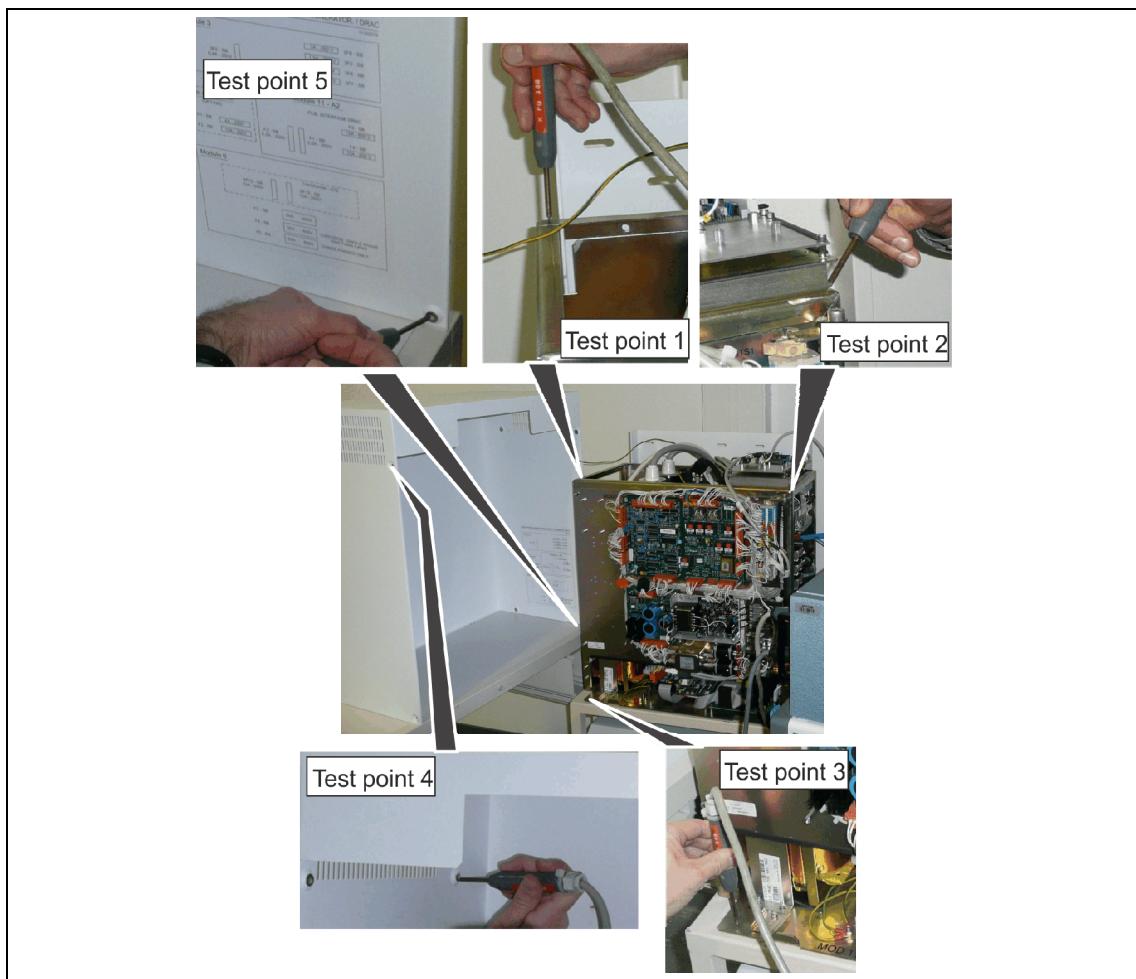


Figure 10: Test points at generator

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#### 4.2.7 Measurements at the table and column

- (1) Remove the covers at the table.

For instructions refer to the DX-D 400 Table and Wall Stand Service Manual, Chapter "Installation of the radiographic table", Document ID 31833723.

- (2) Put one probe at the ground input.

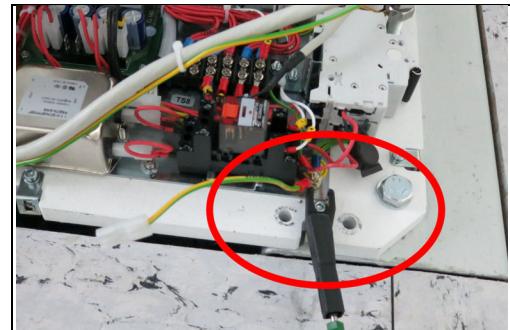


Figure 11

- (3) Measure the protective earth resistance at the locations described below.

PE resistance test at table and column (see Figure 12)				Complies:	
Test point		Measured value	Limit value	YES	NO
Test point 1	Column	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 2	Column rail	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 3	Table	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 4	Table rail	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 5	Bucky	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 6	Chassis	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 7	Tube handle	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 8	X-ray tube left	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 9	X-ray tube mounting	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>
Test point 10	X-ray tube right	$\Omega$	0,1 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>

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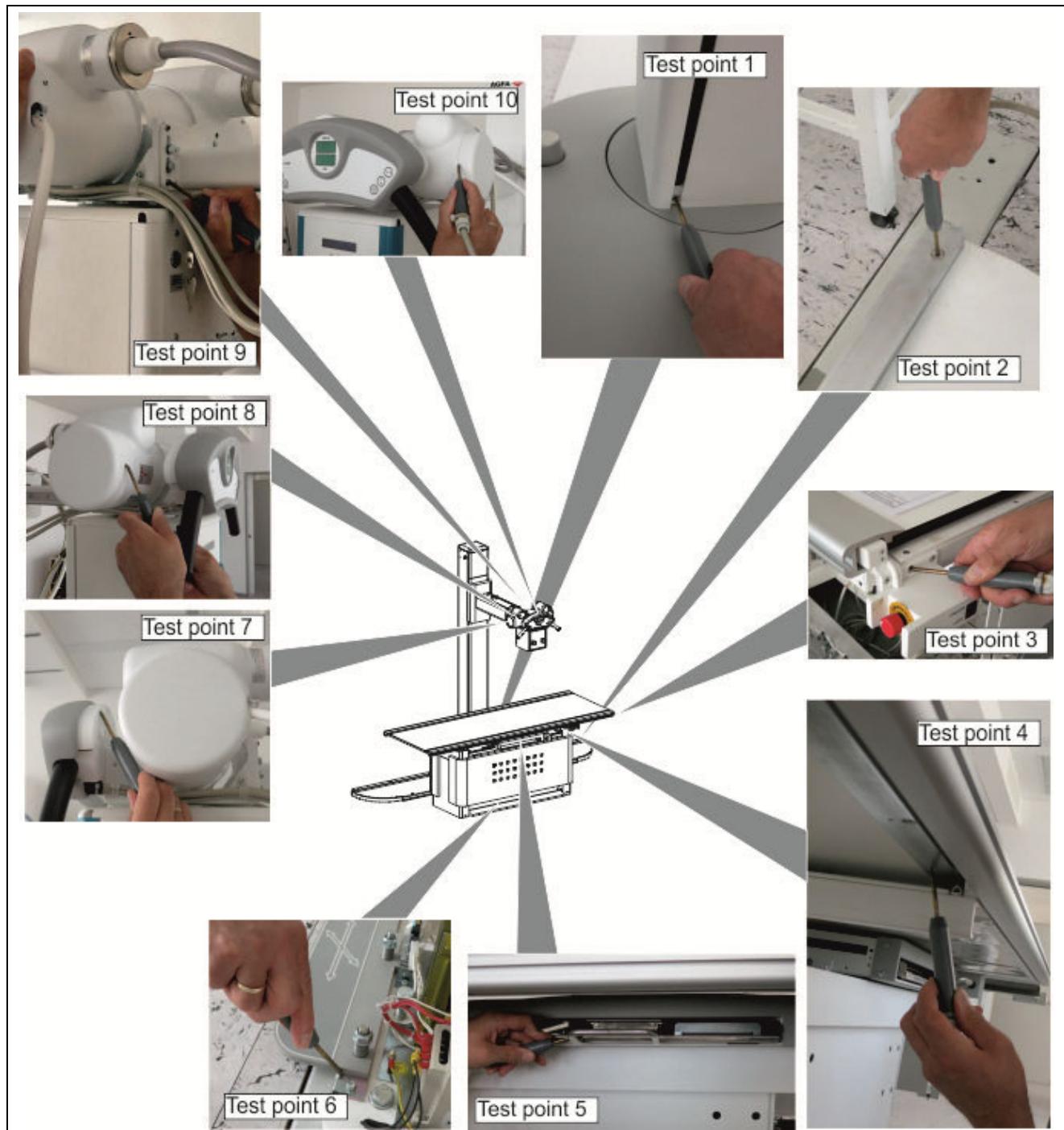


Figure 12: Test points at table and column

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## 4.3 Leakage current

### 4.3.1 Introduction

For measurement of the leakage current the "differential method" is used:

The current is measured with an AC leakage clamp at the input side of the generator and the table.

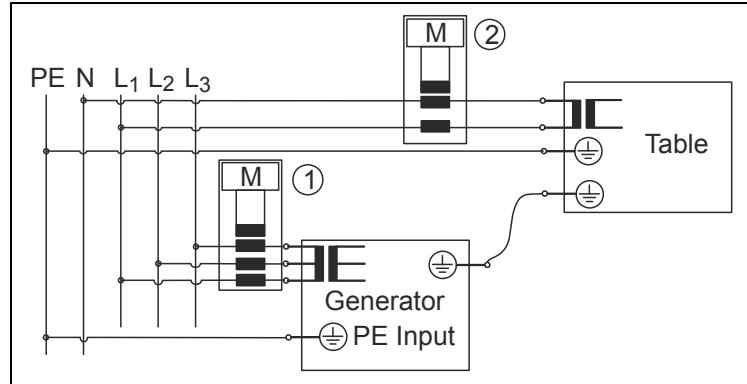


Figure 13

### 4.3.2 Leakage current measurements at the generator

- (1) Keep the mains switch for the generator switched off.
- (2) Connect the leakage clamp around all three input wires (combined with a blue ferrite) before or after the main fuses. See Figure 14.



Figure 14



#### DANGER:

**High voltage. Risk of life.**

Do not touch the generator when powered on.

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- (3) Switch on the system at the main switch.
- (4) Measure the leakage current.
- (5) Switch off the system at the main switch.
- (6) Wait approx. 1 minute to let the capacitors inside the generator discharge.
- (7) Remove the leakage clamp.

<b>Leakage Current at Generator</b>		<b>Complies:</b>	
<b>Measured value</b>	<b>Limit value</b>	<b>YES</b>	<b>NO</b>
mA	5 mA*	<input type="checkbox"/>	<input type="checkbox"/>

\* allowed leakage current according to IEC 60601-1 for permanent installed 3-phase ME equipment

#### 4.3.3 **Leakage current measurements at the table**

- (1) Switch on the system at the main switch.
- (2) Switch off the generator at the control console.



Figure 15

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- (3) Connect the leakage clamp around the two input wires.  
See Figure 16.

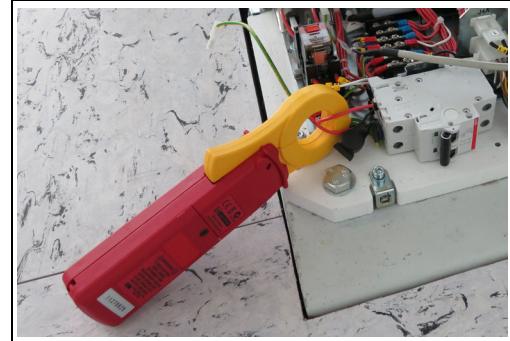


Figure 16

- (4) Switch on the table by lifting the lever at the relais "K1".

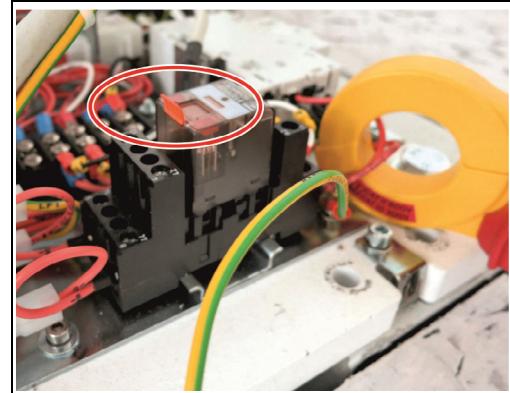


Figure 17

**DANGER:****High voltage. Risk of life.**

Do not touch the opened power cabinet when the table is powered on.

- (5) Measure the leakage current.
- (6) Switch off the system at the main switch.
- (7) Remove the leakage clamp.
- (8) Put back the lever at relais "K1" to home position.

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<b>Leakage Current at Table for permanent installed equipment</b>		<b>Complies:</b>		
<b>Measured value</b>	<b>Limit value</b>	<b>NO</b>	<b>YES</b>	<b>Not applicable</b>
mA	5 mA*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*allowed leakage current according to IEC 60601-1

<b>Leakage Current at Table for connection via detachable power supply cord</b>		<b>Complies:</b>		
<b>Measured value</b>	<b>Limit value</b>	<b>NO</b>	<b>YES</b>	<b>Not applicable</b>
mA	0,5 mA*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*allowed leakage current according to IEC 60601-1

## 5 Re-assembling the system

- (1) Switch off the system at the main switch.
- (2) Wait approx. 1 minute to let the capacitors inside the generator discharge.
- (3) Use a voltmeter to confirm that the power input is potential-free.
- (4) Mount the generator housing.
- (5) Mount the covers at the table.

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## 6 Final protective earth measurement at the generator

- (1) Measure the protective earth resistance of the generator housing.

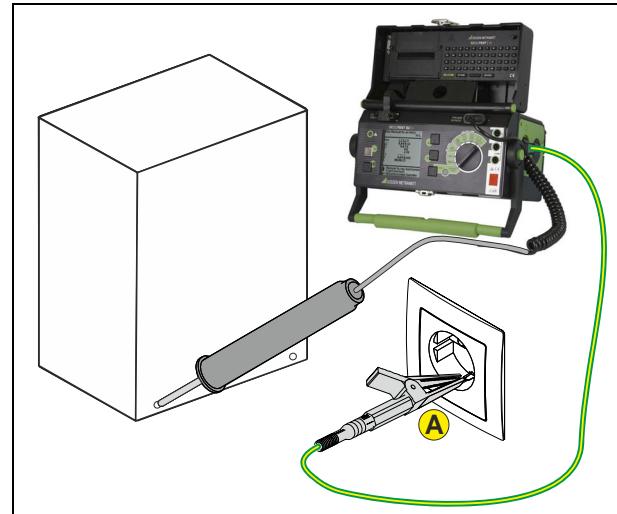


Figure 18

PE resistance test at Generator Housing (see Figure 18)		Complies:	
Measured value	Limit value	YES	NO
$\Omega$	0,2 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>

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**7****Final protective earth measurement at the table**

- (1) Measure the protective earth resistance at some conductive places of the table covers.

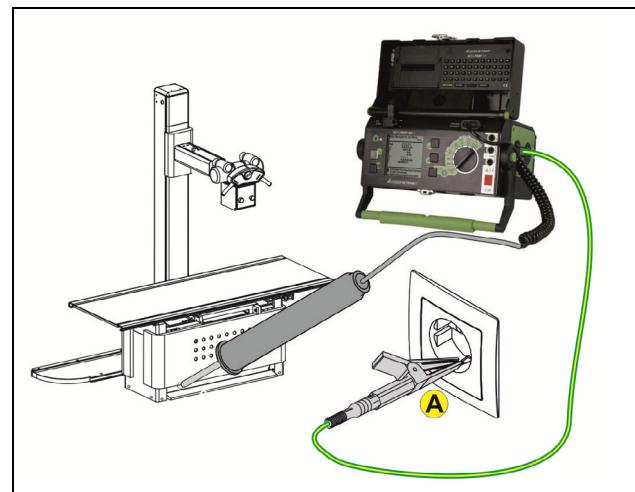


Figure 19

PE resistance test at Table Covers (see Figure 19)		Complies:	
Measured value	Limit value	YES	NO
$\Omega$	0,2 $\Omega$	<input type="checkbox"/>	<input type="checkbox"/>

**8****Insulation resistance**

The insulation resistance measurement is not required. Reason: The generator has overvoltage devices built in which prevent proper measurements.

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## 9 Functional test

The purpose of the functional test is to check the function of the emergency switch at the table.

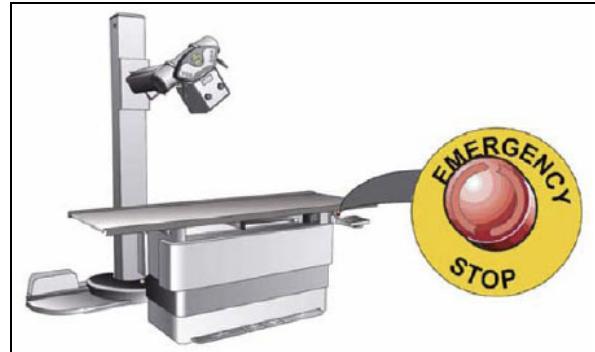


Figure 20: Emergency switches

Recommended procedure for the functional test:

- (1) Put the system into operation.
- (2) Press the emergency switch.
- (3) Try to move the table top, the X-ray tube or the column: They must be movable, i.e. the magnetic brakes must be open.
- (4) Release the emergency switch.
- (5) Put the system into operation again.

Functional Test	Complies:	
	YES	NO
Emergency switch at the table	<input type="checkbox"/>	<input type="checkbox"/>

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## 10 Test evaluation

**Deficiency / Note:****Overall assessment:**

Equipment is OK. No safety or functional deficiencies were detected.

Equipment shows deficiencies. No direct risk: Deficiencies detected have to be corrected on short term.

Equipment shows deficiencies and shall be taken out of operation until deficiencies are corrected.

Equipment does not comply. One of following three actions is recommended:

Modification

or

exchange of components

or

taking out of service .

**Evaluated by:**

Name: \_\_\_\_\_ Date / Signature: \_\_\_\_\_

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