

# SIEMENS

## MOBILETT XP Digital

**SP**

### **Installation and Start-up**

System

Installation and Start-up

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<b>1</b>	<b>General</b>	<b>6</b>
	Performance of work	6
	Text labeling	7
	Icons	8
	Information on product safety and protective measures	9
	System overview - user	12
	Orientation	13
	System overview - service	14
	Cleaning	16
<b>2</b>	<b>General start-up information</b>	<b>17</b>
	Required documents	17
	Required tools, test equipment and aids	18
	Start-up information	19
	Information on the protective conductor resistance test	20
	Information on measuring the leakage current	22
	Information on measuring the patient leakage current	25
<b>3</b>	<b>Unpacking and visual inspection</b>	<b>27</b>
	Unpacking	27
	Visual inspection	28
	Mechanical function test	29
	Cable winch	29
	Support arm movements	29
	Single tank and collimator movements	29
<b>4</b>	<b>Checking the shock sensors</b>	<b>30</b>
	Checking the shock sensors	30
<b>5</b>	<b>Start-up</b>	<b>31</b>
	Line voltage	31
	Controls and displays	32
	Battery charging operation	32
	Exposure operation	32
	Lead apron holder	33
	Collimator function	34
	Calibrating the CXDI detector	35
	Exposure release with high voltage	36
	Checking the preparation limit time	36
	Release an exposure	36
	Manual exposure termination	36
	Light field/radiation field	37

	Evaluation: light field to radiation field . . . . .	37
	Configuration of the imaging system . . . . .	39
	Checking the image quality . . . . .	40
	Options . . . . .	41
	DAP . . . . .	41
	Remote control . . . . .	41
<b>6</b>	<b>DHHS</b> . . . . .	<b>42</b>
	DHHS tests (USA only) . . . . .	42
	Test of kV accuracy . . . . .	43
	kV meter method: . . . . .	43
	Oscilloscope method: . . . . .	44
	Test of mAs accuracy . . . . .	46
	Oscilloscope method: . . . . .	46
	mAs meter method: . . . . .	47
	Reproducibility test . . . . .	48
<b>7</b>	<b>Backup</b> . . . . .	<b>51</b>
	Backup procedure . . . . .	51
	Backup of hard disks . . . . .	51
	Backup of Configuration . . . . .	52
<b>8</b>	<b>Remaining work</b> . . . . .	<b>54</b>
	Final activities . . . . .	54
	Protective conductor test . . . . .	54
	Leakage current measurement . . . . .	54
	Patient leakage current measurement . . . . .	54
	Labels . . . . .	55
	Reports . . . . .	56
<b>9</b>	<b>Start-up report</b> . . . . .	<b>57</b>
	MOBILETT XP Digital . . . . .	57
<b>10</b>	<b>DHHS report</b> . . . . .	<b>59</b>
	MOBILETT XP Digital . . . . .	59
<b>11</b>	<b>Electrical safety/reports</b> . . . . .	<b>61</b>
	Protective conductor resistance/report . . . . .	61
	Measuring circuit . . . . .	62
	Remarks: . . . . .	62
	Leakage current/report . . . . .	63
	Measuring circuit . . . . .	64
	Remarks: . . . . .	65
	Patient leakage current/report . . . . .	67
	Measuring circuit . . . . .	68

# Table of Contents

5

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Remarks: .....	68
<b>12</b> _____ <b>Changes to Previous Version</b> _____	<b>69</b>

## Performance of work



Any technician duly assigned by the local Siemens office is authorized to perform maintenance and service work.




Certain tasks may also be performed by other technical personnel (e.g. the customer's hospital technicians). These tasks are marked by this icon.

It is absolutely necessary to

- follow all instructions in textual and graphic form and to
- use the specified tools, test equipment and aids.

You can also contact your national Siemens Uptime Service Center for support.

Text labeling

 <b>DANGER</b>	<p><b>DANGER</b> indicates an immediate danger that if disregarded will cause death or serious physical injury.</p> <p style="text-align: center;">⇨</p>
 <b>WARNING</b>	<p><b>WARNING</b> indicates a possible danger that if disregarded can cause death or serious physical injury.</p> <p style="text-align: center;">⇨</p>
 <b>CAUTION</b>	<p><b>CAUTION</b> used with the safety alert icon indicates a possible danger that if disregarded will or can lead to minor or moderate physical injury and/or damage to property.</p> <p style="text-align: center;">⇨</p>
<p><b>NOTICE</b></p>	<p><b>NOTICE</b> used without the safety alert icon indicates a possible danger that if disregarded can or will lead to an undesirable outcome or state other than death, physical injury or property damage.</p> <p style="text-align: center;">⇨</p>
<p><b>NOTE</b></p>	<p><b>NOTE</b> is used to indicate information that explains the proper way to use devices or to carry out a process, i.e., provides pointers and tips.</p>

## Icons



Warning about ionizing radiation or radioactive substances. Tests and adjustments that must be performed with the radiation switched on are indicated by this radiation warning icon.



Dangerous electrical voltage > 25 VAC or > 60 VDC.



Caution! General hazard warning.



ESD: Warning about electrostatically sensitive components.



Report icon. Used to indicate entries in certificates.



Certain tasks can also be performed by other technical personnel (e.g. the customer's hospital technicians).

**U**                      Certain sections apply only to the USA. These sections are marked with this icon.  
**S**

Fig. 1:



---

## Information on product safety and protective measures

---



While performing maintenance and service work on the MOBILETT XP Digital with the covers removed, it is possible to come into contact with components under voltage.

Carelessness can result in death or serious bodily injury.

When conducting maintenance and service work, follow:

- ⇒ the product-specific safety information contained in the technical documentation,
  - ⇒ and the general safety information (TD00-000.860.01...).
- 



Remove or install components only if:

- ⇒ - The system is switched off, and
  - ⇒ - The capacitors are discharged, and
  - ⇒ - The ESD guidelines are followed, and
  - ⇒ - The batteries have been disconnected.
- 



Releasing radiation:

- ⇒ Checks and settings for which radiation must be released are marked with the radiation warning symbol.
  - ⇒ Radiation protection measures must be used.
-

**⚠ DANGER**

To avoid electrical shock from components under voltage, also be aware that:

**The capacitors of the capacitor bank can be electrically charged even when the system is switched off and the power cable is disconnected!**

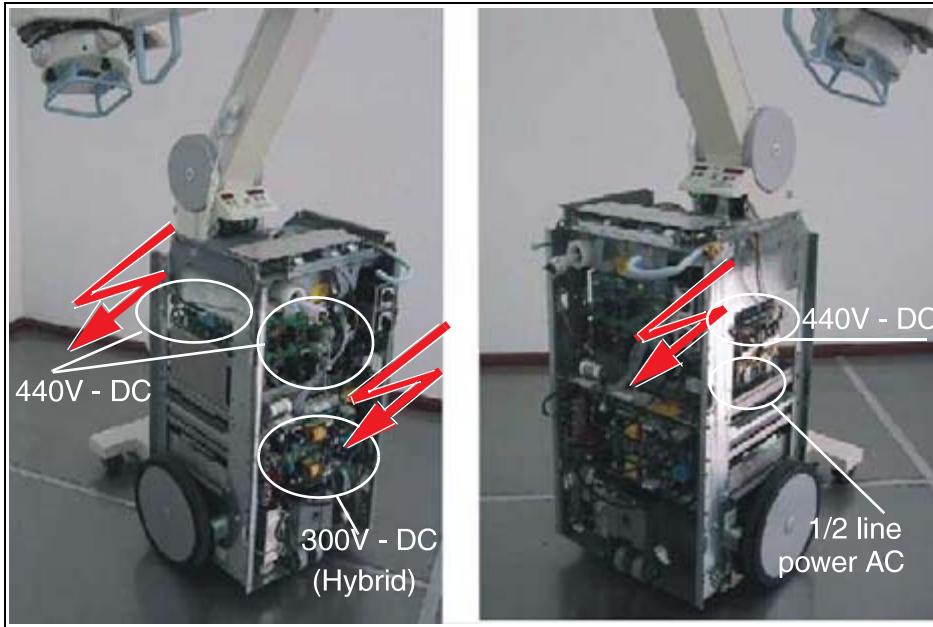
**Individual capacitors of the capacitor bank may have been disconnected from the discharging circuit, erroneously or as a result of failure, and can still be electrically charged!**

**Disconnect the battery blocks in the XP Digital prior to maintenance and service work!**

**Carelessness can result in death or serious bodily injury.**

- ⇒ **Make sure that no parts or tools fall into the unit;**
- ⇒ **Do not touch potentially dangerous components**([Fig. 2 / p. 11](#))
- ⇒ **If loose parts must be removed from the unit, use only insulated tools;**
- ⇒ **Protect the work area so that no other persons are able touch the unit while the covers are open or removed!**

- Switch the unit off before servicing or maintenance. Always disconnect the power plug first.
- Make sure that the main switch is switched off.
- The capacitor bank discharges to < 40 V in approx. 15 minutes.
  - ⇒ The safety covers can be removed after this period has elapsed.
- Prior to performing any work, it must be verified that areas with dangerous voltage are voltage-free ([Fig. 2 / p. 11](#)).



*Fig. 2: Locations with dangerous voltage*  
 With housing covers open and safety covers removed.

Back:

CAUTION: DC voltage (300 V) from the battery block to PCB D982!  
 Always disconnect the battery plug from BK1-BK4.

CAUTION: DC voltage (440V) at capacitor bank (D927)

Left side:

CAUTION: DC voltage (440V) directly at the capacitor bank!

Right side:

CAUTION: DC voltage (440V) directly at the capacitor bank!

CAUTION: AC voltage (> 100 V or > 60 V - half line voltage) at power supplies U1 and U2 when the power cord is connected.

System overview - user

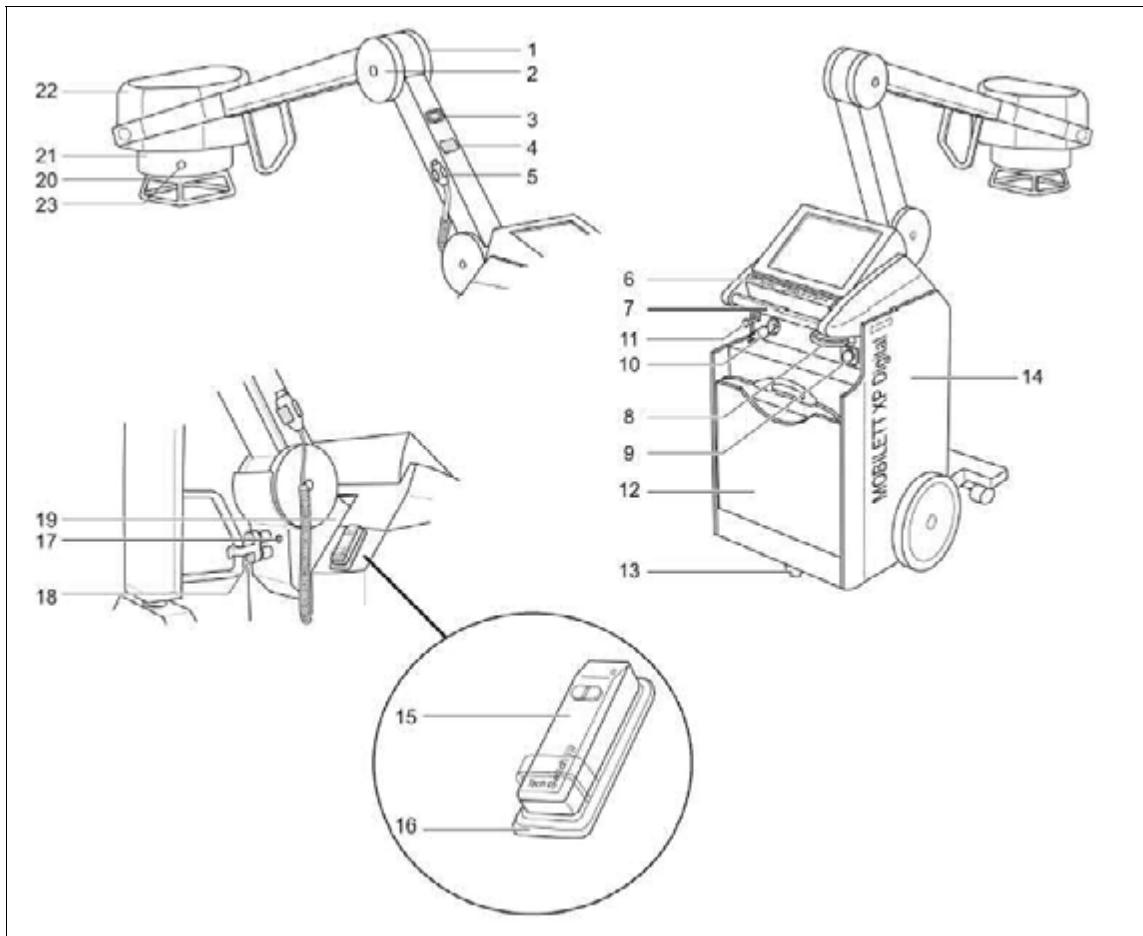


Fig. 3: User overview

(1) Hanger for lead apron	(13) Castors
(2) Articulated arm	(14) Console with chassis
(3) Sensor for IR remote control (optional)	(15) IR remote control (optional)
(4) DAP display (optional)	(16) Holder for IR remote control (optional)
(5) Exposure switch (S27)	(17) Potential equalization connector
(6) Control panel and display field	(18) Transport safety device
(7) Transport handle/motor control	(19) Stand column
(8) Hand/parking brake handle	(20) DAP ionization chamber (optional)
(9) Main switch	(21) Collimator
(10) Power cord	(22) X-ray tube assembly
(11) Brake handle for cable winch	(23) Light localizer buttons (two sides)
(12) CXDI-50G detector holder	n.a.

Orientation

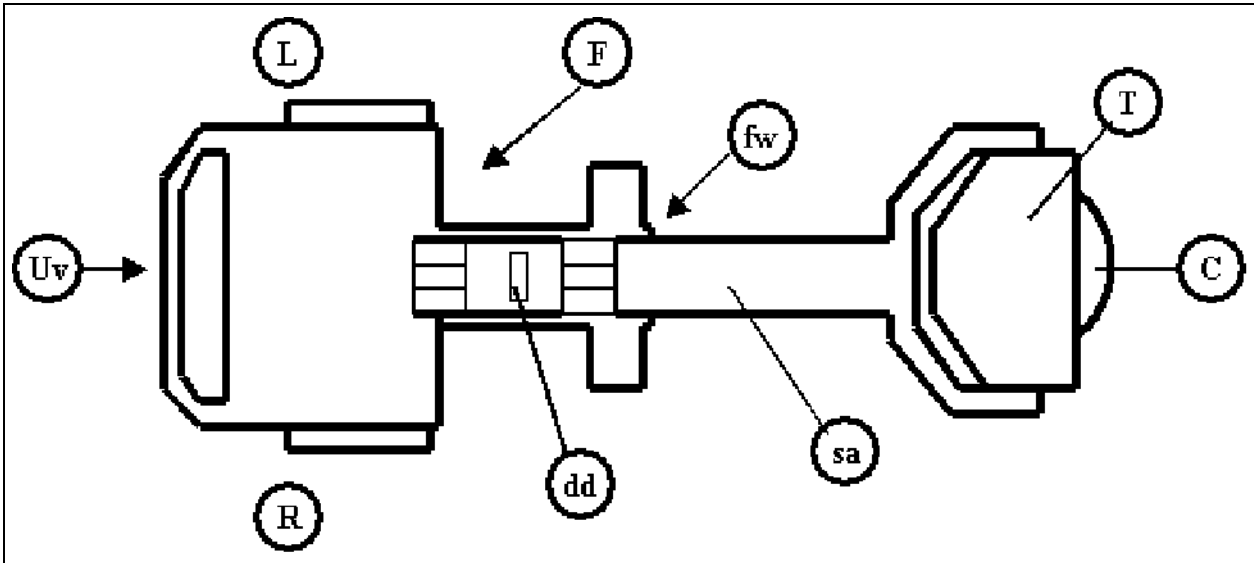


Fig. 4: Top view of system\_01

System orientation to clarify the technical description	
Abbreviations	Explanation
Uv	User view - back ( <b>U</b> ser <b>v</b> iew)
L	Left side of unit ( <b>l</b> eft)
R	Right side of unit ( <b>r</b> ight)
F	Front ( <b>f</b> ront)
fw	Front wheels ( <b>f</b> ront <b>w</b> heels)
sa	Support arm ( <b>s</b> upport <b>a</b> rm)
T	Tube (single <b>t</b> ank)
C	Multileaf collimator ( <b>c</b> ollimator)
dd	DAP display ( <b>d</b> ose <b>d</b> isplay)

**NOTE**

These orientation indicators are used in all technical documents. Descriptions are always from the “forward travel” user view. Always use this perspective when communicating with third parties (e.g., USC/HSC).

System overview - service

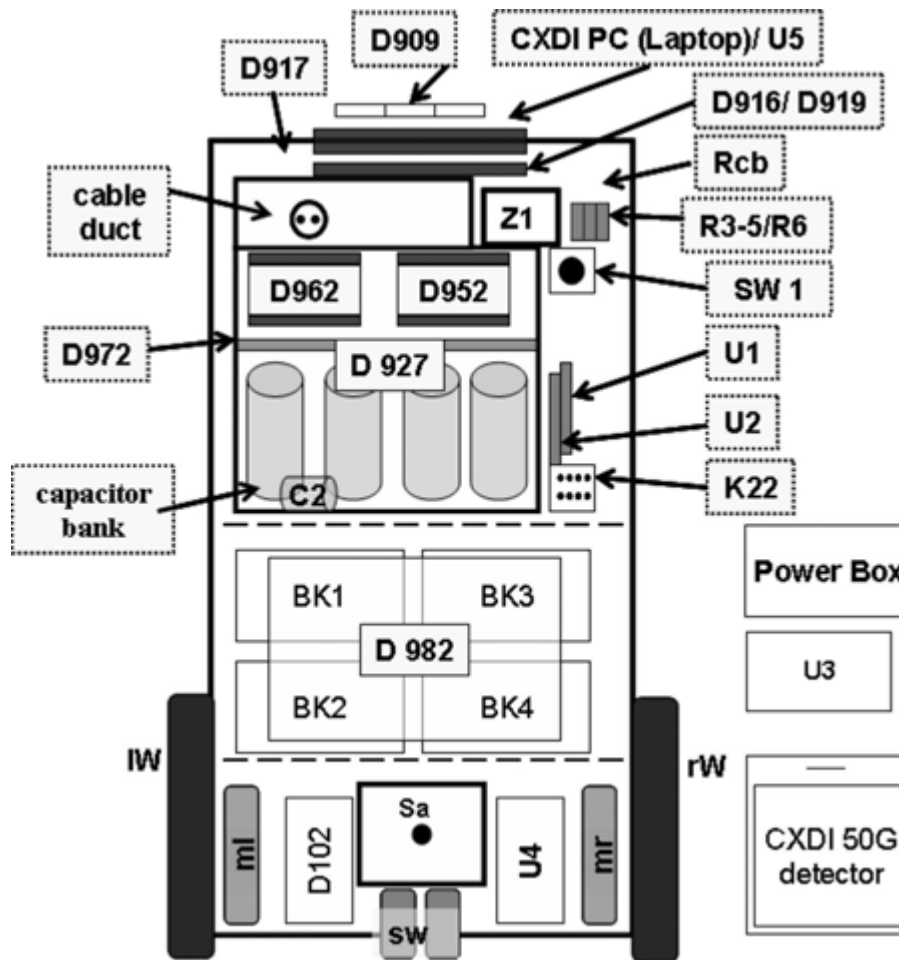


Fig. 5: Schematic overview of XP Digital

MOBILETT XP Digital parts	
Abbreviations	Explanation
D916/D919	CPU board/X-ray interface
D917	Galvanic separation for S27/DAP/remote
Rcb	Remote control board (remote control option)
SW1	Key switch, power ON/OFF
Z1	Line filter
C1 (R1)	Capacitor for inverter with discharge resistor (front left side / not shown here)
C2 (R2)	Starter capacitor with discharge resistor
R3-R5, R6 (X9)	Discharge resistor capacitor bank (front right side)
Capacitor bank	12 x 10 mF capacitors, mounted on D972
K22	Main relay

D909	X-ray display and keyboard
U1	+5V / $\pm$ 15V power supply
U2	+24V power supply
D927	Power supply
D952	Charging board capacitor bank (behind D927)
D962	kV inverter (behind D927)
D972	Capacitor bank board (behind D927)
Sa	Support arm adjusting spring
lw/rw/sw	Support wheels and back wheels
D982	Battery charger
D102	Motor drive control
BK1 / BK2	Battery block, left
BK3 / BK4	Battery block, right
mr/ml	Motor right / motor left
CXDI PC	Laptop for the imaging system
CXDI Detector	CXDI flat detector
Power box	Connecting unit between CXDI PC and CXDI detector
U3	DC converter 300V DC/24V DC
U4	Inverter 24V DC/220V AC
U5	Power supply CXDI PC (laptop)
<b>Optional parts for MOBILETT XP Digital (not shown in illustration)</b>	
DAP chamber	Dose area product measuring chamber
D991	DAP adapter card (inside the collimator cover)
DAP display	DAP display board (in the lower arm segment cover)

## Cleaning

- Always disconnect the MOBILETT from the power supply and switch it off before cleaning or disinfecting it.
- Never use abrasive cleaners or cleaning agents with solvents (e.g. cleaning solutions, alcohol or spot removers), since they may damage housing surfaces.
- Do not spray anything on or into the unit.
- Wipe off the MOBILETT with a cloth moistened in water or a diluted, lukewarm solution of water and dishwashing liquid.

For more information, see the chapter on "Cleaning and disinfection" in the operating instructions.



## Required documents



Check the documents delivered for completeness.

Ring binders containing user documents:

- Operator Manual SPR8-230.621.30..

Ring binders containing technical documents:

- General Safety Information TD00-000.860.01...
- Installation and Start-up SPR8-230.814.30...
- Software Installation SPR8-230.816.30...
- Quality Assurance SPR8-230.820.30...
- Maintenance Protocol SPR8-230.832.01...
- Wiring Diagram SPR8-230.844.30...
- Disposal Instructions SPR8-230.861.30...
- Manufacturer's certificates n.a.

The MOBILETT XP Digital password list can be obtained by accessing the “Knowledge-base” or from the Troubleshooting Guide SPR8-230.840.30...

- MOBILETT XP Digital password list n.a.

The following additional documents are required to configure DICOM Hardcopy:

- General Hardcopy Camera Information SPR8-230.814.40..

## Required tools, test equipment and aids

- |   |                 |
|---|-----------------|
| • Standard service tool kit   | n.a.            |
| • Measuring device for leakage current and patient leakage current, e.g.:               | 51 38 727 Y0766 |
| • Grounding measuring device, e.g.: SECUTEST  | 44 15 899 RV090 |
| • 2.1 mm precision copper filter or, alternatively, copper filter set (44 06 120 RV090) | 99 00 598RV090  |
| • Dose measuring device, e.g.: PTW DIADOS   | 97 17 612 Y0388 |
| • Densitometer, e.g.: DensiX-LE 52003   | 49 51 286Y0388  |
| • Digital multimeter, e.g.: Fluke 8060 A  | 97 02 101 Y4290 |
| • Centering cross   | 96 60 051 RE999 |
| • Test phantom, e.g., PTW Normi 13  | n.a.            |
| • At least 3 blank writable CDR's   | n.a.            |

## U S

- Storage oscilloscope ( $\pm 2.5$  % accuracy) or kV meter.
- Storage oscilloscope ( $\pm 2.5$  % accuracy) or mAs meter.

## Start-up information

- The start-up procedure described here corresponds to a functional test. All adjustments and calibrations are performed at the factory. The MOBILETT XP Digital is ready for operation on completion of the start-up report.
- The top cover has to be removed to access the CXDI PC or perform measurements on D916. Place the top cover on a table or similar surface. All cables remain connected.
- The unit can be connected to line voltages of 100-130 V ( $\pm 10\%$ ) or 200-240 V ( $\pm 10\%$ ). The unit automatically adjusts to the existing line voltage.

**NOTE**

**Observe the nominal current of the fuses for the on-site power connections:**

- 15A slow-blow (on-site) for 100-130V  $\pm 10\%$  or
- 15A slow-blow (on-site) for 200-240 V  $\pm 10\%$  line voltage.

**The power cable for this device is equipped with a standard safety plug.**

**Attach a power plug that is compliant with local standards if necessary.**

- Following start-up, country-specific tests must be performed if necessary.

For example:

Acceptance test according to §16 of the X-ray Ordinance (Germany):

Use the measurements in the test certificate provided as the initial values for the required measurements.

The following values were measured by the manufacturer; refer to the test certificate:

- Brightness of the light localizer
- Filter values (Al equivalent for tube assembly and collimator)
- Coincidence of light field and radiation field
- Accuracy of the tube voltage
- Accuracy of the kV value steps
- Accuracy of the mAs values
- Reproducibility of dose values
- The test/measured values marked by the report icon must be entered in the start-up report located at the end of this manual.

**NOTE**

**Recording information immediately during start-up saves time.**

**Fill in the report form after completing each task.**

**The start-up report is a component of this documentation.**

## Information on the protective conductor resistance test

Observe the instructions in the "Safety Rules for Installation and Repair" (ARTD-002.731.17 ...).

The protective conductor resistance of 0.2 ohms must not be exceeded.

### Initial measurement

Perform the protective conductor test after completion of all work.

The measurement must be performed according to DIN VDE 0751, Part 1 (see ARTD Part 2). The protective conductor resistance for all touchable conductive parts must be measured during the normal operating state of the system.

Make sure that control cables or data cables between the components of the system are not mistaken for protective conductor connections.

During the measurement, move the power cable and additional connection cables with an integrated protective conductor section by section to detect cable breaks.

The protective conductor resistance must not exceed 0.2 Ohms.

The values must be recorded as initial measurements, and the measuring points noted, in the protective conductor resistance report.

The measuring procedure and the measuring device used (designation and serial number) must also be documented.

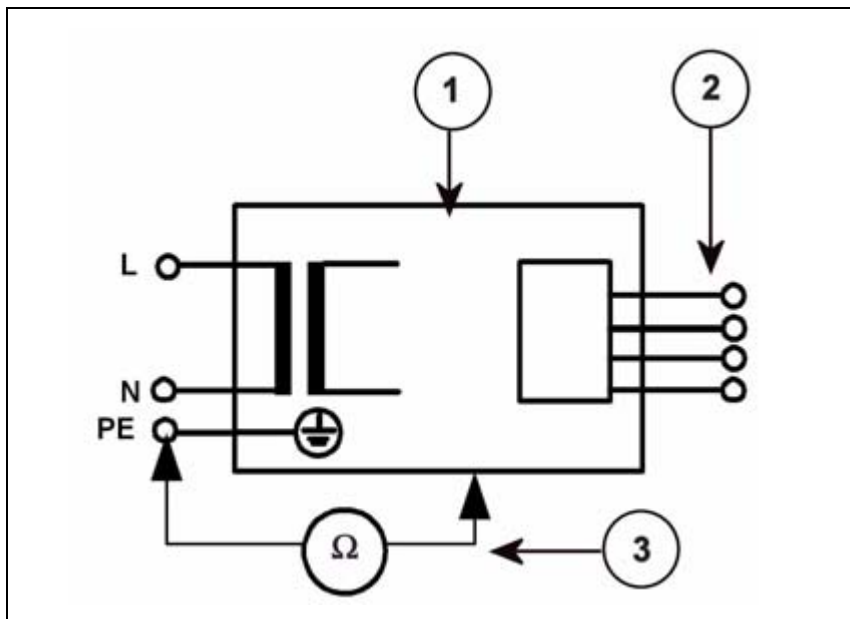


Fig. 6: Measuring circuit for measuring the protective conductor resistance for units that are disconnected from power, in compliance with DIN VDE 0751-1/2001-10, Fig. C2.

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)

### Repeat measurement

In the case of maintenance or repairs, perform the protective conductor resistance measurement again.

Document and assess the values determined in the repeat measurement.

The measurement must be performed according to DIN VDE 0751, Part 1 (see ARTD Part 2). The protective conductor resistance for all touchable conductive parts must be measured during the normal operating state of the system.

Make sure that control cables or data cables between the components of the system are not mistaken for protective conductor connections.

During the measurement, move the power cable and additional connection cables with an integrated protective conductor section by section to detect cable breaks.

The protective conductor resistance must not exceed 0.2 Ohms.

The values determined in the repeat measurement must be recorded and assessed, and the measuring points noted, in the protective conductor resistance report.

The measuring procedure and the measuring device used (designation and serial number) must also be documented.

**NOTE**

---

**For evaluation purposes, the first measured value and the values documented during maintenance or safety checks must be compared to the measured values. A sudden or unexpected increase in the measured values may indicate a defect in the protective conductor connections (protective conductor or contacts) - even if the limit value of 0.2 ohms is not exceeded.**

---

## Information on measuring the leakage current

Observe the instructions in the "Safety Rules for Installation and Repair" (ARTD-002.731.17 ...).



**WARNING**

**Electrical voltage!**

**Non-compliance can lead to severe injury and even death.**

⇒ **The leakage current measurement may be performed on systems of protection class I only after the protective conductor test has been passed.**

### Initial measurement

Perform the leakage current measurement after completion of all work.

Perform the measurement according to DIN VDE 0751, Part 1 (see ARTD-002.731.17....), and record the determined value as the first measured value.

Measurement of the leakage current according to the differential current method (measurement setup according to (Fig. 7 / p. 22)) must be given preference, since this method is not dangerous to the person performing the measurement and other persons.

However, please note the minimum resolution of the leakage current measuring device and any additional manufacturer information restricting the use of the measuring device.

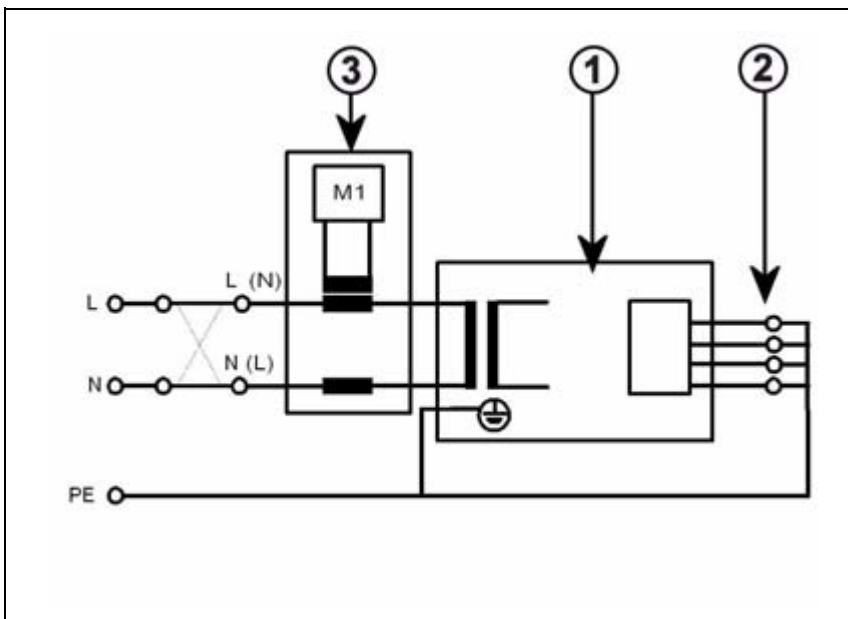


Fig. 7: *Measuring circuit for measuring the system leakage current according to the differential current method in compliance with DIN VDE 0751-1/2001-10, Fig. C6 for protection class I.*

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)

If the direct measurement of the leakage current is used (measurement setup according to (Fig. 8 / p. 23)), the system must be insulated during the measurement and must not be touched.

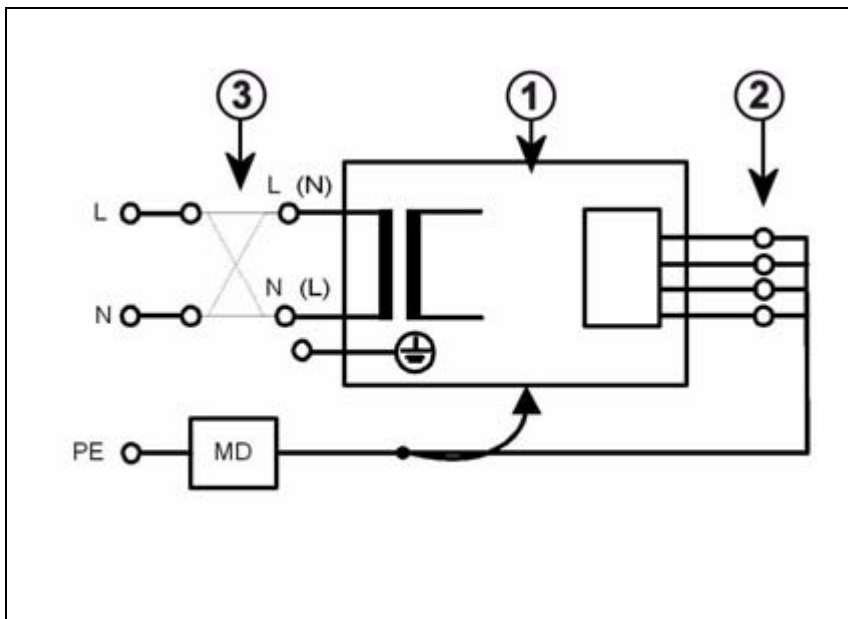


Fig. 8: Measuring circuit for direct measurement of the system leakage current in compliance with DIN VDE 0751-1/2001-10, Fig. C5 for protection class I.

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)

**⚠ WARNING**

**Electrical voltage!**

**Non-compliance can lead to severe injury and even death.**

- ⇒ **No housing parts of the system may be touched during direct measurement of the leakage current (measurement setup according to (Fig. 8 / p. 23)).**
- ⇒ **Third-person access to the system must be prevented.**

The system must be switched on during measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.

Enter the highest value as the first measured value in the leakage current report.

This value must not exceed the permissible leakage current values according to DIN VDE 0751-1/2001-10, Table F.1, line "leakage current for devices according to remarks 1 and 3", of 2.5 mA.

Measure and record the current line voltage. If the measured line voltage deviates from the nominal voltage, correct the measured value to the value corresponding to a measurement at the nominal value of the line voltage. This must also be documented.

Document the measuring procedure (differential measurement or direct measurement) and the measuring device used (designation and serial number).

**Repeat measurement**

When maintenance or repair work is performed on the primary power supply circuit (e.g., repairs to the power-on circuit or replacement of the line filter), the leakage current measurement must be repeated.

The same measuring conditions as in the first measurement apply.

Record and assess the highest value determined in the repeat measurement in the existing system leakage current report.

This value must not exceed the permissible leakage current values according to DIN VDE 0751-1/2001-10, Table F.1, line "leakage current for devices according to remarks 1 and 3", of 2.5 mA.

Measure and record the current line voltage. If the measured line voltage deviates from the nominal voltage, correct the measured value to the value corresponding to a measurement at the nominal value of the line voltage. This must also be documented.

Document the measuring procedure (differential measurement or direct measurement) and the measuring device used (designation and serial number).

**NOTE**

---

**For evaluation purposes, the first measured value and the values documented during maintenance or safety checks must be compared to the measured values. A sudden or unexpected increase in the measured values may indicate that a fault has occurred in the primary power supply circuit (damaged insulation, damage from moisture, defective interference suppressor, etc.) - even if the limit value of 2.5 mA is not exceeded.**

---



Information on measuring the patient leakage current

Observe the instructions in the "Safety Rules for Installation and Repair" (ARTD-002.731.17 ...).

The patient leakage current must be measured at each application part for systems of protection class I with type B application parts.)

If the application part has a surface made of non-conductive material, a conductive material (e.g., aluminum foil) must be placed on the surface. The conductive surface must be large enough to approximate the contact surface of the patient with the application part.

In the case of a flat detector, completely cover the contact surface with aluminum foil.

During the measurement, hold the aluminum foil securely to the application part to be measured using approx. 0.5 N/cm<sup>2</sup> of pressure.



**Electrical voltage!**

**Non-compliance can lead to severe injury and even death.**

⇒ **The patient leakage current measurement may be performed on systems of protection class I only after the protective conductor test has been passed.**

**Initial measurement**

The patient leakage current must be measured for each application part.

The measurement must be made according to DIN VDE 0751, Part 1 (see ARTD-002.731.17...).

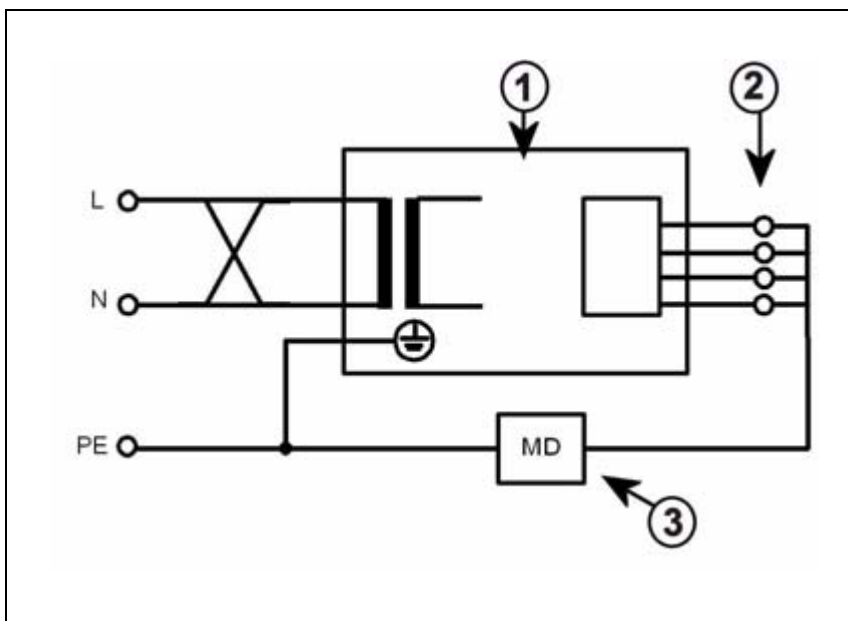


Fig. 9: Measuring circuit for measurement of the patient leakage current in a type B application

*part with a protective conductor in compliance with DIN VDE 0751-1/2001-10, Fig. C10.*

- Pos. 1 = System  
Pos. 2 = Application part type B  
Pos. 3 = Measurement setup (integrated into measuring device)

The system must be switched on during measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.

The determined values, including the application parts/measuring points, must be entered as the first measured values in the patient leakage current report.

The values for each application part may not exceed the permissible leakage current values according to DIN VDE 0751-1/ 2001-10, table F.1, line "patient leakage current" of 0.01 mA for direct current and 0.1 mA for alternating current.

Document the measuring procedure and the measuring device used (designation and serial number).

### Repeat measurement

When maintenance or repair work capable of affecting the patient leakage current is performed on the system (e.g. repairs to the protective conductor connections, replacement of parts in the primary power supply circuit, replacement of application parts, technical changes to application parts), the patient leakage current must be remeasured and documented for each application part.

The same measuring conditions as in the first measurement apply.

The values determined in the repeat measurement, including the application parts/measuring points, must be recorded and assessed in the patient leakage current report.

The values may not exceed the permissible leakage current values according to DIN VDE 0751-1/ 2001-10, table F.1, line "patient leakage current" of 0.01 mA for direct current and 0.1 mA for alternating current.

Document the measuring procedure and the measuring device used (designation and serial number).

#### NOTE

**For evaluation purposes, the first measured value and the values documented during maintenance or safety checks must be compared to the measured values. A sudden or unexpected increase in the measured values may indicate a defect in the system (protective conductor connection damage, insulation damage, damage from moisture, etc.) - even if the limit value of 0.01 mA for direct current and 0.1 mA for alternating current is not exceeded.**

## Unpacking

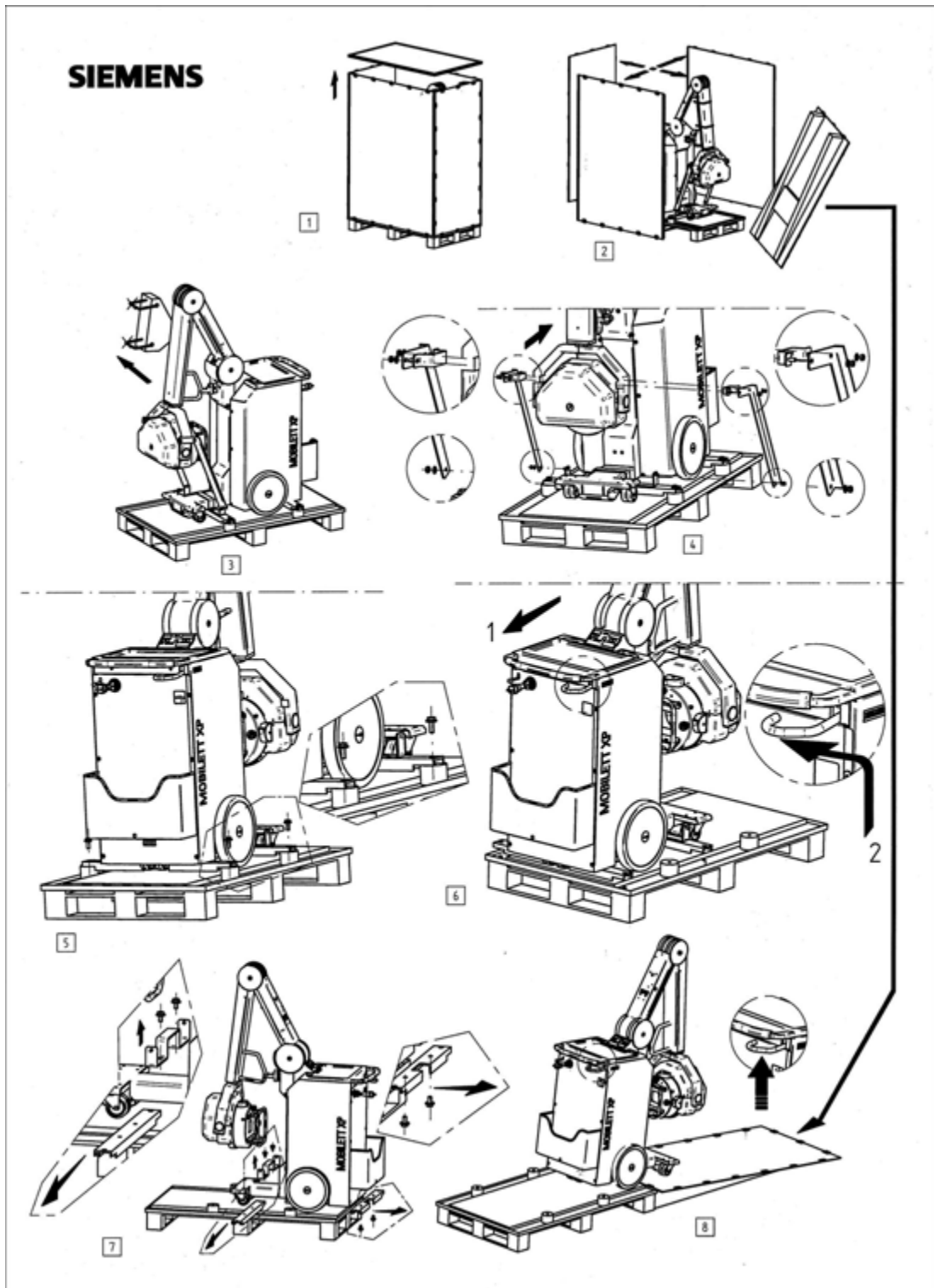


Fig. 10: Unpacking

- Please follow the unpacking instructions.
- Check the manual movement mode and the hand brake.

## Visual inspection



- Check the unit for external damage (cracks, breaks, scratches, corrosion etc.).
- Check whether the single tank or the multileaf collimator show any signs of mechanical defects which might impair the radiation protection.

## Mechanical function test

### Cable winch

- ✎ Pull out the cable until it is completely unwound.
- Hold the cable with one hand near the duct to slow it down as it is being wound. Pull up the brake of the cable winch and wind up the cable completely.

This device is equipped with a standard safety plug. Attach a power plug that is compliant with local standards if necessary.

### Support arm movements

- ✎ • Unlock the support arm. Then check its movements, including several stops. If the DAP chamber option is included in the delivery, it must be attached to the collimator. The arm should be easy to move through its full range using one hand and should stop in every position without any additional movement (up or down).



Fig. 11: Positioning of support arm

### Single tank and collimator movements

- ✎ • Turn the collimator with the handle to the end positions  $\pm 90^\circ$ .
- Rotate the tube to all of its commonly used working and park positions.

## Checking the shock sensors



Prior to startup, the 4 shock sensors must be checked.



*Fig. 12: Shock sensor*

If a shock sensor has been activated (colored red), the CXDI detector has to be replaced before start-up.

- Check the shock sensors.

## Line voltage



The power supply range can vary between 100V AC and 240V AC. Use the DVM to check the voltage at the socket.

<b>NOTE</b>
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**The system automatically adjusts to the local line voltage.**

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## Controls and displays

### Battery charging operation



The MOBILETT XP Digital is switched off.

Connect the power plug and check whether the AC symbol (~) lights up on the control panel (4/Fig. 13 / p. 32).

The battery charge status displays must light up. (The batteries are charging)

### Exposure operation

#### NOTE

At least one of the 3 battery status LEDs must light up for the checks in exposure operation (3/Fig. 13 / p. 32).

Otherwise, charge the batteries until this operating state is reached (min. charging time: 2 hrs.).

#### NOTE

If the unit has not been used for some time, error ERR13 may appear, indicating a high leakage current at the capacitor bank.

Switch the system off and back on to correct this problem.

If the error persists even after the system has been switched off and on several times, execute Service Program 1, "Format Capacitor Bank," according to the system troubleshooting instructions.

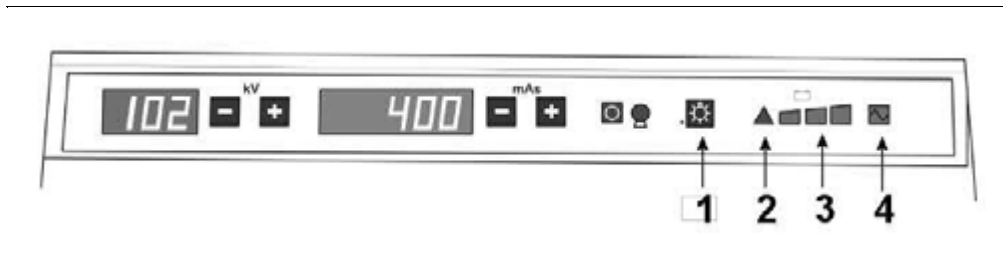


Fig. 13: Battery status display

- Disconnect the main power cord from the power supply and wind it completely around the cable spool.
- Switch the unit on. Wait for the initialization process to finish (acoustic signal, KV/mAs displays visible).
- Check the battery status.
- Switch to manual/analog operation (A/D button on control panel).
- Use the "± kV/± mAs" keys to select different values for KV and mAs.





- Check the following functions according to the operator manual:
  - Motor drive
  - Locking brake



Fig. 14: XP Digital functional check

(1) Power key switch ON/OFF/charge battery
(2) Hand brake
(3) Main power cord
(4) Motor drive - forward/reverse
(5) Brake/release for cable winch

## Lead apron holder



Attach the supplied lead apron holder to the support arm joint as needed.

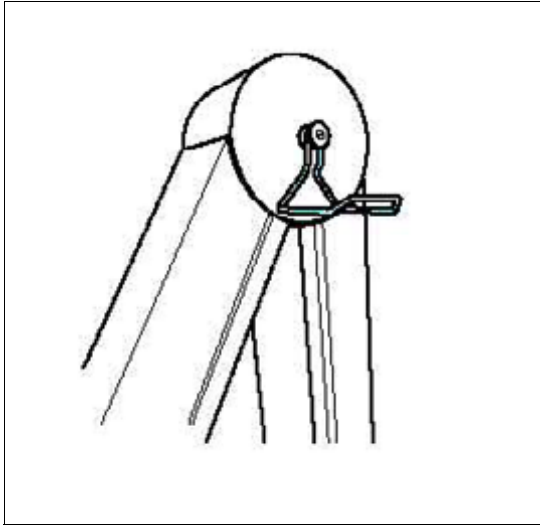


Fig. 15: Holder

### Collimator function



- Completely open the collimator.
- Check the functioning of the light keys on the collimator.
- Check the manual collimations with the light on.
- The light switches off after approx. 20 sec.
- Test the collimator light key on the control panel ([1/ Fig. 13 / p. 32](#)).

## Calibrating the CXDI detector

Start-up of the MOBILETT XP Digital requires a one-time calibration of the CXDI detector. Four test exposures are performed during this procedure.

### Preparation

- Remove the grid (if available).
- Switch the MOBILETT XP Digital on and start the CXDI PC (digital operation)
- Center the CXDI detector with respect to the tube assembly (SID 150 cm).
- Set to maximum collimation

### Procedure

Perform the following steps from the user application:

- Select SYSTEM/CALIBRATION.
- Enter the following parameters in the list boxes:

Exposure data e.g.= exposure = 4; 70KV; 1.8 mAs, SID 150cm

- ⇒ If error messages ("Too much/little dose", "Collimator is used") are displayed during calibration, the KV and mAs values have to be adjusted accordingly.

#### NOTE

**If the calibration is unsuccessful, check the calibration settings. The KV and mAs settings may have to be adjusted.**

**If the calibration continues to be unsuccessful, start the detector self-test (see Troubleshooting Guide SPR8-230.240.30...) or notify the Uptime Support Center.**



- Check the detector centering. No other objects affecting the calibration may be located in the beam path.
- Click "START" to begin the calibration.
- Follow the on-screen instructions.
  - ⇒ Four exposures are required. No error messages should be displayed. The calibration completion is indicated.
- Use "EXIT" to exit the menu.
- Switch the MOBILETT XP Digital "OFF" and back "ON".



## Exposure release with high voltage

<b>NOTE</b>
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If the "DAP" and/or "Remote Control" options are installed, they can be tested for proper function during the following tests involving release of X-ray radiation.



### Checking the preparation limit time

- Select manual/analog operation on the MOBILETT XP Digital control panel (A/D button).
- Close the collimator and set 60 kV/10 mAs on the control panel.
- The control display for "exposure circuit ready" on the control panel must light up green.
- Set the exposure switch (S27) to preparation and check the "exposure ready" acoustic signal.
- Hold 'Preparation' and check the preparation limit time of approx. 20 seconds. ERR 25 appears on the display (preparation time without exposure).
- Acknowledge the error with the "collimator light" key on the control panel.

### Release an exposure



- Release an exposure.
  - ⇒ The radiation indicator on the control panel lights up during the exposure; at the same time an acoustic signal sounds and the "exposure circuit ready" light on the control panel goes out.
- "Exposure circuit ready" on the control panel lights up within 15 sec maximum.

### Manual exposure termination

The user must be able to cancel an exposure at any time.



- Set a midrange kV value (e.g., 70 kV) and the highest possible mAs value.
- Release an exposure and interrupt it immediately. "ERR 39" appears on the display and a succession of brief signal tones (exposure cancelled) sounds. Acknowledge the error message with the "collimator light" key on the control panel.

## Light field/radiation field

Checking the light and radiation field

- Place the detector (35 cm x 43 cm) on the tabletop.
- Set the central beam so it is vertical.
- Set a vertical SID of 100 cm; measure to the upper edge of the detector using the tape measure in the collimator.
- Switch on the light localizer and set a light field of approx. 30 cm x 30 cm.
- Place the lead ruler (centering cross) centered on the detector.
- Measure the light field and make a note of the dimensions (Fig. 16 / p. 37).
- Position a washer as a side marker.



Fig. 16: Centering cross



- Create a test patient.
- Select an organ program from the "test" range, with approx. 60 kV, 4 mAs.
- Release an exposure.

### Evaluation: light field to radiation field

- Using the centering cross, evaluate on screen, on all four sides, the deviations (A, C and B, D) between the recorded light field and the radiation field edges (Fig. 17 / p. 38). Use the zoom function as necessary.



- ⇒ The maximum total allowable deviation from the SID is 1.7% (regardless of the prefix). If the deviation is > 1.7%, the collimator must be adjusted (see the "Replacement of Parts" instructions).

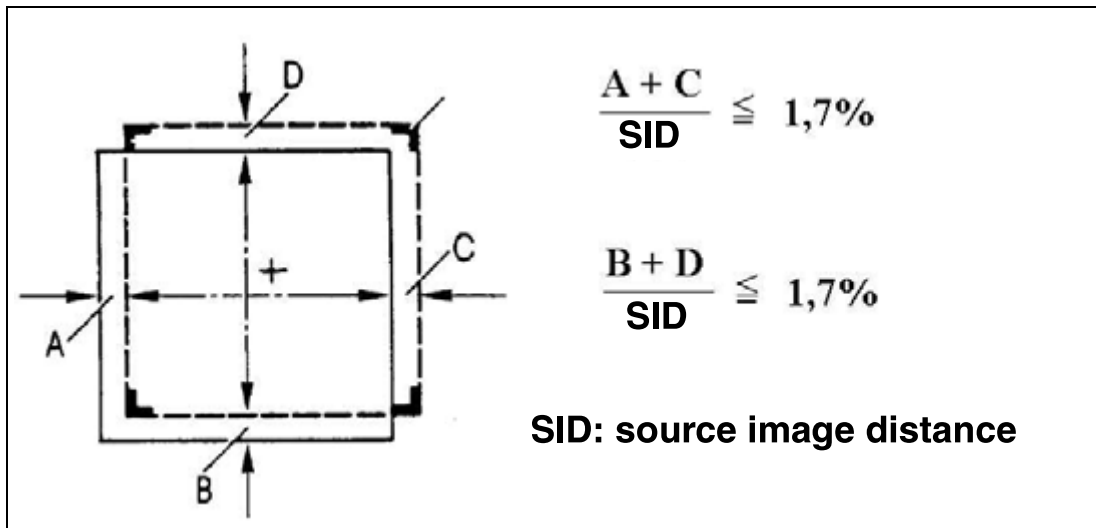


Fig. 17: Light field/radiation film

## Configuration of the imaging system



Configure the MOBILETT XP Digital for user setting and network connection according to the "Software Configuration" chapter of "Software Installation" SPR8-230.816.30....

## Checking the image quality



At start-up, the touch screen display must be checked with the SMPTE test image (brightness and contrast) and the image quality parameters recorded using the quality assurance document SPR8-230.820.30....

File the filled-out quality assurance document in register 9, "Certificates," in the system binder.



## Options

### DAP



Measuring device for dose area product (**D**ose **A**rea **P**roduct).

The DAP measuring device is used to measure the kerma area product (kerma = kinetic energy released in matter) during an X-ray examination. It is primarily used to record the radiation dose a patient is exposed to.

The DAP is calibrated at the factory:

- Press the test button on the DAP display, a value between 80-120  $\mu\text{Gym}^2$  (DAP resolution 0.1  $\mu\text{Gym}^2$ ) or in the case of a high-resolution chamber, 8-12  $\mu\text{Gym}^2$  (DAP resolution 0.01  $\mu\text{Gym}^2$ ) must be subsequently displayed.

If the display is incorrect, the measuring device must be calibrated. See the "Replacement of Parts" instructions, SPR8-230.841.30...).



- Check the function of the DAP display by releasing an exposure. The DAP display shows a measurement value depending on the object in the beam path.

### Remote control



- Adhere the remote control holder to the front right or left side ([16/15/Fig. 3 / p. 12](#)).
- Switch on the MOBILETT XP Digital.



- Check the "collimator light" and "exposure release" functions of the remote control.

## DHHS tests (USA only)

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The following tests must be performed and recorded to satisfy the DHHS requirements:

- kV accuracy
- mAs accuracy
- Reproducibility

<b>NOTE</b>
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**All of the following DHHS checks are performed in manual operation!**

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## Test of kV accuracy

### Requirement:

The measured kV values must comply with the limit values specified in the tables. One of two measuring methods can be used:

1. kV meter procedure:
  - kV meter based on the filter comparison technique (e.g. PTW-Nomex). Use the correction factor given in the kV meter operating instructions for non-invasive kV measurements.
2. Oscilloscope method:
  - Storage oscilloscope with a measuring accuracy of  $\pm 2.5\%$

### kV meter method:

<b>NOTE</b>
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**The inherent filtration (Al equivalent) of MOBILETT XP Digital is 3.1mm Al (single tank plus collimator).**

**An installed DAP measurement chamber increases the inherent filtration by 0.4 mm AL.**

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- Switch the MOBILETT XP Digital on.
- Maintain or switch to manual operation of the MOBILETT XP.
- Prepare the kV meter for the measurement according to the operating instructions.
- Place the measuring detector on a suitable surface and adjust the single tank to the detector using the light localizer ([Fig. 18 / p. 44](#)).
- Set the source-to-image distance to the value specified in the kV meter operating instructions.

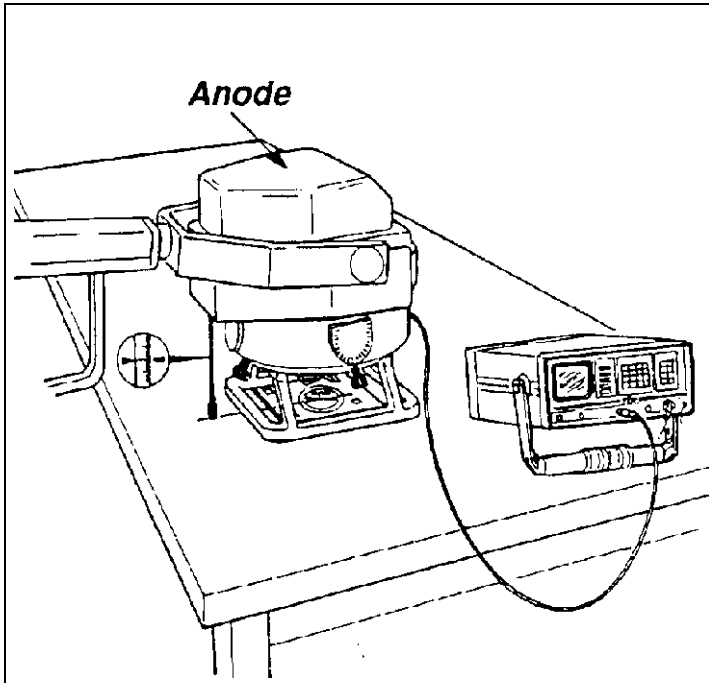


Fig. 18: kV measurement



- Set the following exposure parameters and release an exposure after each setting:

kV meter Selection	Exposure parameters		Limit values*
DC voltage	52 kV	50 mAs	49.0 - 55.0 kV
	81 kV	20 mAs	77.0 - 85.0 kV
	133 kV	12.5 mAs	126.4 - 139.6 kV

\* The measuring inaccuracy of the measuring instrument used must be subtracted from the specified limit values.



Record the measured values.

**Oscilloscope method:**

"KVS" measuring point for the nominal value and "KV" measuring point for the actual value. The measuring ratio is 30 kV/V.

- Remove the top cover and place on a table or similar surface. All cables remain connected. Measuring points on CPU D916 (see troubleshooting instructions).
- Connect the oscilloscope to the measuring points of the CPU D916 TP KV, KVS, and GND (also see the troubleshooting instructions). Oscilloscope setting: Channel 1 = TP KV 1V/div, channel 2 TP KVS 2V/div, trigger channel 2, trigger stage 2.5 V, 2V/div, 50 ms/div

- Follow the same procedure as described in “kV meter method”.

## Test of mAs accuracy

### Requirement:

The measured mAs values must comply with the limit values specified in the tables. One of two measuring methods can be used:

1. mAs meter method:
  - mAs meter (e.g. MAS meter 8160400 with a measuring accuracy of  $1\% \pm 1$  digit)
2. Oscilloscope method:
  - Storage oscilloscope with a measuring accuracy of  $\pm 2.5\%$

### Oscilloscope method:

- Close the collimator.
- Remove the top cover and place on a table or similar surface. All cables remain connected.
- Clamp the oscilloscope to the "JR" and "GND" measuring points on CPU D916.
- Switch the MOBILETT XP Digital on and select manual operation.
- After switching the unit on, wait for approx. 5 minutes to let it stabilize.

### Example: Calculation of the mAs value

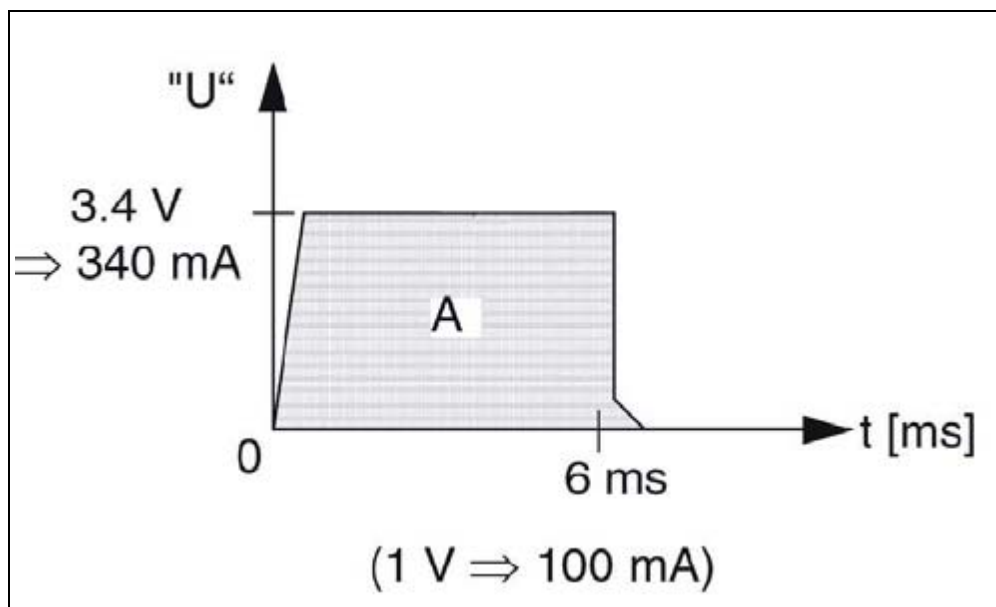


Fig. 19: mAs calculation

The mAs value can be calculated with the help of the oscilloscope display.

Surface "A" corresponds to the mAs value.

$$\text{mAs} = \text{tube current} \times \text{exposure time}$$

$$\text{mAs} = 340 \text{ mA} \times 0.006 \text{ s} = 2.0 \text{ mAs}$$

- Determination for the following exposure parameters (product of tube current x exposure time):



Control unit setting		Allowable mAs value*
kV	mAs	
40	5	4,7 - 5,3
81	2	1,9 - 2,1
133	10	9,5 - 10,5

\* The measuring inaccuracy of the measuring instrument must be subtracted from the specified limit values.



Calculate and record the mAs values.

**mAs meter method:**

Use of the mAs jumper on PCB D907 directly at the single tank.

- Remove cover from single tank and connect mAs meter to D907 (1/ Fig. 20 / p. 47).
- Follow the same procedure as described in "Oscilloscope method".

For more information on the measuring technique, refer to the user's manual for the mAs meter.

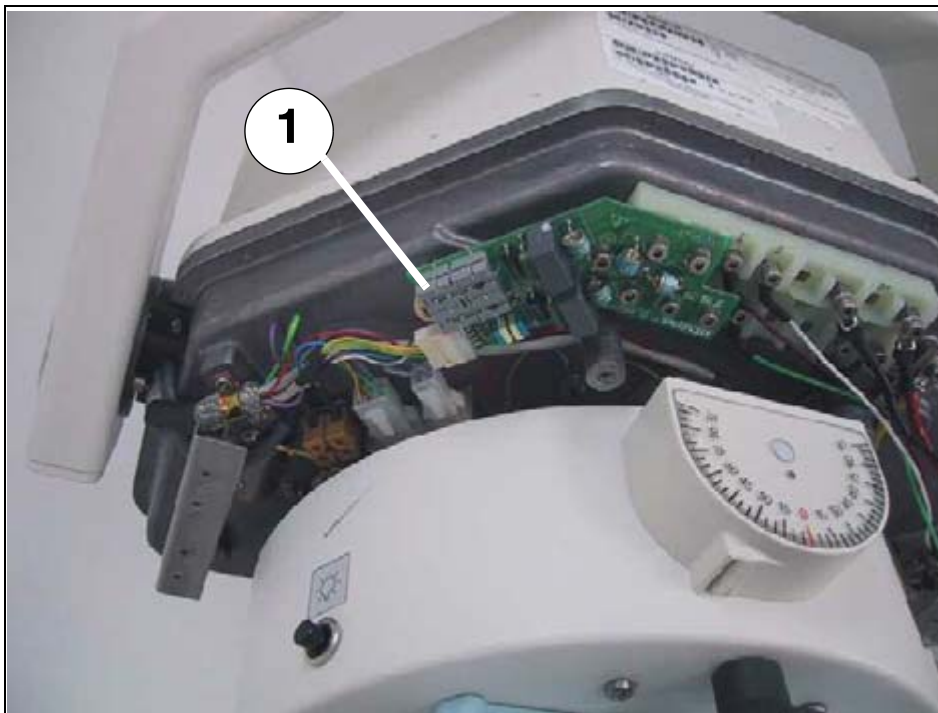


Fig. 20: mAs jumper D907

## Reproducibility test

### Requirement:

- The coefficient of variation for the radiation dose for any combination of exposure parameters does not exceed 0.045. This requires operation at the line voltage compliant with Siemens specifications.

<b>NOTE</b>
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**In the following test, 10 sequential exposures are taken within one hour.**

**The exposure parameters should be temporarily set to different values following each measurement.**

### Required measuring instrument:

- Dosimeter

### Procedure:



- After switching the system on, wait until its temperature has stabilized. The unit is ready for these measurements after 15 minutes.
- Release the number of exposures with the specified exposure data:
  - 85 kV, 1.0 mAs, 10 exposures.
- Measure the dose for each exposure.
- Reset the display prior to each new measurement.

### Calculations: Coefficient of variation C

- For a series of 10 dose measurements, coefficient of variation C is determined using the following formula:

$$C = \frac{s}{\bar{x}} = \frac{1}{\bar{x}} \left[ \sum_{i=1}^n \frac{(x_i - \bar{x})^2}{n-1} \right]^{1/2}$$

Fig. 21:

s = Standard deviation resulting from the measurements

–

x = Average measured value of series

x<sub>i</sub> = i. measured value of series

n = Number of individual measurements in series

Coefficient of variation C must be ≤ 0.045.

### Example for determining coefficient of variation C:

#### Step 1)

- 10 exposures with recorded measured values (fictitious values).



Exposure (n=10)	Measured values (xi)
1	1,01
2	1,02
3	1,03
4	1,04
5	1,03
6	1,02
7	1,02
8	1,01
9	1,03
10	1,04

**Step 2)**

- Addition of measured values:

$$\Sigma = 1,01 + 1,02 + 1,03 + 1,04 + 1,03 + 1,02 + 1,02 + 1,01 + 1,03 + 1,04 = \mathbf{10,25}$$

Calculation of mean value:

$$\bar{x} = \frac{\Sigma}{n} = \frac{10,25}{10} \Rightarrow \bar{x} = 1,025$$

Fig. 22:

**Step 3)**

Calculation of standard deviation:

$$s = \sqrt{\frac{(x_1 - \bar{x})^2}{n - 1} + \dots} =$$

Fig. 23:

$$\sqrt{\frac{(1.01-1.025)^2}{9} + \frac{(1.02-1.025)^2}{9} + \frac{(1.03-1.025)^2}{9} + \frac{(1.04-1.025)^2}{9} + \frac{(1.03-1.025)^2}{9} + \frac{(1.02-1.025)^2}{9} + \frac{(1.02-1.025)^2}{9} + \frac{(1.01-1.025)^2}{9} + \frac{(1.03-1.025)^2}{9} + \frac{(1.04-1.025)^2}{9}} = S$$

Fig. 24:

$$\sqrt{2.5 \times 10^{-5} + 2.8 \times 10^{-6} + 2.8 \times 10^{-6} + 2.5 \times 10^{-5} + 2.8 \times 10^{-6} + 2.8 \times 10^{-6} + 2.8 \times 10^{-6} + 2.5 \times 10^{-5} + 2.8 \times 10^{-6} + 2.5 \times 10^{-5}} \Rightarrow s = 0.0108$$

Fig. 25:

**Step 4)**

- Calculation of coefficient:

$$C = \frac{s}{x} = \frac{0.0108}{1.025} = 0.0105$$

Fig. 26:

In this example, the generator complies with the specification:

$C = 0.0105$ , which is  $\leq 0.0450$ .



- Perform the described procedure and record the results in the DHHS report.
- Complete the DHHS report.

## Backup procedure

Included with delivery of the MOBILETT XP Digital is a backup of the entire C: drive and D: drive on the system DVD (factory settings).



Following start-up of the MOBILETT XP Digital at the customer site and completion of all adjustment and configuration steps, a second backup operation of the hard drives to CD is performed.

A "Backup of Configuration" is also created. The "Backup of Configuration" includes all configuration settings, organ programs, log files, and images from the external storage.

This ensures that the customer configuration can be restored or that the imaging system can be reinstalled with the customer configuration.

## Backup of hard disks

### Prerequisite

The Mobilett XP Digital has been completely installed and configured according to customer specifications. All checks have been successfully completed.

The MOBILETT XP Digital System DVD is available.

At least 2 blank writable CDs are available (2 blank CDs are included with the delivery).

Delete all test exposures in "local Temp Storage" and in "External Storage" prior to the backup.

### Procedure

- The MOBILETT XP Digital is switched off.
- Open the top cover of the MOBILETT XP Digital and place on a table or similar surface. All cables remain connected (access to CXDI PC).
- Open the CXDI PC (laptop) to access the keyboard and display. Do NOT switch on the CXDI PC if it is disconnected from the MOBILETT XP Digital. Otherwise, the display setting can switch to the default setting without touch screen display on the laptop.
- Label the blank CDs used for the backup with the date and image and number them sequentially (min. 2 CDRs required)
- Switch the MOBILETT XP Digital "ON" and place the system DVD in the DVD/RW drive of the CXDI PC (boot from the system DVD)

**NOTE**

**If necessary, set the boot device to DVD-ROM in the laptop's BIOS. Access to BIOS: while system is booting, press the F2 key and enter the administrator password "99999".**

⇒ The display shows the following menu:

- 1 - Backup the complete hard drive (c: + d:)
- 2 - Restore the complete hard drive (c: + d:)
- 3 - Restore factory settings (c: + d:)
- 4 - Back up the complete hard drive (c:)

- 5 - Restore the complete hard drive (c:)
- 6 - Use GHOST interactive
- E - Exit
- Select "1" - Back up the complete hard drive (c: + d:):
  - ⇒ Follow the on-screen instructions
  - ⇒ The backup completion is displayed
- Remove the CD from the DVD/CD RW drive of the CXDI PC.
- Restart the MOBILETT XP Digital and perform the "Backup of Configuration" as described below.

## Backup of Configuration

The "Backup of Configuration" includes all configuration settings, organ programs, log files, and images from the external storage and has to be performed following start-up of the MOBILETT XP Digital at the customer site.

The imaging system service tool is used to back up all relevant data to the D:\\_Siemens\_ folder. This folder is written to CD using Windows XP Explorer and stored as a backup CD.

### Prerequisites

The system is completely installed and configured according to customer specifications. All checks have been successfully completed.

At least one blank writable CD is available.

Before backup, delete all test exposures from "external storage."

The CXDI PC is accessible (see "Backup of hard disks" earlier).

The MOBILETT XP Digital is switched on and the application has been launched properly.

### Procedure

Perform the following steps from the application:

- Select SYSTEM/ CONFIGURATION/ ADMINISTRATOR SETUP/ SERVICE TOOL.
- Enter the administrator password and confirm with "OK".
  - ⇒ See password list.
- Select "Copy files to \_Siemens\_" from the SERVICE TOOL menu.
- Select "START".
  - ⇒ Enter the service password (see password list)
- Confirm with "OK".
  - ⇒ All necessary files are copied to the "\_Siemens\_" directory. Existing data is overwritten.

## Writing backup data to CD



After backing up all relevant data to the D:\\_Siemens\_ folder using the imaging system service tool, the data in this folder has to be written to CD using Windows XP Explorer.

- Label the blank CD for the backup with the date and "Backup of Configuration" and number it.
- Select "Explorer" from the SERVICE TOOL menu.
- Start via "START"
  - ⇒ Enter the service password (see password list)
- Insert the labeled CD into then CD RW drive of the CXDI PC.
- Copy the "D:\\_Siemens\_" folder to drive E:\ (CD RW drive).
- Right-click in the right pane of the E:\ drive Explorer window and select "Write these files to CD".
- Follow the prompts.
  - ⇒ The data is saved to CD
- Wait until the write operation is completed.
- Close Explorer.
- Click "Exit" to exit the "SERVICE TOOL".
- Click "OK" to exit "ADMINISTRATOR SETUP".
- Switch the MOBILETT XP Digital OFF.
- Close the CXDI PC, secure the CXDI PC transport fastener, and attach the top cover

## Final activities

### Protective conductor test

Observe the protective conductor resistance test information in these instructions.

- Perform the protective conductor test with all covers closed in accordance with ARTD-002.731.17... The protective conductor resistance must not exceed 0.2 Ohms.
-  • The values determined must be recorded as initial measurements in the protective conductor resistance report (chapter 11 of these instructions), and the measuring points must be given.
-  • The measuring procedure and the measuring device used (designation and serial number) must also be documented.

### Leakage current measurement

Observe the leakage current measurement information in these instructions.

- The leakage current must be measured with all covers closed, in accordance with ARTD-002.731.17... The limit value of 2.5 mA must not be exceeded.




**WARNING**

**Electrical voltage!**

**Non-compliance can lead to severe injury and even death.**

⇒ **No housing parts of the system may be touched during direct measurement of the leakage current .**



⇒ **Third-person access to the system must be prevented.**

- The system must be switched on during measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.
-  • Enter the highest value as the first measured value in the leakage current report (chapter 11 of these instructions).
- This value must not exceed the permissible leakage current values according to DIN VDE 0751-1/2001-10, Table F.1, line "leakage current for devices according to remarks 1 and 3", of 2.5 mA.
-  • Measure and record the current line voltage. If the measured line voltage deviates from the nominal voltage, correct the measured value to the value corresponding to a measurement at the nominal value of the line voltage. This must also be documented.
-  • The measuring procedure (differential measurement or direct measurement) and the measuring instrument used (designation and serial number) must also be documented.

### Patient leakage current measurement


Observe the patient leakage current measurement information in these instructions.

- The patient leakage current must be measured with all covers closed, in accordance with ARTD-002.731.17...

- The patient leakage current must be measured at the flat detector.
- The system must be switched on during measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.
-  • Enter the value determined as the first measured value in the patient leakage current report (chapter 11 of these instructions).
- This value may not exceed the permissible leakage current values according to DIN VDE 0751-1/2001-10, table F.1, line "patient leakage current" of 0.01 mA for direct current and 0.1 mA for alternating current.
-  • The measuring procedure and the measuring device used (designation and serial number) must also be documented.

## Labels

### Country-specific labeling

-  • The "Warning!" label "This X-ray unit may be dangerous..." is supplied in a number of languages. Select the correct language and attach the label according to the MOBILETT XP Digital operator manual.
- The "Danger!" label "Explosion hazard..." is supplied in a number of languages. Select the correct language and attach the label according to the MOBILETT XP Digital operator manual.
- Affix the "Do not open doors to rooms with the unit" label as shown in (Fig. 27 / p. 55).
- For Germany only:  
Select the 1.5 m, 2.5 m or 3.5 m "control area" label as required by the customer and affix it to the bottom of the arm as shown in (Fig. 28 / p. 56).

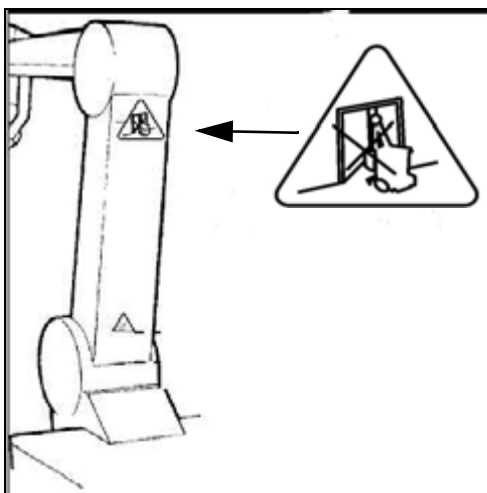


Fig. 27: "Rambo" label



Fig. 28: "Control area" label

## Reports

- Separate the completed 'Start-up report' (chapter 9 of these instructions) from these instructions and file it in the system binder, Register 9, "Certificates."

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- Separate the completed DHHS report (chapter 10 of these instructions) from these instructions and file it in the system binder, Register 9, "Certificates."
- Separate the completed protective conductor resistance report, leakage current report, and patient leakage current report (chapter 11 of these instructions) from these instructions and file them in the system binder, Register 9, "Certificates."
- Complete the "Installation Protocol" included with the unit and send it (by fax) to the address listed in the protocol.



**MOBILETT XP Digital**

This protocol confirms operability according to the datasheet. The original document remains with the unit, and a copy is filed at the local branch office.

Type / Material No. / Serial No.: .....

Customer: ..... Customer No.:  
.....

Check	Control point	Additional information
<input type="checkbox"/>	Required documents complete	
<input type="checkbox"/>	Visual inspection	
<input type="checkbox"/>	Cable winch	
<input type="checkbox"/>	Support arm movements	
<input type="checkbox"/>	Single tank and collimator movements	
<input type="checkbox"/>	Shock sensors	
<input type="checkbox"/>	Line voltage	_____ V
<input type="checkbox"/>	Battery charging operation	
<input type="checkbox"/>	Exposure operation	
<input type="checkbox"/>	Lead apron holder	
<input type="checkbox"/>	Collimator function	
<input type="checkbox"/>	Calibrating the CXDI detector	
<input type="checkbox"/>	Exposure release with high voltage	
<input type="checkbox"/>	Configuration of the imaging system	
<input type="checkbox"/>	Light field/radiation field	Deviation $\leq \pm 1.7\%$
<b>Options</b>		
<input type="checkbox"/>	DAP (test display 80 - 120 $\mu\text{Gy m}^2$ or 8-12 $\mu\text{Gym}$ )	Display _____ $\mu\text{Gym}^2$
<input type="checkbox"/>	Remote control	
<b>Quality checks</b>		

<input type="checkbox"/>	Checking the image quality
<input type="checkbox"/>	DHHS checks
<b>Final activities</b>	
<input type="checkbox"/>	Backup performed
<input type="checkbox"/>	Protective conductor test (Measurement values in separate protective conductor resistance report)
<input type="checkbox"/>	Leakage current measurement (Measurement values in separate leakage current report)
<input type="checkbox"/>	Patient leakage current measurement (Measurement values in separate patient leakage current report)
<input type="checkbox"/>	Affixing labels
Name: _____ Date: _____ Signature: _____	

**MOBILETT XP Digital**

The original document remains with the unit, and a copy is filed at the local branch office.

Type / Material No. / Serial No.: .....

Customer: ..... Customer No.:  
.....

<b>kV accuracy</b>			
<b>Check</b>	<b>Control point</b>	<b>Check value</b>	<b>Additional information</b>
<input type="checkbox"/>	52 kV / 50 mAs	_____ kV	Measuring instrument: _____
<input type="checkbox"/>	81 kV / 20 mAs	_____ kV	Serial no.: _____
<input type="checkbox"/>	133 kV/12.5 mAs	_____ kV	Date of calibration: _____
<b>mAs accuracy</b>			
<input type="checkbox"/>	40 kV / 5 mAs	_____ mAs	Measuring instrument: _____
<input type="checkbox"/>	81 kV / 2 mAs	_____ mAs	Serial no.: _____
<input type="checkbox"/>	133 kV/10 mAs	_____ mAs	Date of calibration: _____
<b>Reproducibility</b>			
<input type="checkbox"/>	Dose measurement	Coefficient of variation C:	Measuring instrument: _____
		_____	Serial no.: _____
			Date of calibration: _____
Name: _____ Date: _____ Signature: _____			



**Protective conductor resistance/report**

System: .....

Material number: .....

Serial number: .....

Customer-spec. Identification number: .....

Tab. 1

	Protective conductor resistance					
	First measured value	Repeat measurement values				
Meas. point 1: .....						
Meas. point 2: .....						
Meas. point 3: .....						
Meas. point 4: .....						
Meas. point 5: .....						
Meas. point 6: .....						
Meas. point 7: .....						
Meas. point 8: .....						
(*1) Meas. circuit:						
Meas. device type:						
Meas. device ser. no.:						
Meas. device calibrated up to:						
Evaluation:	n.a.					
Date:						
Name:						
Signature						

(\*1) Meas. circuit: See [\(Fig. 29 / p. 62\)](#)

Measuring circuit

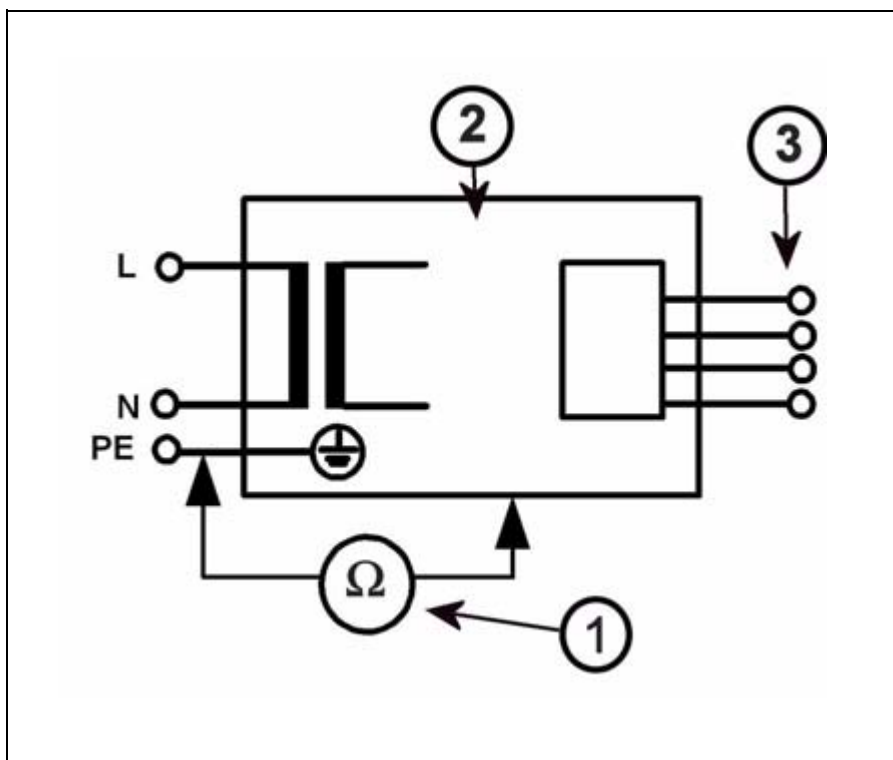


Fig. 29: Measuring circuit for measuring the protective conductor resistance for units that are disconnected from power, in compliance with DIN VDE 0751-1/2001-10, Fig. C2.

- Pos. 1 Measurement setup (measuring device)
- Pos. 2 System
- Pos. 3 Application part (if applicable)

Remarks:

Tab. 2

Date	Comments	Name	Signature

Leakage current/report

System: .....  
 Material number: .....  
 Serial number: .....  
 Customer-spec. Identification number:  
 .....

Tab. 3

Leakage current						
	First measured value	Repeat measurement values				
Leakage current (Highest measured value) [mA]						
Line voltage during the measurement [V~]						
Leakage current, Corrected value [mA]						
(*1) Meas. circuit:						
Meas. device type:						
Meas. device ser. no.:						
Measuring device, calibrated to:						
Evaluation:						
Date:						
Name:						
Signature:						

(\*1) Meas. circuit: See [\(Fig. 30 / p. 64\)](#) through [\(Fig. 31 / p. 64\)](#)

## Measuring circuit

### Direct measurement

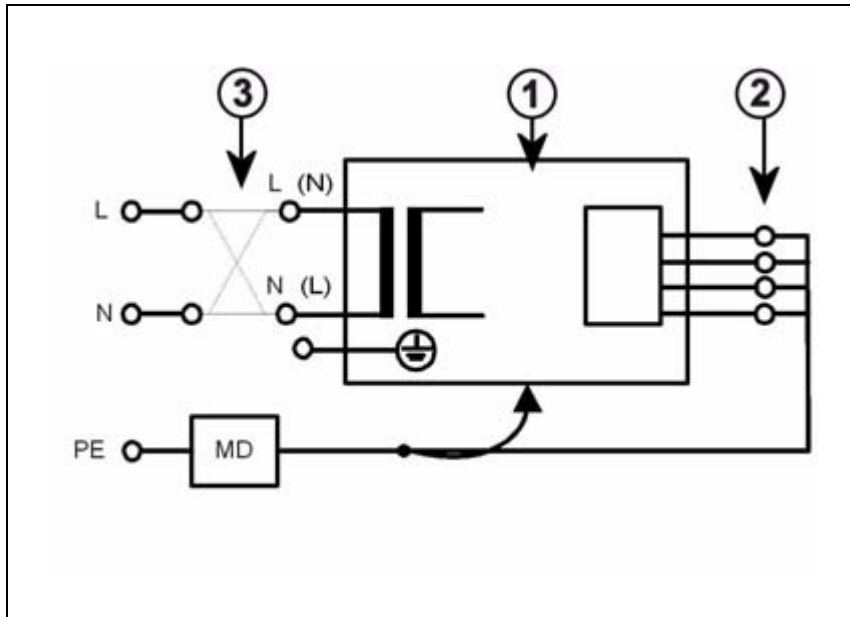


Fig. 30: Measuring circuit for direct measurement of the system leakage current in compliance with DIN VDE 0751-1/2001-10, Fig. C5 for protection class I.

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)

### Differential measurement

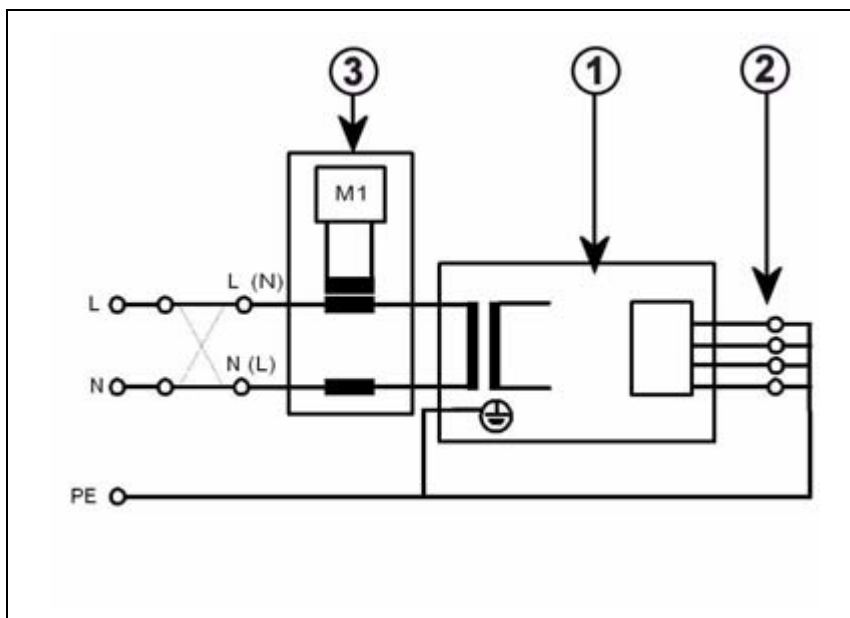


Fig. 31: Measuring circuit for measuring the system leakage current according to the differential current method in compliance with DIN VDE 0751-1/2001-10, Fig. C6 for protection class I.

- Pos. 1 = System
- Pos. 2 = Application part type B (if available)
- Pos. 3 = Measurement setup (integrated into measuring device)







**Patient leakage current/report**

System: .....  
 Material number: .....  
 Serial number: .....  
 Customer-spec. Identification number:  
 .....

Tab. 5

Patient leakage current						
	First measured value	Repeat measurement values				
Patient leakage current 1. Application part .....						
Patient leakage current 2. Application part .....						
Patient leakage current 3. Application part .....						
Patient leakage current 4. Application part .....						
Patient leakage current 5. Application part .....						
(*1) Meas. circuit:						
Meas. device type:						
Meas. device ser. no.:						
Meas. inst. calibrated to:						
Evaluation:						
Date:						
Name:						
Signature:						

(\*1) Meas. circuit: See [\(Fig. 32 / p. 68\)](#)

Measuring circuit

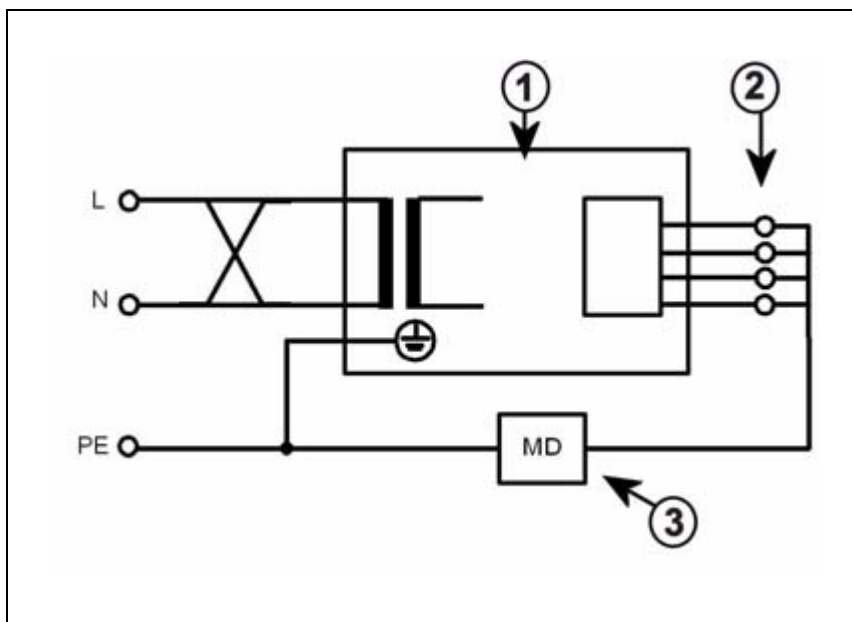


Fig. 32: Measuring circuit for measurement of the patient leakage current in a type B application part with a protective conductor in compliance with DIN VDE 0751-1/2001-10, Fig. C10.

- Pos. 1 = System
- Pos. 2 = Application part type B
- Pos. 3 = Measurement setup (integrated into measuring device)

Remarks:

Tab. 6

Date	Remarks	Name	Signature

Chapter	Section	Revision
General start-up information	Information on the protective conductor resistance test	New section added
General start-up information	Information on measuring the leakage current	New section added
General start-up information	Information on measuring the patient leakage current	New section added
Unpacking and visual inspection	Unpacking	New illustration added.
Remaining work - final tasks	Protective conductor test	Completely rewritten
Remaining work - final tasks	Leakage current measurement	Completely rewritten
Remaining work - final tasks	Patient leakage current measurement	New section added
Remaining work - final tasks	Reports	Adapted in accordance with changes
Start-up report	n.a.	Adapted in accordance with changes
Electrical safety/reports	n.a.	New chapter added.

