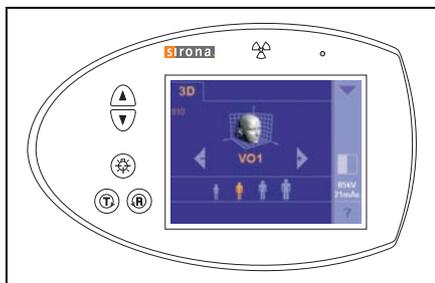


# GALILEOS

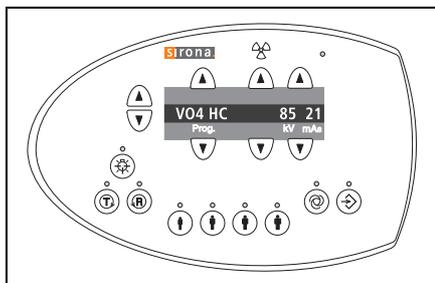
## Service Manual

English

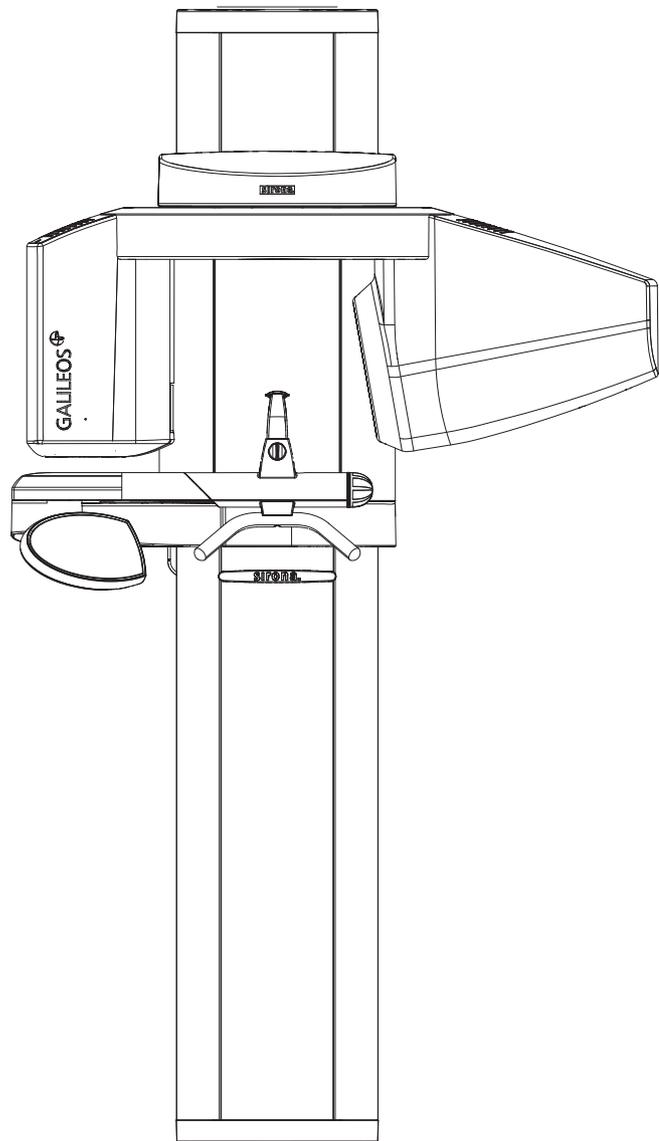
### GALILEOS



### GALILEOS GAX5



**Version 7.0**



## About the Service Manual:

This document describes the servicing of the digital volume tomograph GALILEOS and GALILEOS GAX5.

### In addition, you also require:

- **Spare parts list: Order No. 61 25 699**
  - GALILEOS
  
- **Wiring diagrams: Order No. 61 25 640**
  - GALILEOS
  
- **Installation Instructions**
  - GALILEOS: Order No. 61 25 574
  - GALILEOS Software: Order No. 61 42 389
  - GALAXIS Operator's Manual: Order No. 61 23 488
  - SIDEXIS: Order No. 59 67 356
  
- **Tools**
  - GALILEOS service set (Order No. 61 46 562)
  - Screwdriver (medium sized)
  - Torx offset screwdrivers TX10\*, TX20\*, TX25\*
  - Imbus offset screwdriver, Allen key size 6 mm\*
  - Open-end wrench, 13 mm A/F
  - Socket wrench, 13 mm A/F, 17 mm A/F, 18 mm A/F
  - Side cutters
  - Spirit level
  
- **Auxiliary devices**
  - Digital multimeter, Accuracy Class 1
  - Mult-O-Meter 510L
  - Soldering tool for repairing cables
  - Cable ties
  - Teflon tape
  - Loctite

\* Supplied with the GALILEOS unit

**General information/Software update 1**

**Messages 2**

**Troubleshooting 3**

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# 1 General information

GALILEOS

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## 1

# General information

## 1.1 Safety

Please be sure to observe the warnings and safety information listed in this service manual.

They are specially labeled as CAUTION, WARNING or DANGER:



### **CAUTION**

*Nonobservance may result in minor physical injuries or material damage and malfunctions.*



### **WARNING**

*Nonobservance may lead to serious physical injury or death.*



### **DANGER**

*Immediate danger to life and limb. Threat of serious physical injury or death.*

## 1.2 Operation notes

### Rated line voltage

The volume tomograph GALILEOS functions in the following rated line voltage ranges:

- 200 – 240V
- 50/60 Hz

The permissible line voltage fluctuation is  $\pm 10\%$ .

The internal line impedance must not exceed max.  $0.8 \Omega$ .

Only permanent electrical connection of the system is allowed in Germany.

### Remote control

The system can be equipped with...

- a 1 - 3 m coiled cable with release button inside the treatment room or ...
- a remote control with or without coiled cable located outside the X-ray room (see installation instructions).

### Warm-up time

After it is switched ON, the system requires a warm-up time of approx. 1 min.

### Self-adjustment routine

At the same time, a mechanical and electronic self-adjustment routine is executed. If a key is pressed during the self-adjustment routine, an error message will display on the Easypad.

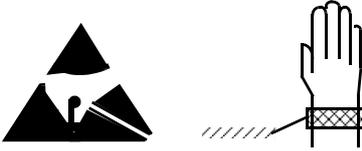
### Cooling period

The cooling period between two exposures is maintained by an automatic exposure blocking function according to the pulse/pause ratio. The decrementing waiting time count is displayed on the Easypad.

### Turn-off time

The turn-off time must amount to at least 30s.

<b>Demo units</b>	If the volume tomography unit is to be presented as a demo unit at trade fairs or exhibitions, it must be ensured that radiation release is blocked (see "Demo mode – Operation without radiation release" on page 1-6).
<b>Software version</b>	The overall system software version is determined by the software statuses of the EEPROMs on the boards (see "List of software versions" on page 1-10).
<b>Wireless phone interference with medical electrical equipment</b>	To ensure safe operation of medical electrical equipment, the use of mobile wireless phones in practice or hospital environments is prohibited.
<b>Disposal</b>	The X-ray tube assembly and X-ray detector contain a tube with potential implosion hazard, a small amount of beryllium, a lead lining as well as mineral oil.
<b>Error messages</b>	Error messages are displayed on the control panel.
<b>Help messages in case exposure readiness cannot be attained</b>	Help messages are displayed on the control panel.
<b>If you have to remove covers from the unit.</b>	<p>Proceed according to section "1.11 Removing the covers".</p> <p>When removing covers, always remember that direct sunlight or bright room lighting can cause system malfunctions due to activated light barriers.</p> <p>Therefore: avoid direct sunlight and bright room lighting above the unit!</p> <p>Reattach the covers.</p> <p>When attaching the covers: be sure to screw the sheet metal cover back on.</p> <p><b>IMPORTANT:</b> For reasons of electromagnetic compatibility, be sure to fasten <b>all</b> screws.</p>
<b>Measurements</b>	<p>Always switch the unit OFF before connecting a measuring instrument.</p> <p>Select the correct current/voltage type and adjust the measuring range to match the expected readings.</p> <p>Perform continuity tests only on units which are switched off.</p> <p>If several exposures with radiation must be taken to check a measurement, make sure that the prescribed cool-down intervals are observed. They are maintained by an automatic exposure blocking function (see operating instructions).</p> <p>The pulse/pause ratio is 1: 20, i.e. a 20 second pause is maintained for each second of radiation cycle. The pulse/pause ratio is automatically maintained (automatic exposure blocking).</p> <p>It is essential that you observe the radiation protection regulations applicable in your country prior to radiation release.</p> <p>The test rotations triggered by pressing the T key on the Easypad and then the release button are executed without radiation.</p>

**When replacing parts**

Switch the unit OFF before replacing parts.

**For safety reasons** the power supply should be switched off at the junction box of the building installation when replacing parts around the line transformer.

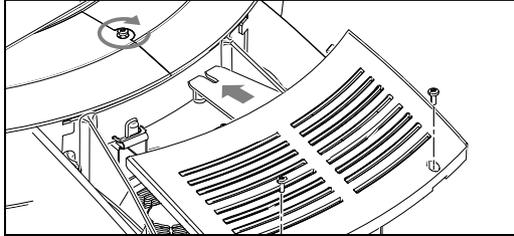
Please always wear an ESD wrist band to protect sensitive components on printed circuit boards (ESD).

Always check the system and adjust it as required after replacing a board or the X-ray tube assembly.

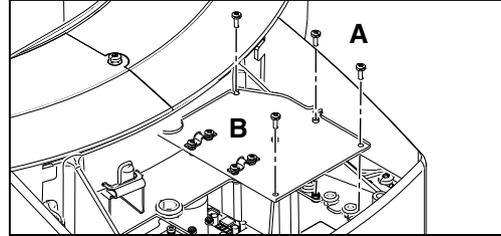
The article numbers for ordering spare parts can be found in the spare parts list, Order No. 61 25 699. The diagrams contained in the spare parts list provide a useful guide when replacing parts.

1.3 Demo mode – Operation without radiation release

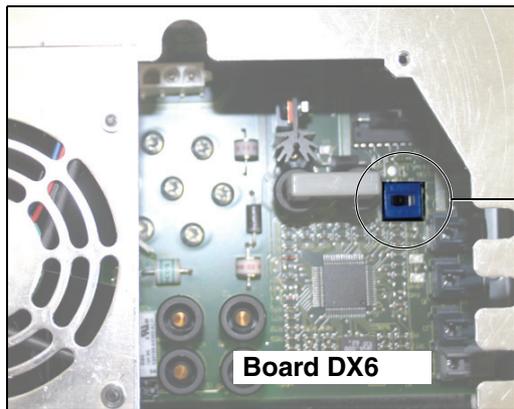
1.



2.



3.

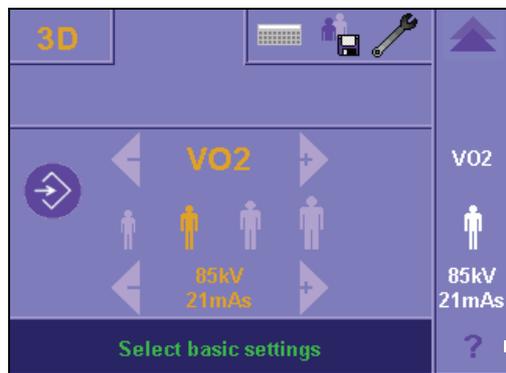


4.

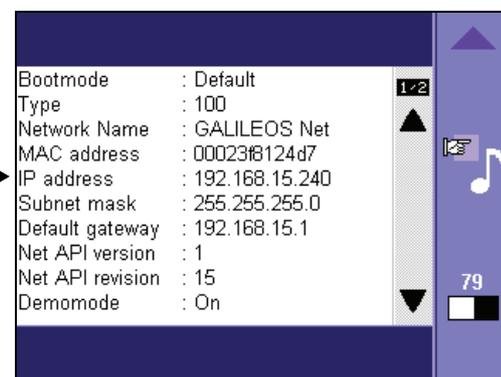


5.

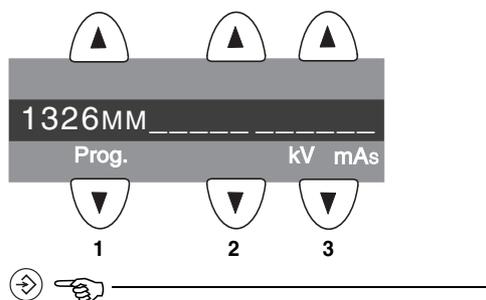
**GALILEOS: Easypad touchscreen**



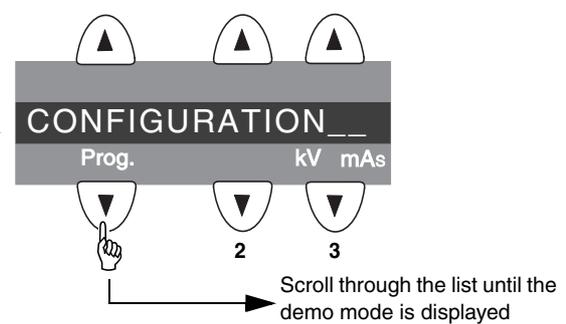
**GALILEOS: Info screen**



**GALILEOS GAX5: Multipad**



**GALILEOS GAX5: Info screen**



---

**i NOTE**

*For demo use, the "X-ray detector dummy for GALILEOS" (order no. 61 19 007) should be used instead of the actual X-ray detector. For further information, please refer to the instructions included with the dummy.*

---

### 1.3.1 Switching the demo mode ON

When operated in demo mode, the unit must not release any radiation. For this reason, you must take the following safety measures:

- Switch the unit OFF.

---

** DANGER**

**PERILOUS SHOCK HAZARD. It is essential to switch the unit off and to wait at least another 1 minute before taking off the covers of the X-ray tube assembly.**

---

1. Remove the cover of the tube assembly.
2. Loosen screws **A** and remove cover plate **B**.
3. Set dip switch **S2** (DX6) to **position 2**.

---

**i NOTE**

*If switch S2 is not set to position 2 before switching off the unit, various error messages will display when the unit is turned back on.*

---

4. Pull cable **L5** (X-RAY) off of connector **J6** (DX6).
  5. Radiation release is now no longer possible.
  6. Switch the unit ON and check the mode with the info screen.  
*Demo mode: ON means that: The demo mode is switched ON (Radiation release is not possible)*  
*Demo mode: OFF means: The demo mode is switched OFF (Radiography, X-ray radiation are possible!)*
- Switch the unit OFF again and reattach cover plate **B** and the tube assembly covers by following the dismantling procedure in reverse order.

### 1.3.2 Switching the demo mode OFF

- Switch the unit OFF.

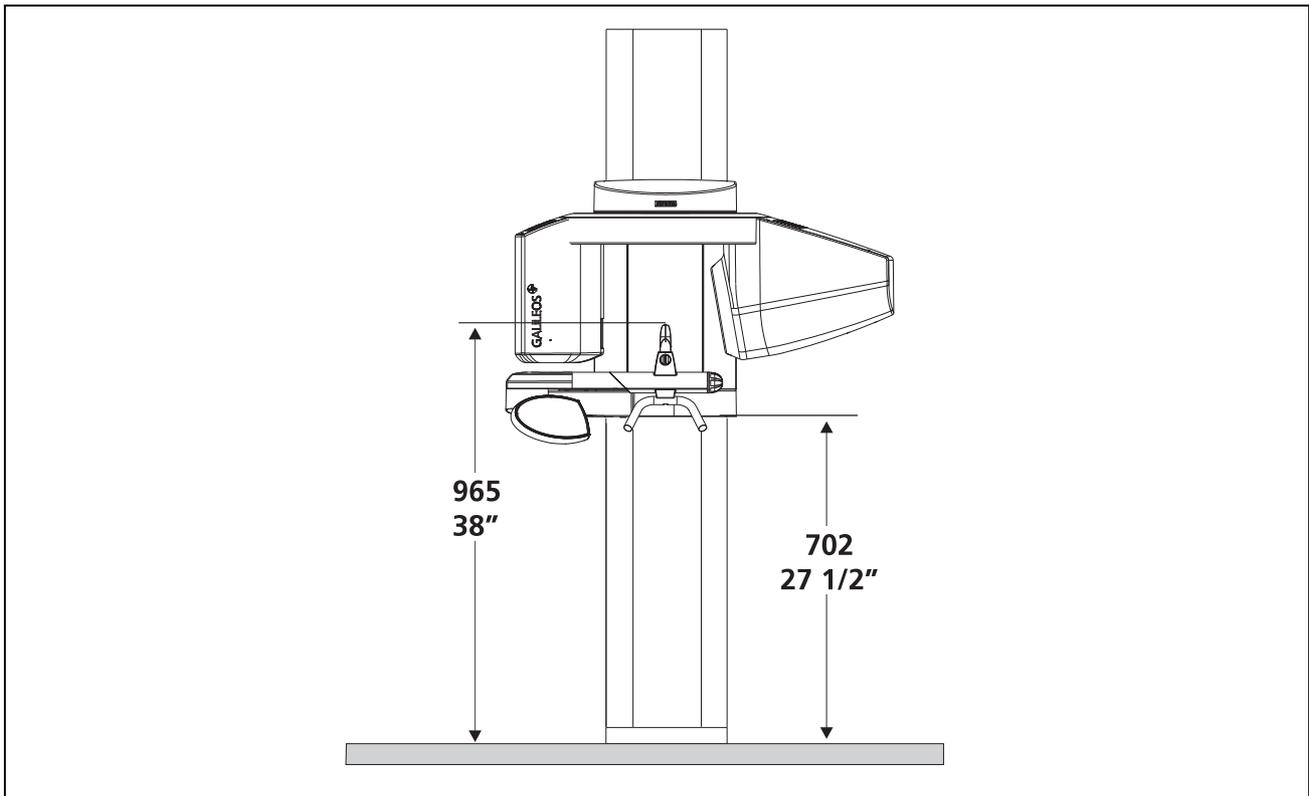
**DANGER**

**PERILOUS SHOCK HAZARD.** *It is essential to switch the unit off and to wait at least another 1 minute before taking off the covers of the X-ray tube assembly.*

---

1. Remove the cover of the tube assembly.
  2. Loosen screws **A** and remove cover plate **B**.
  3. Set dip switch **S2** (DX6) to **position 1**.
  4. Connect cable **L5** (X-RAY) to connector **J6** (DX6).
  5. Radiation release is now once again possible.
  6. Switch the unit ON and check the mode with the info screen.  
Demo mode: ON means that: The demo mode is switched ON  
(Radiation release is *not* possible)  
*Demo mode: OFF means: The demo mode is switched OFF  
(Radiography, X-ray radiation are possible!)*
- Switch the unit OFF again and reattach cover plate **B** and the tube assembly covers by following the dismantling procedure in reverse order.

## 1.4 Exhibition mode – Repacking and transport



- Switch the unit ON and move it to its packing height by actuating the **UP/DOWN** keys on the Easypad:
  - Bite block height = 965 mm (displayed as height on the Easypad)
  - Bottom edge of the slide = 702 mm
- Switch the unit OFF.



### **DANGER**

**PERILOUS SHOCK HAZARD. Prior to disconnecting the power supply, switch off the power and wait 1 minute.**

- Remove any connections between the external devices and the DX41 board, and disconnect the unit from the power supply.



### **NOTE**

*For information about repackaging and transporting the image detector dummy for GALILEOS, please refer to the instructions included with the dummy.*

## 1.5 List of software versions

### **i** NOTE

Any software combinations other than those listed here are not allowed. If the software version of any particular module does not match the overall software version, the overall software version will be marked with an asterisk on the Info screen (e.g. 03.03.01\*).

GALILEOS													Remarks
Board	DX6	DX7	DX7-L0	DX7-L1	DX7-L2	DX7-L3	DX7-L4	DX71	DX11	DX41	DX89	DX89 FPGA	
Overall software V 03.03.02	02.88.00	02.57.00	02.18.00	02.18.00	02.18.00	02.18.00	–	–	02.61.01	02.30.00	01.10.06	01.13.01	compatible w/ GALI- LEOS-SW V 1.2 and higher
Overall software V 03.04.00	02.88.00	02.58.03	02.22.00	02.22.00	02.22.00	02.22.00	–	–	02.63.05	02.30.00	01.12.07	01.13.01	compatible w/ GALI- LEOS-SW V 1.4 and higher
Overall software V 03.04.02	02.88.00	02.58.03	02.22.00	02.22.00	02.22.00	02.22.00	–	–	02.64.00	02.30.00	01.12.07	01.13.01	compatible w/ GALI- LEOS-SW V 1.4.3 and higher
Overall software V 03.05.00	02.88.00	02.60.00	02.22.00	02.22.00	02.22.00	02.22.00	01.00.00	–	02.66.00	02.30.00	01.16.00	01.15.00	compatible w/ GALI- LEOS-SW V 1.5 and higher
Overall software V 03.06.01	02.90.00	02.61.00	02.22.00	02.22.00	02.22.00	02.22.00	01.00.00	02.40.00	02.67.01	02.30.00	01.17.00	01.15.00	GALILEOS: compatible w/ GALI- LEOS-SW V 1.5 and higher  GALILEOS GAX5: compatible w/ GALI- LEOS-SW V 1.6

Remote control		Remarks
Board	DX42	
Overall software V 03.03.02	02.45.06	
Overall software V 03.04.00	02.46.04	
Overall software V 03.04.02	02.46.04	
Overall software V 03.05.00	02.47.00	
Overall software V 03.06.01	02.48.00	

Sidexis XG	Remarks
V 2.0	requires GALILEOS unit software version V 03.03.01
V 2.2	requires GALILEOS unit software version V 03.04.00 or V 03.04.01
V 2.3	requires GALILEOS unit software version V 03.05.00 or higher
V 2.4	For GALILEOS: requires GALILEOS unit software version V 03.05.00 or higher For GALILEOS GAX5: requires GALILEOS unit software version V 03.06.01 or higher

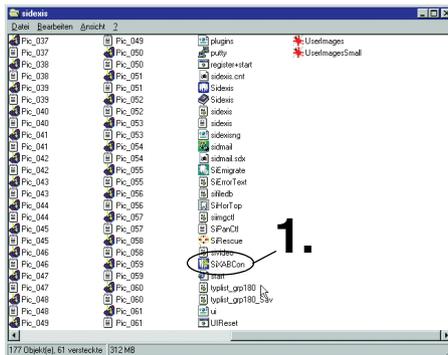
<b>Galileos software</b>	<b>CD index</b>	<b>Remarks</b>
V 1.2	004	requires GALILEOS unit software version V 03.03.01 and SIDEXIS 2.0
V 1.4	005	requires GALILEOS unit software version V 03.04.00 and SIDEXIS 2.2
V 1.4.3 SW	007	requires GALILEOS unit software version V 03.04.01 and SIDEXIS 2.2
V 1.5	009	requires GALILEOS unit software version V 03.05.00 and SIDEXIS 2.3
V 1.6	011	GALILEOS: requires GALILEOS unit software version V 03.05.00 and SIDEXIS 2.3 or higher GALILEOS GAX5: requires GALILEOS unit software version V 03.06.01 and SIDEXIS 2.3 or higher

## 1.6 Software update

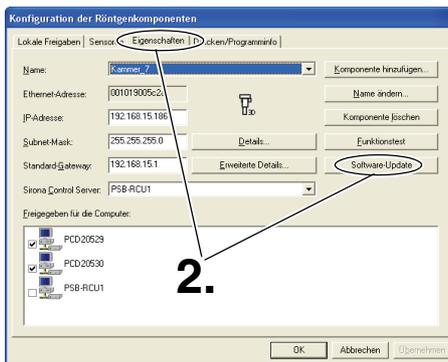
### **i** NOTE

Read the information provided on the GALILEOS software CD and on the SI-RONA dealer page on the Internet very carefully. It always contains the latest information on the software updates.

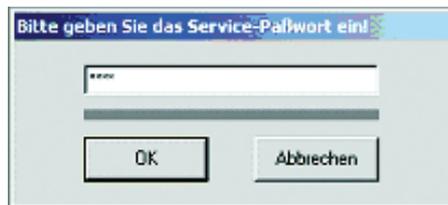
### Opening SIXABCON.exe



### To open the SOFTWARE UPDATE menu



### Entering the password



1. Open the SIXABCON utility program in the SIDEXIS XG program folder. Click on SIXABCON.exe (see screen shot) or via the pulldown menus **PROGRAMS → SIDEXIS → CONFIGURATION OF X-RAY COMPONENTS**

2. Open the **SOFTWARE UPDATE** menu. Click the **ATTRIBUTES** tab and then **SOFTWARE UPDATE**. The dialog box for entering the service password appears on the screen.

3. Enter the service password.

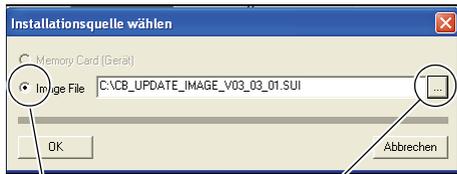
### **i** NOTE

Enter the first 4 digits of the current system date in reverse order as the service date (e.g. on 24/05/1995 (May 24, 1995), 5042 must be entered as the servicepassword).

If an incorrect service password or no password at all is entered, the limited update menu for users will be started. This includes only the possibility for an automatic update (see page 1-14).

The dialog box for selecting the installation source opens.

### Selecting an installation source



4.

5.

### Selecting the update mode

4. **IMAGE FILE** is preset as the installation source for the software update.
5. Select the path and the desired update file and confirm your selection by clicking **OPEN**.  
Click on **NAME UPDATE** and **OPEN**.

#### **i** NOTE

The update file can be found on the GALILEOS software CD. It is delivered with each DX11 replacement board and also included in the country set. The contents of the CD can be downloaded from the Dealer section of the SI-RONA Internet home page (under Product Info † X-ray Systems). [www.sirona.com](http://www.sirona.com)

6. Select the mode for the software update.  
You can select two different update modes via the index tabs:

- **Automatic**

The software of all components is automatically updated to the **latest software version**.

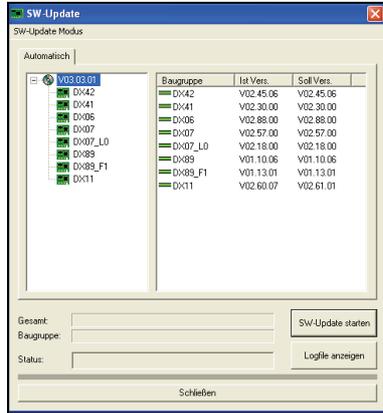
- **Main version**

The software can be **upgraded or downgraded** to the **desired version**.

This update mode is required e.g. if a replacement component delivered out of stock has a newer status than the prevailing overall system status. In this case, a main version update to the overall system status (displayed on the info screen) must be performed for the corresponding component with the appropriate update file (\*.SUI). The module is then reprogrammed.

(For more information on the update mode, see the next page)

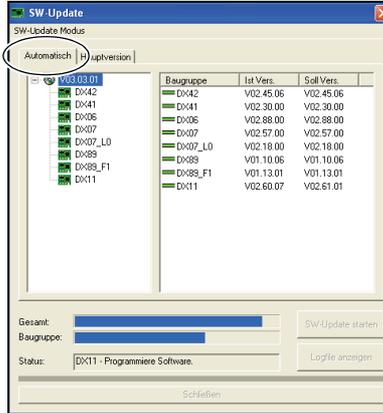
User domain



Automatic

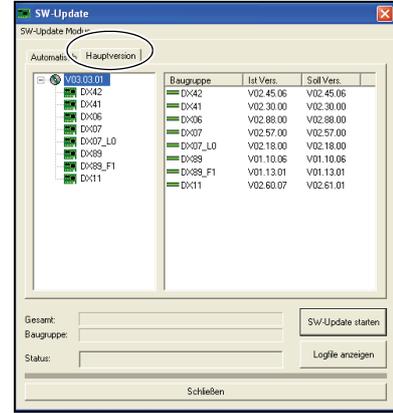
(accessible without password)

Service domain



Automatic

A list of modules, their installed software version and the latest software version offered by the update function is displayed in the right pane.



Main version

(e.g. if modules have a newer version status than the overall system following module replacement)

**i** NOTE

 Modules that are connected and the program versions of which correspond to the current main program version are identified by a continuous green bar.

 Modules that are not recognized by the system are identified by a broken red bar.

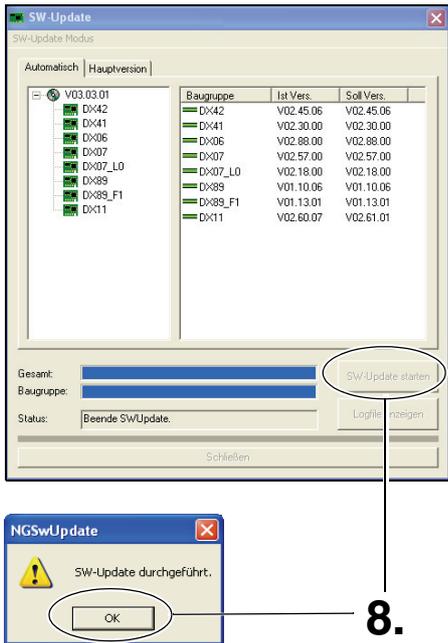
If the actual status of the module could not be queried for the update, then V00:00 is displayed for the SW actual version.

If there is a hardware incompatibility for the program version to be newly programmed, or if the module contains a newer software version than what is offered in the update file, this is identified by a red triangle with exclamation mark.

If the version of the selected update file is lower than the current software version of the system, nothing is displayed in the right-hand window. The downgrade required in this case is possible only via the **MAIN VERSION** mode.

7. Select the update mode and the update or component.

**Starting the update**



8. Start the update by clicking **START UPDATE**.

**i NOTE**

Before starting the software update, make sure that no unit movements are active. Otherwise the system may become inoperable in rare cases.

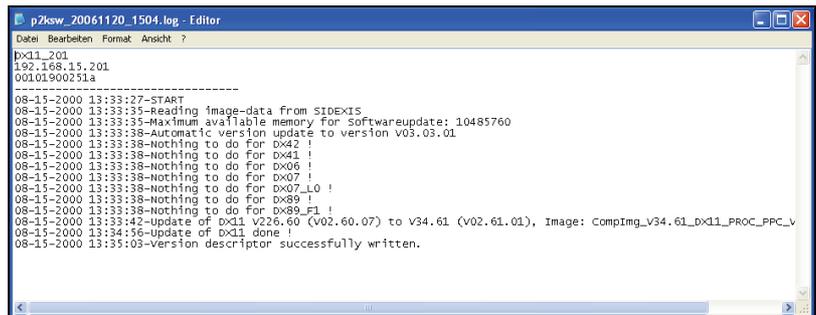
The X-ray detector must be installed during the update procedure. Exposure readiness must be deselected in *SIDEXIS* and the system may not be in the service mode already.

The update is started. A message box informs you when the update process is completed. Confirm the update with **OK**.

**Checking the log file**

9. Check the log file to make sure that the update was completed successfully.

Click **SHOW LOGFILE**



**i NOTE**

If messages such as **Update of DXxx failed!** appear there, please perform the update again. Repeat this procedure as often as necessary until the "failed" messages no longer appear.

10. Reboot the system.

### CAUTION

*It is always necessary to reboot the system after any software update*

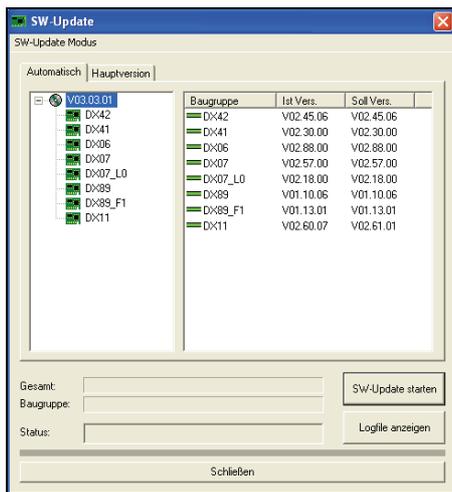
*(The new DX11 version can run only after the system is successfully rebooted; see also Section 6.11, "Replacing circuit boards".)*

### NOTE

*Any errors with the consecutive numbers 01, 03, 04, 06 and/or 07 displayed immediately following the software update may be ignored. If these messages appear again after the system is rebooted, please carry out troubleshooting as described in section 2.5.*

*If any conspicuous problems occur in connection with system handling after the software update has been completed, please repeat the software update immediately.*

## Checking the program versions



SW Update Manager

11. Check whether all modules contain the current program version via the SW Update Manager or Service routine S008.2 (see page 5-35).

### NOTE

 Modules that are connected and the program versions of which correspond to the current main program version are identified by a continuous green bar.

 Modules that are not recognized by the system are identified by a broken red bar.

*If the actual status of the module could not be queried for the update, then V00:00 is displayed for the SW actual version.*

*If there is a hardware incompatibility for the program version to be newly programmed, or if the module contains a newer software version than what is offered in the update file, this is identified by a red triangle with exclamation mark.*

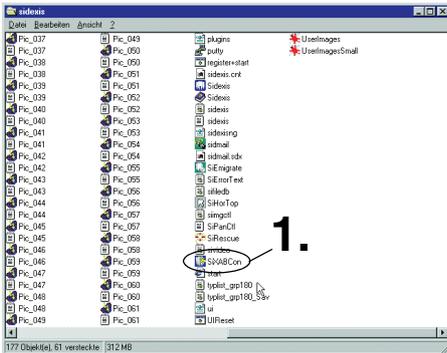
*If the version of the selected update file is lower than the current software version of the system, nothing is displayed in the right-hand window. The downgrade required in this case is possible only via the **MAIN VERSION** mode.*

12. Select the "Extended details" via SIXABCON.

This generates a XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.7 on page 1-17).

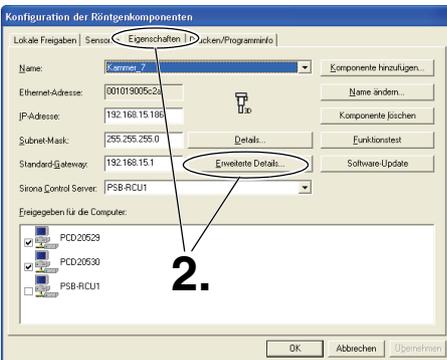
## 1.7 Selecting More details

### Opening SIXABCON.exe



1. Open the SIXABCON utility program in the SIDEXIS XG program folder. Click on SIXABCON.exe (see screen shot) or via the pulldown menus **PROGRAMS → SIDEXIS → CONFIGURATION OF X-RAY COMPONENTS**

### Opening the EXTENDED DETAILS menu

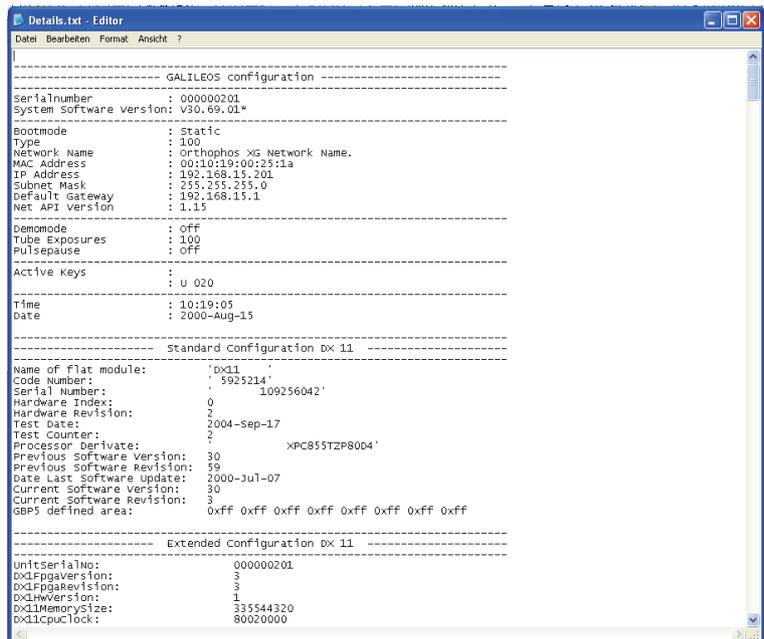


2. Open the **EXTENDED DETAILS** menu. Click the **ATTRIBUTES** tab and then **EXTENDED DETAILS**.

The current parameters are read from the unit and filed as XML file under the network name of the unit in the PDATA/P2K\_Config folder.

This process can take up to 30 seconds.

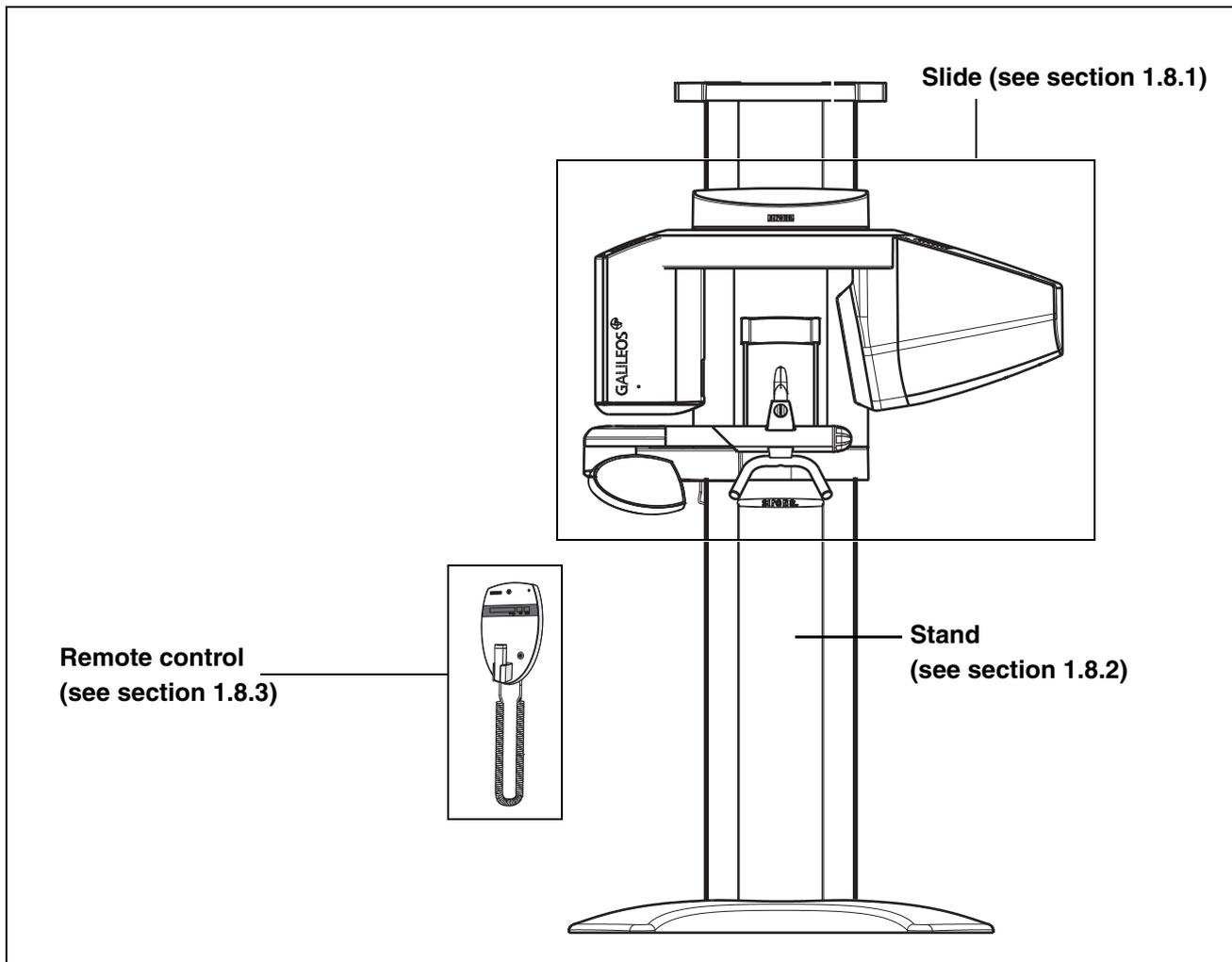
After the parameters are read, an editor displaying the data is opened automatically.



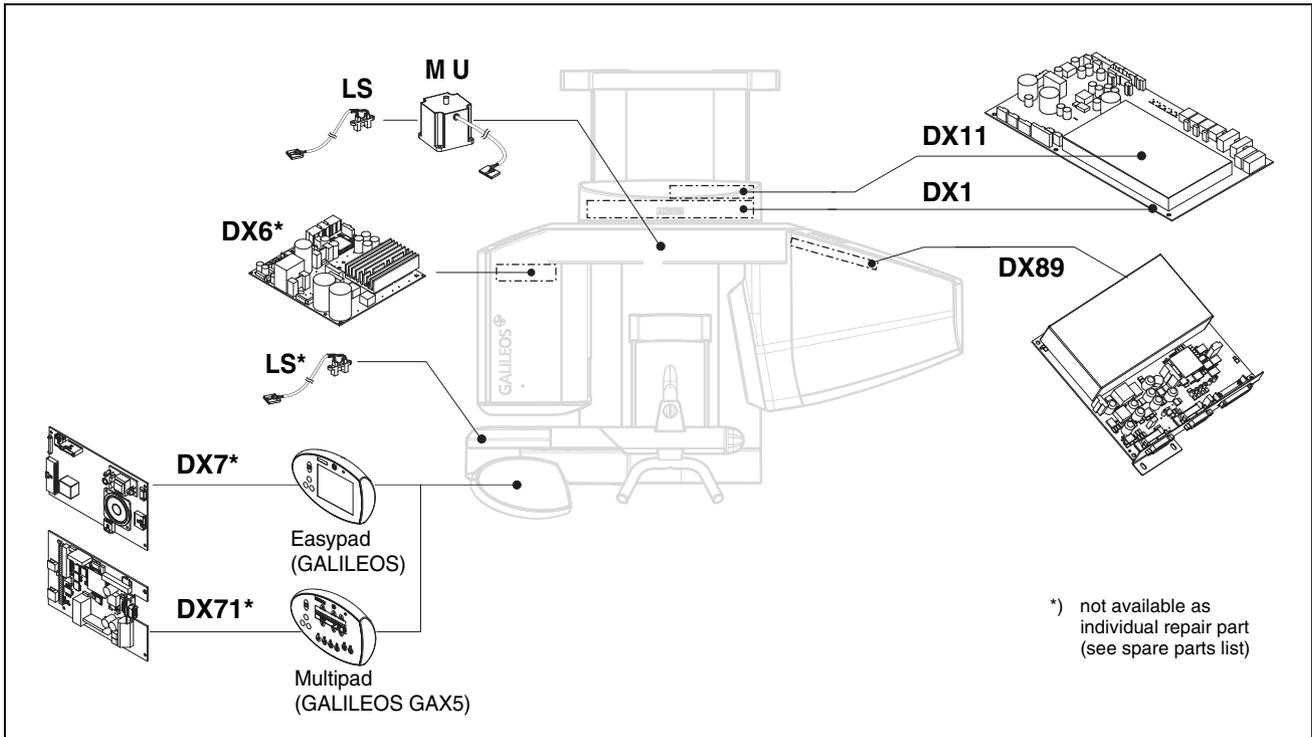
## 1.8 The most important modules and components

The GALILEOS volume tomography system comprises the following main modules:

- Slide with rotation unit and X-ray detector
- Stand
- Remote control (optional)

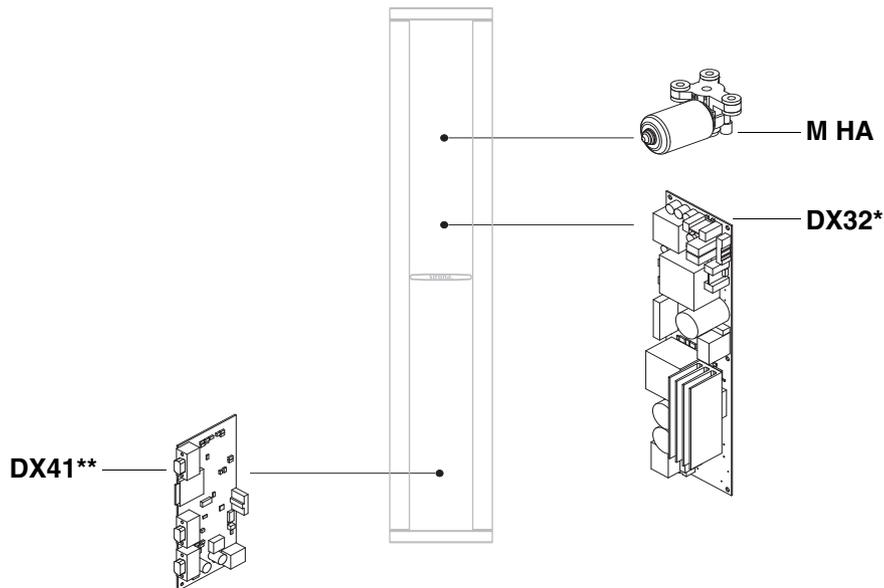


1.8.1 Slide



Component	Designation	Function
Boards	DX1	Open-loop/automatic control in general
	DX11	Controller board
	DX6*	Open-loop/automatic control for tube assembly
	DX7*	Easypad touchscreen (GALILEOS)
	DX71*	LED display on Multipad (GALILEOS GAX5)
	DX89	Image memory of the X-ray detector
Motors	M U	Rotary movement of rotating element
Light barriers	LS	Position control of the ring cycle
	LS	Position control of the swivel arm

### 1.8.2 Stand

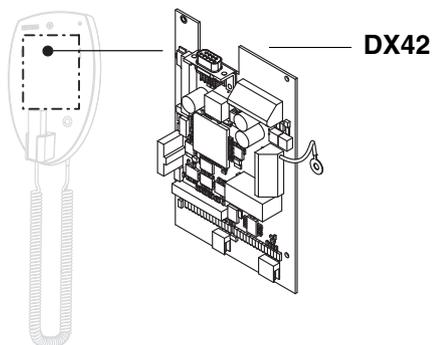


Component	Designation	Function
Boards	DX32*	Power supply board
	DX41**	Interface board
Motor	M HA	Linear movement of height adjustment

\* Starting with unit serial number 3101, new units will be delivered with the new version of board DX32 (see Section 1.9).

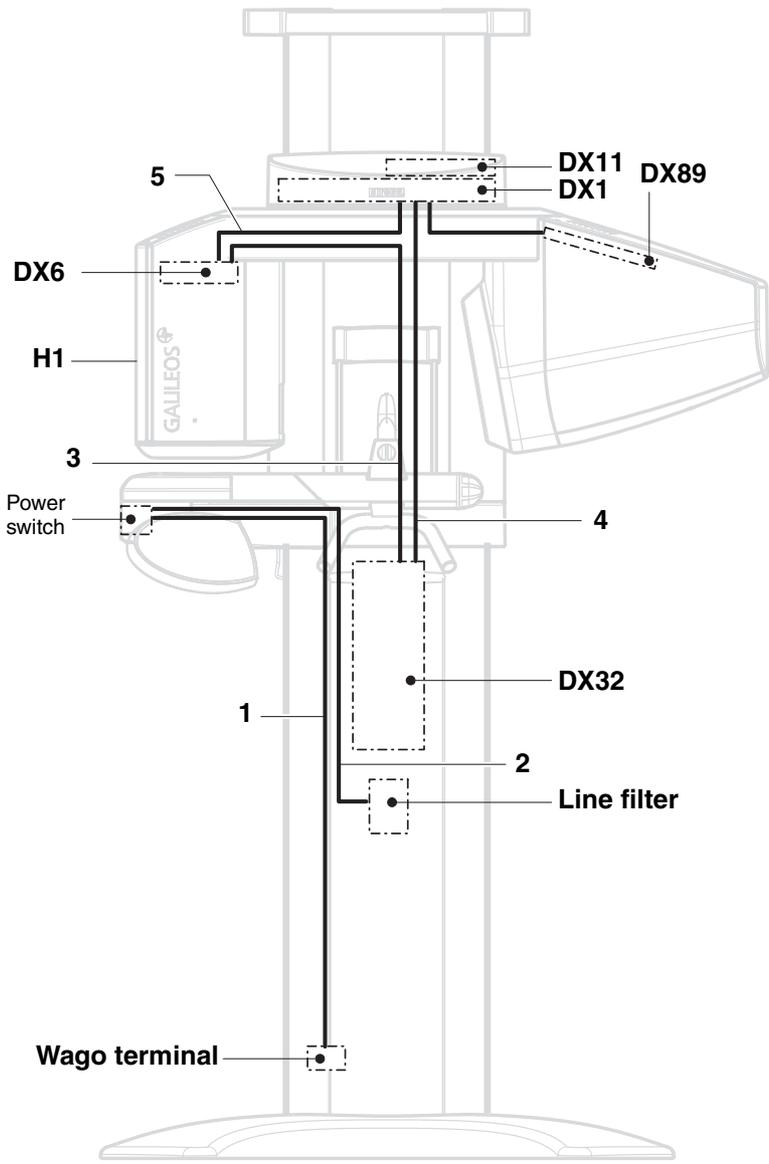
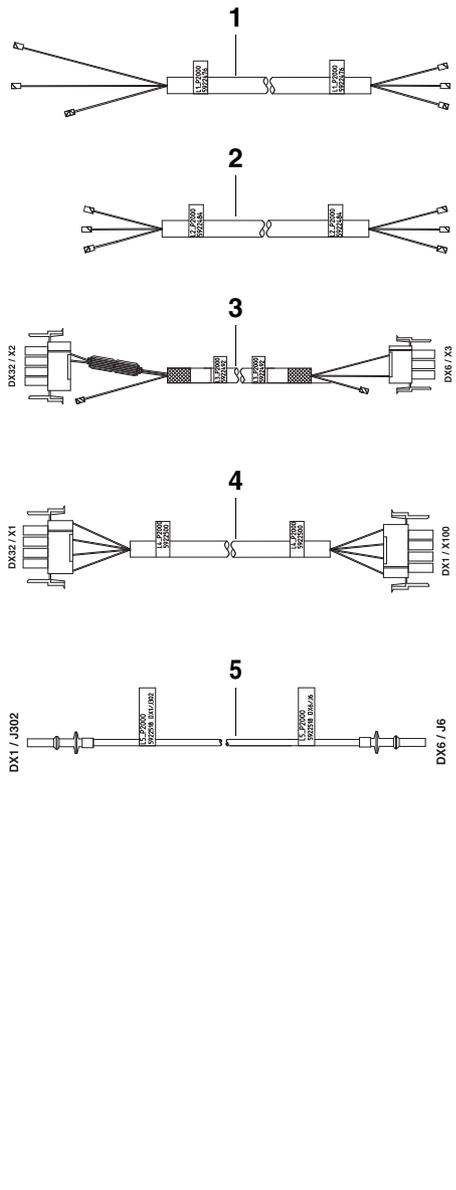
\*\* Starting with unit serial number 3201, new units will be delivered without board DX41.

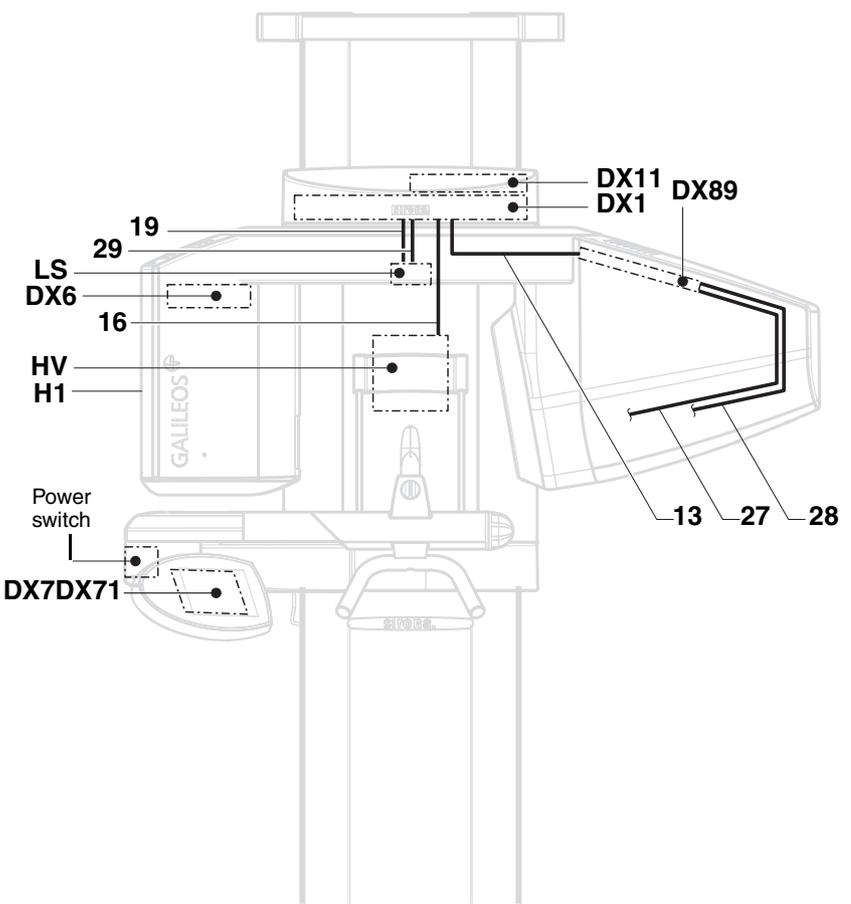
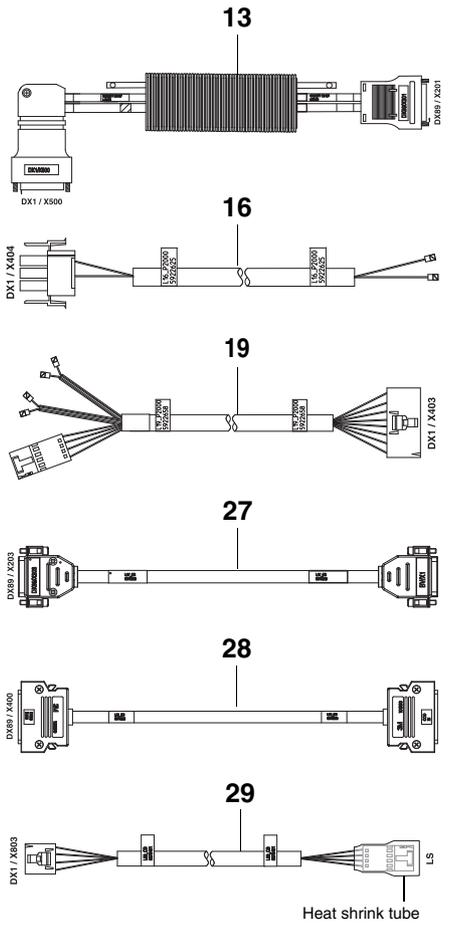
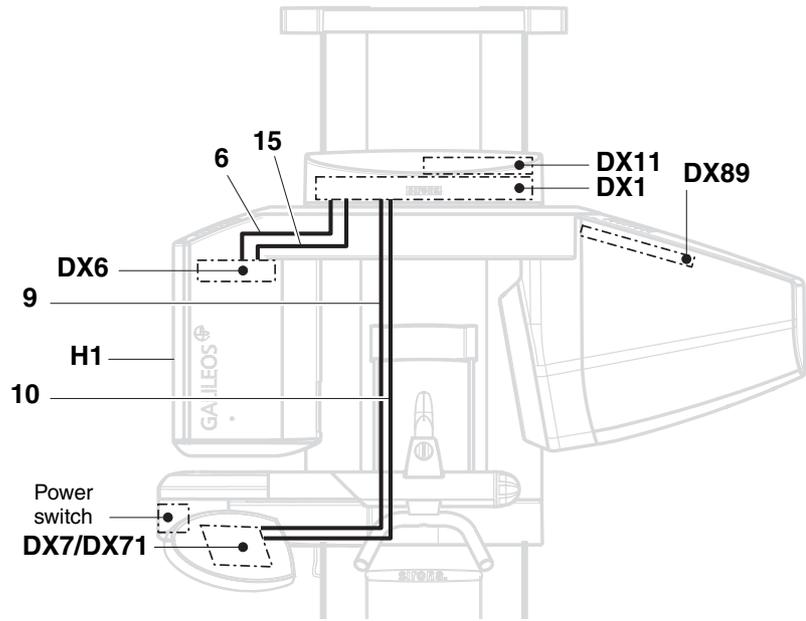
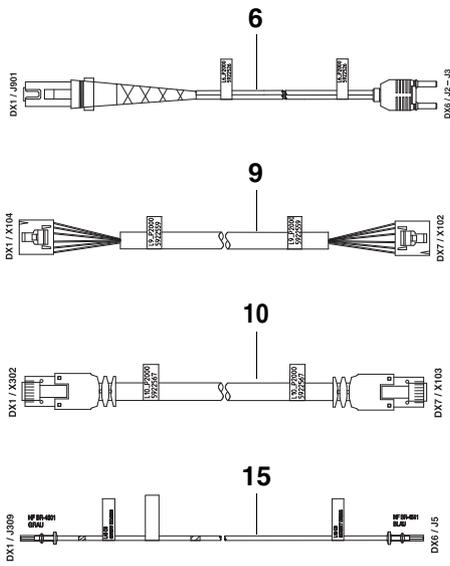
### 1.8.3 Remote control



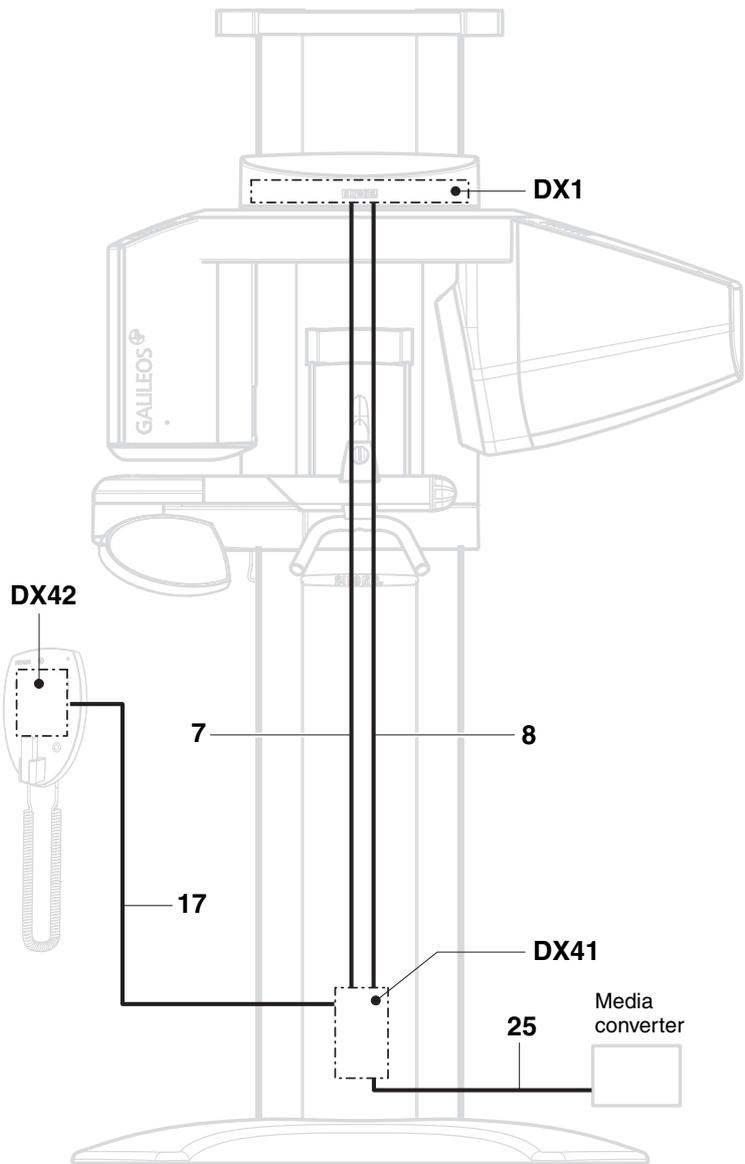
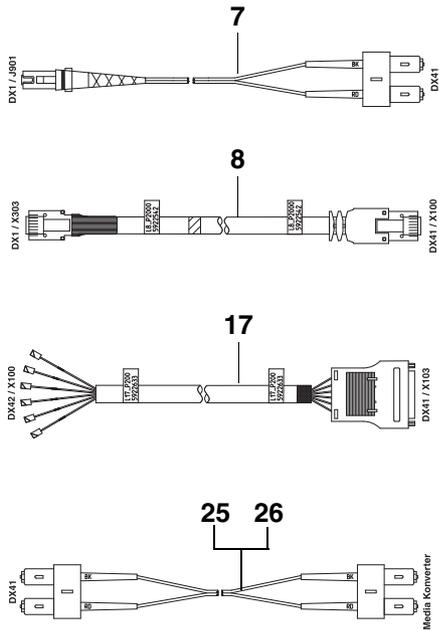
Component	Designation	Function
Boards	DX42	Display board for remote control

1.9 Cabling overview

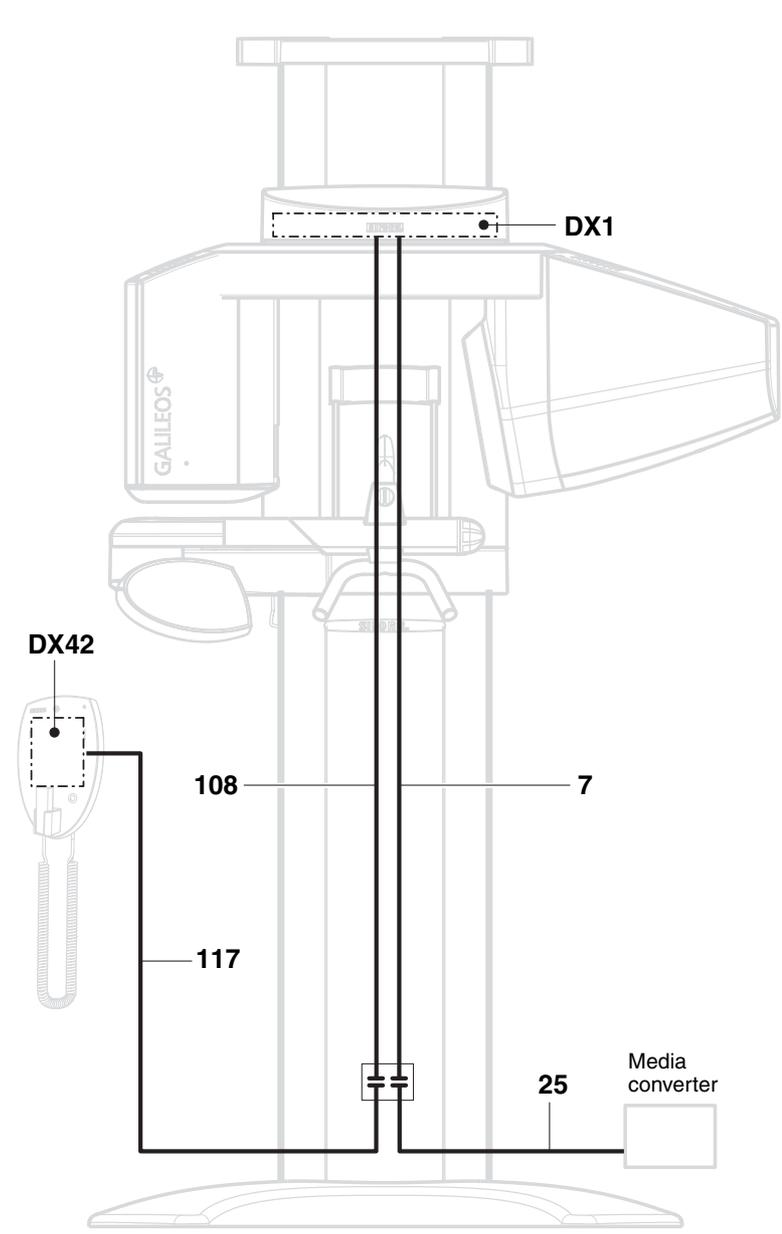
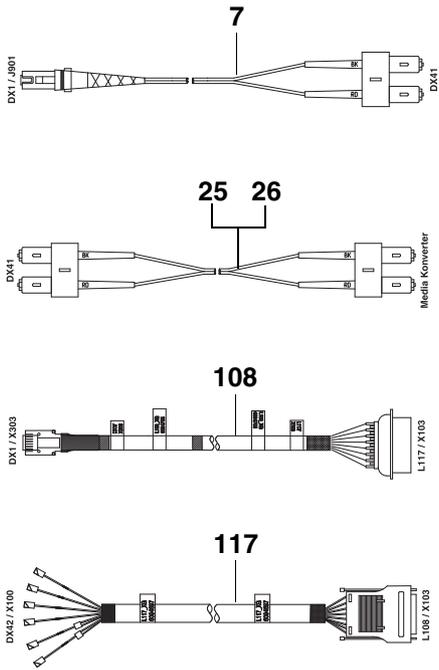




GALILEOS cabling up to serial number 3199:



GALILEOS cabling from serial number 3201:

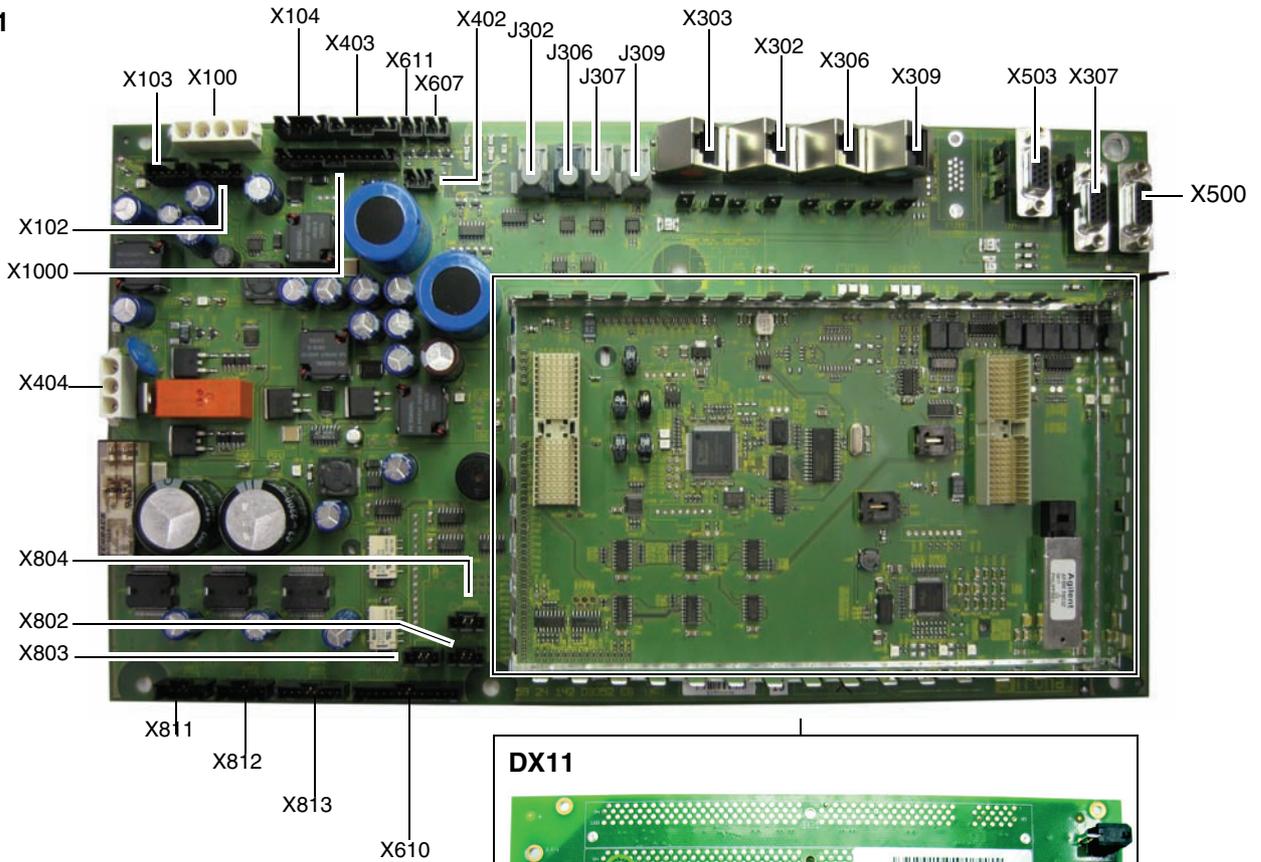


## 1.10 Illustrations of boards

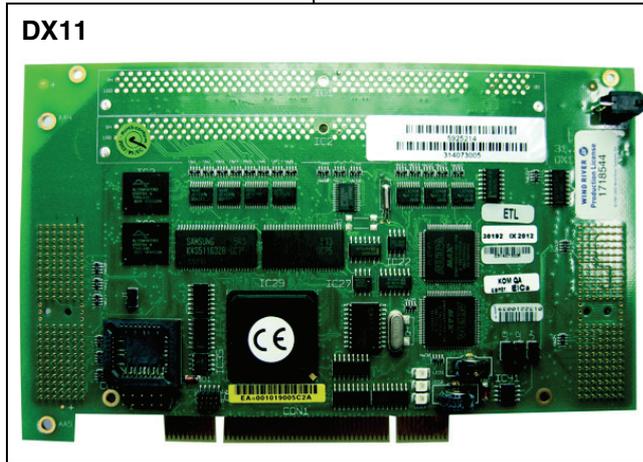
### 1.10.1 Boards in the slide

#### Boards DX1/DX11

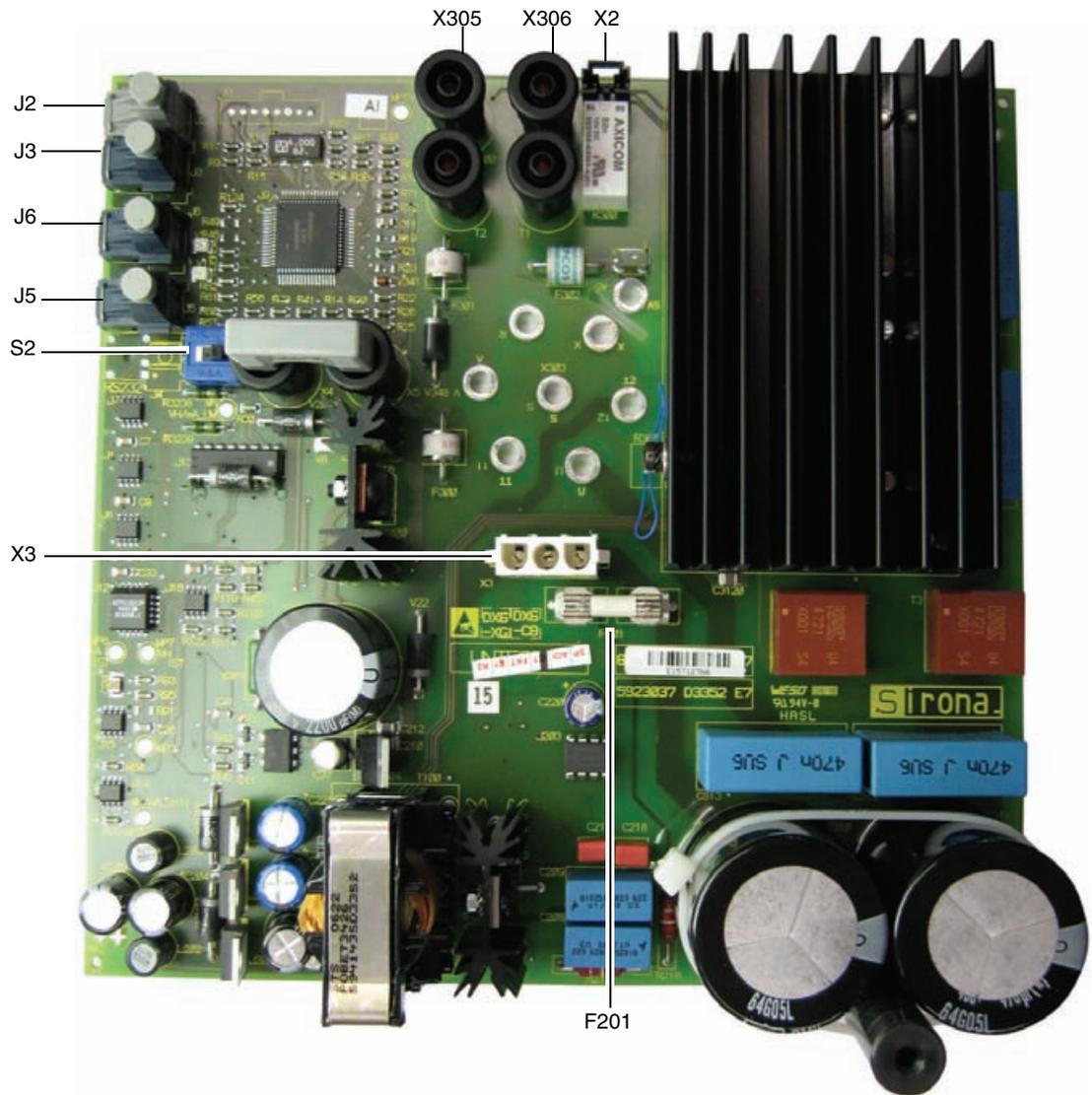
##### DX1



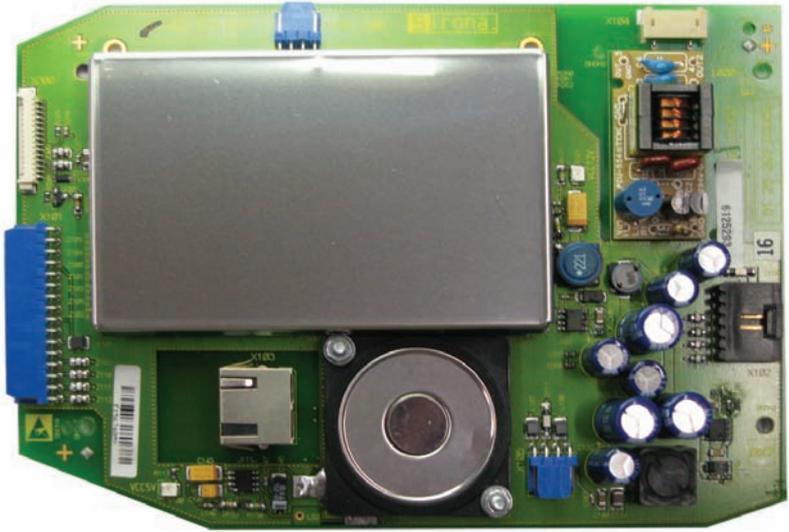
##### DX11



**Board DX6** (not available as spare and repair part, X-ray tube assembly can only be ordered in full)



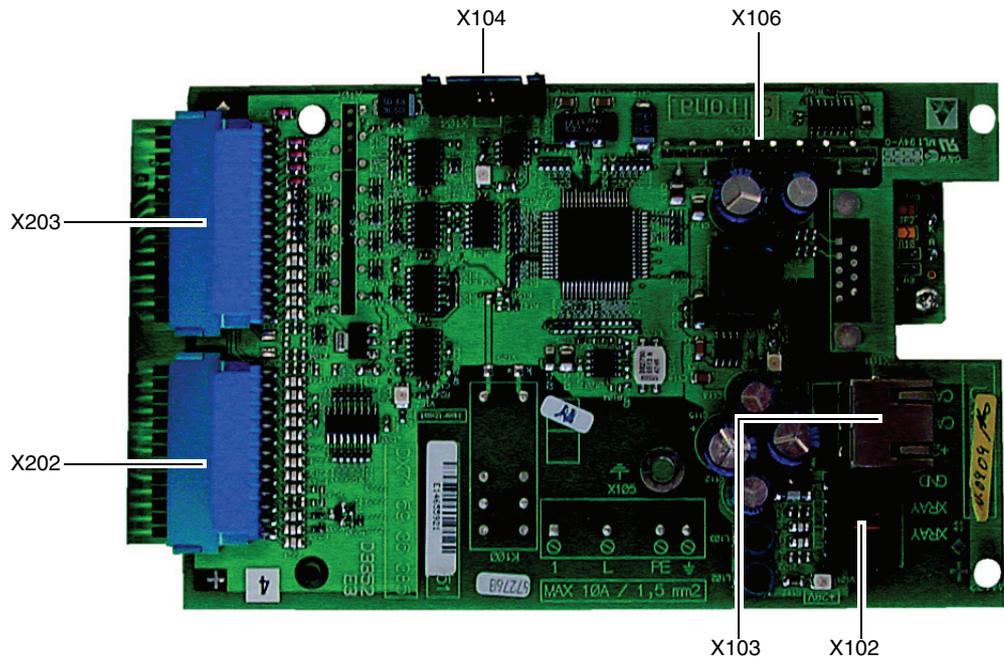
**Board DX7** (GALILEOS only, not available as repair part)



**i NOTE**

Board DX7 is shown here only for enhanced clarity.  
**The Easypad may be replaced only as a complete unit!**

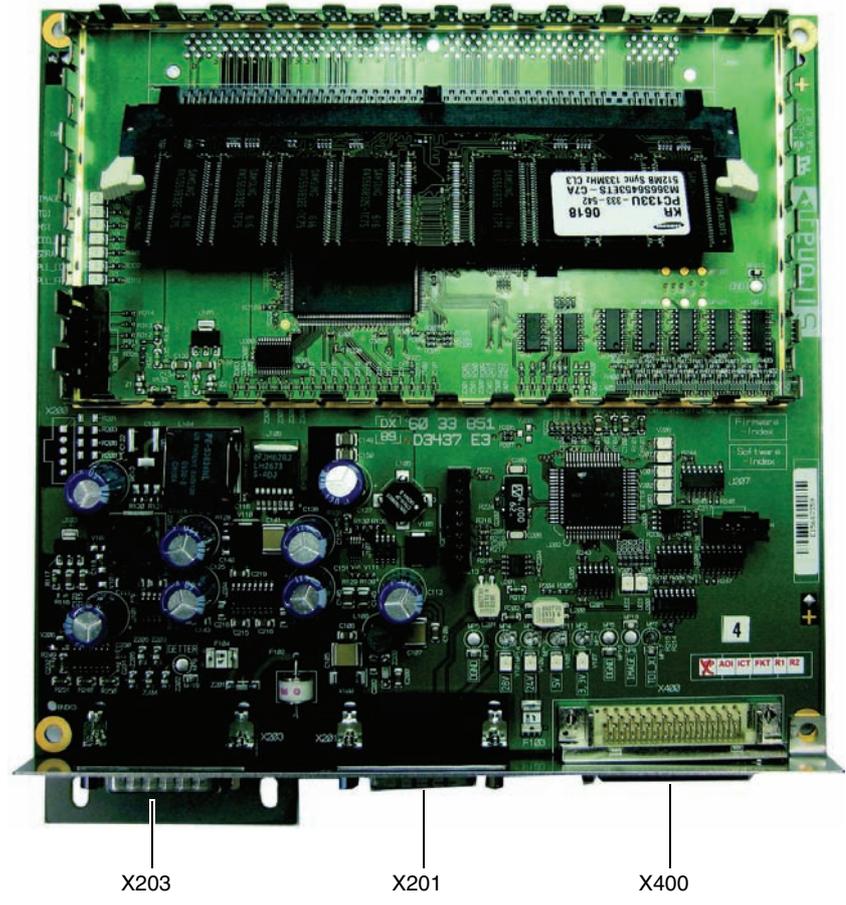
**Board DX71**(GALILEOS GAX5 only, not available as spare part)



**i NOTE**

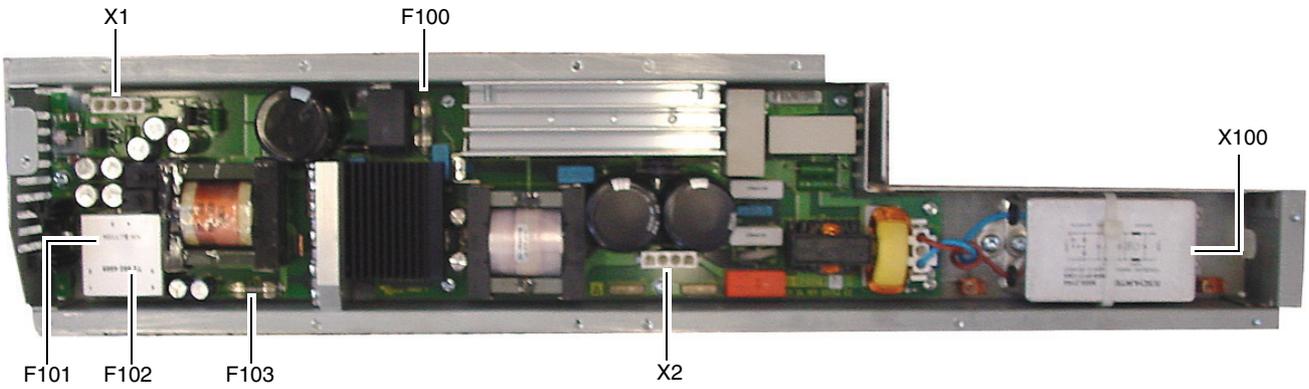
Board DX71 is shown here only for enhanced clarity. **The Multipad may be replaced only as a complete unit!**

Board DX89

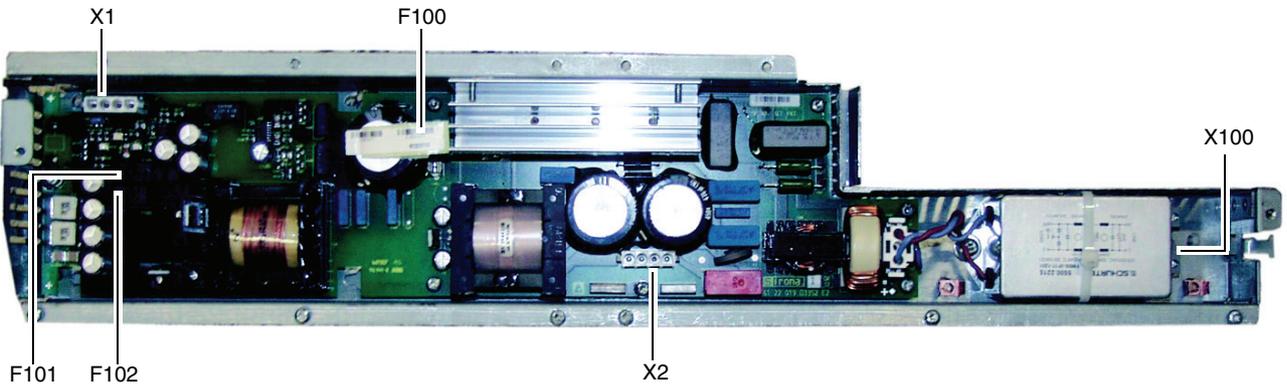


### 1.10.2 Boards in the stand

**Board DX32 up to unit serial number 3199**

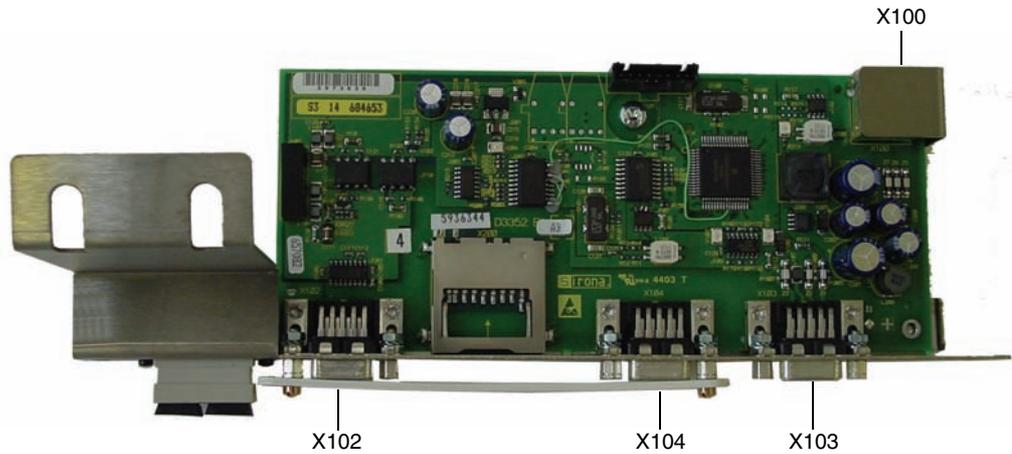


**Board DX32 from unit serial number 3201**



**Board DX41**

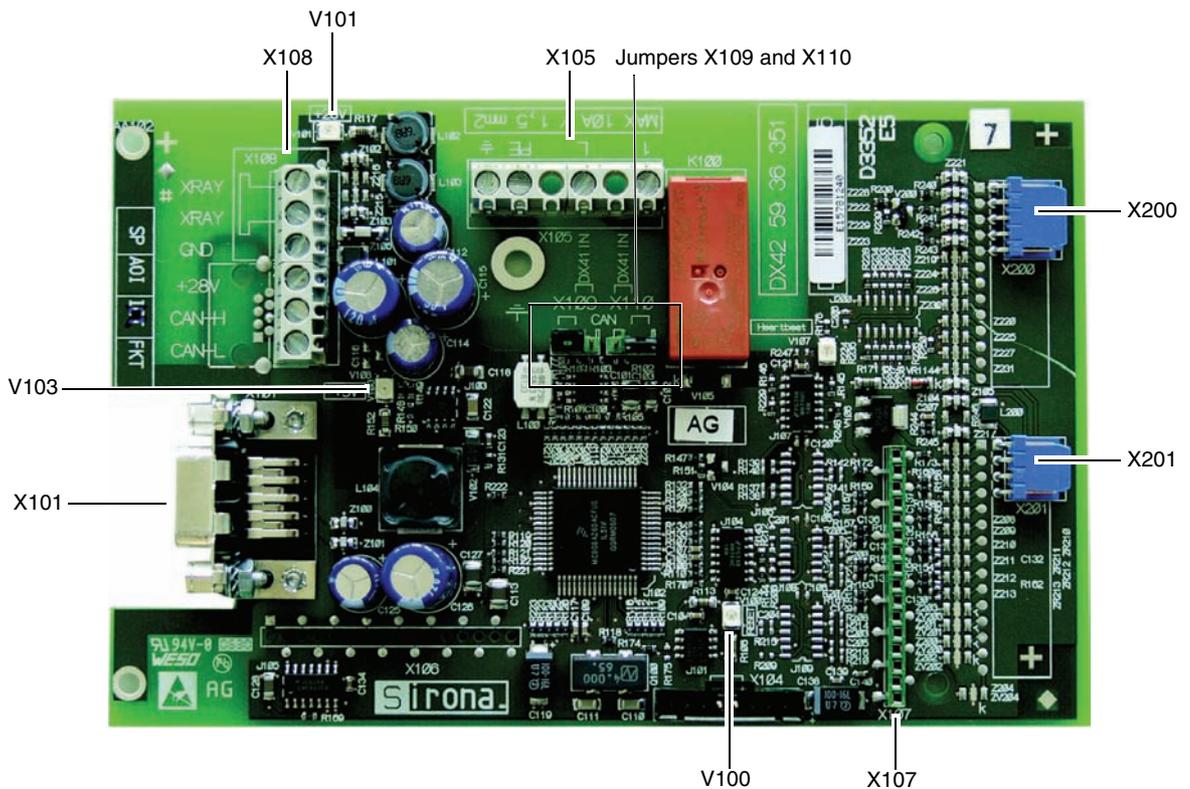
omitted as of unit serial number 3201



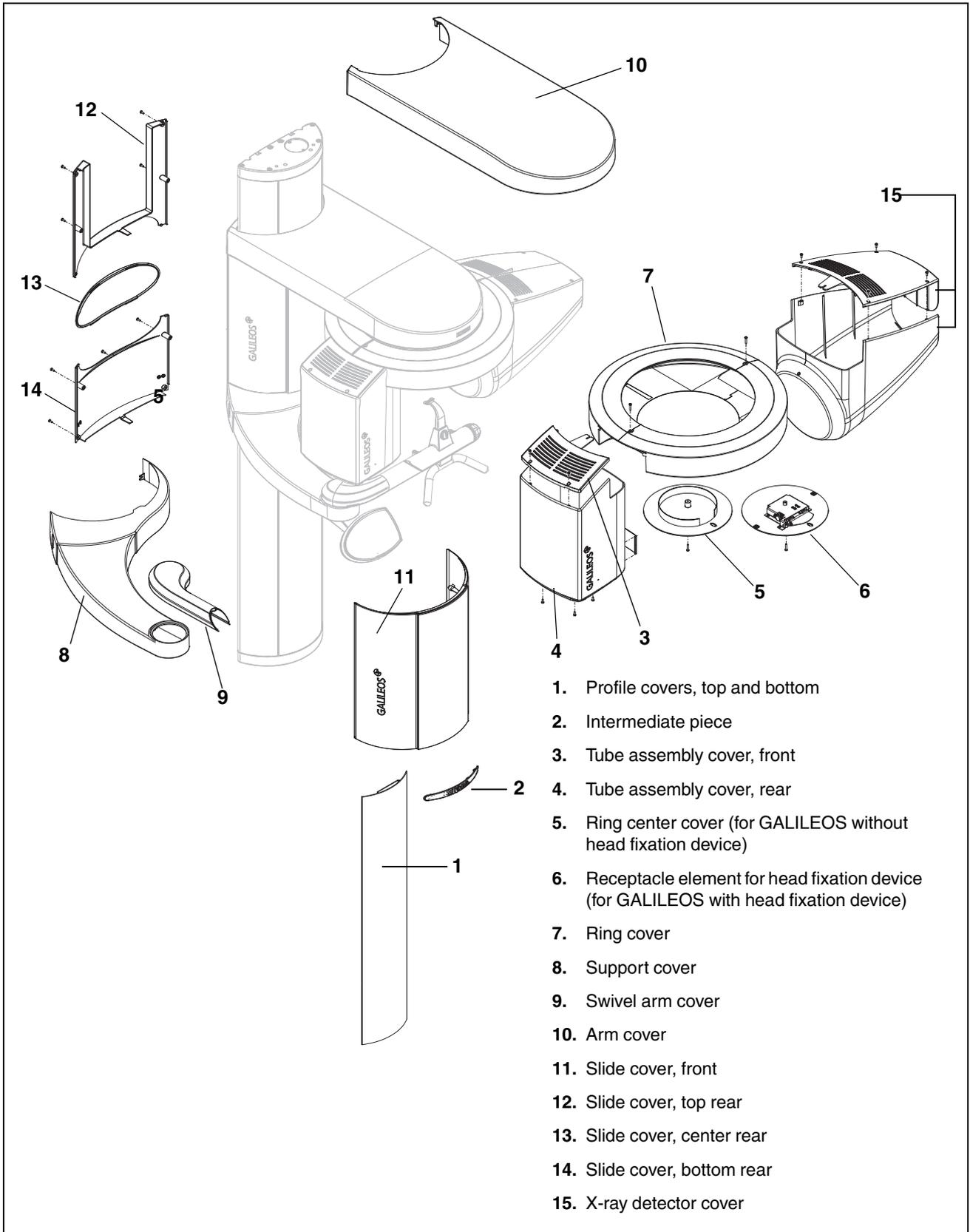
**1.10.3 Board in the remote control**

**Board DX42**

(not available as repair part)



1.11 Removing the covers



1. Profile covers, top and bottom
2. Intermediate piece
3. Tube assembly cover, front
4. Tube assembly cover, rear
5. Ring center cover (for GALILEOS without head fixation device)
6. Receptacle element for head fixation device (for GALILEOS with head fixation device)
7. Ring cover
8. Support cover
9. Swivel arm cover
10. Arm cover
11. Slide cover, front
12. Slide cover, top rear
13. Slide cover, center rear
14. Slide cover, bottom rear
15. X-ray detector cover



# 2 Messages

GALILEOS

## Contents

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2.4	Error messages .....	2 – 5
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	2.4.3 <b>Ex yy zz</b> .....	2 – 7
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# Messages

The different message texts are displayed...

- For **GALILEOS**: on the EasyPad touchscreen
- For **GALILEOS GAX5**: on the Multipad display on the display of the remote control.

There are 3 groups of message texts:

- **Help messages (Hx xx)**
  - Help messages are caused by operator errors
  - The user must take action
- **Error messages (Ex yy zz)**
  - Error messages indicate system faults
  - The user must take action to eliminate the fault(s)
- **System messages (Sxxx)**
  - System messages inform the user about the current operating status of the system
  - The user is not required to take action

---

**i** **NOTE**

*If error messages are displayed on the control panel that are not listed in Section 2.5 (such as message 1311), these messages come from the Windows system. In such cases, check again whether the firmware used is compatible with the SIDEXIS version (see p. 1-10) and, if necessary, perform a software update (see p. 1-12).*

---

## 2.1 Help messages

The help messages are displayed as help codes (Hxxx) on the Easypad touchscreen (GALILEOS) or on the Multipad display (GALILEOS GAX5) as well as on the display of the remote control (if present). The codes tell you how to operate the system if radiation release is not possible due to a previous operator error.

The following list provides you with an overview of all help codes, their meaning and the action required to eliminate the corresponding problems:

Help code	Description	Actions required
H301	The rotating element on the unit is not set to its starting position.	<ul style="list-style-type: none"> <li>● Press the R key: The unit moves to the starting position.</li> </ul>
H320	The exposure parameters have not been acknowledged yet.	<ul style="list-style-type: none"> <li>● Press the R key: The exposure parameters are confirmed.</li> </ul>
H321	The X-ray room door contact is not detected.	<ul style="list-style-type: none"> <li>● Close the door or check door contact.</li> </ul>
H323	The swivel arm is not in its end position.	<ul style="list-style-type: none"> <li>● Move the swivel arm to its end position (completely open or completely closed).</li> </ul>
H324	The X-ray detector preparation is in progress.	<ul style="list-style-type: none"> <li>● Wait until the X-ray detector is ready. This can take up to 10 minutes.</li> </ul>
H403	SIDEXIS is not ready for exposure.	<ul style="list-style-type: none"> <li>● Make SIDEXIS ready for exposure.</li> </ul>
H420	<p>The image could not be transferred to SIDEXIS.</p> <hr/> <p> <b>CAUTION</b> Do not switch the system off until the help message has disappeared.</p> <hr/>	<ul style="list-style-type: none"> <li>● Retrieve the exposure with NGAdmin plugin (see SIDEXIS Operator's Manual).</li> </ul>

### NOTE

The above measures clear those help messages that result from operator errors. If it is not possible to clear the help message by taking the above measures, another type of error is the cause. To identify the error, proceed as described in section 2.5.

## 2.2 System messages

**i** **NOTE**

System messages are displayed only on the Multipad (GALILEOS GAX5). The system messages are displayed in plain text on the Easypad (GALILEOS).displayed.

System code	Description	Actions required
<b>S100</b>	System is being started.	<ul style="list-style-type: none"> <li>● Wait, no action required. Message will be deleted automatically.</li> </ul>
<b>S110</b>	Exposure is not possible.	<ul style="list-style-type: none"> <li>● Quit readiness for exposure, switch unit OFF, wait for 1 minute, switch unit back ON and observe error messages displayed after switch-on.</li> <li>● Repeat procedure if necessary</li> </ul>
<b>S150</b>	Sensor preparation in progress.	<ul style="list-style-type: none"> <li>● Wait, no action required. The message will be deleted automatically (this may take up to 10 minutes)</li> </ul>

2.2

## 2.3 Status displays

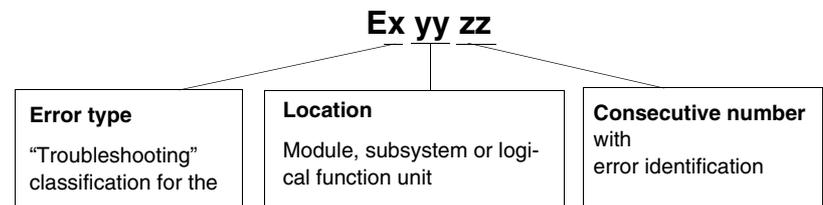
Status displays		Description
Easypad (GALILEOS)	Multipad (GALILEOS GAX5)	
<b>Ready for exposure</b>	No special display;	System is ready for exposure.
<b>X R A Y</b>	kV level and mAs are displayed	
<b>X R A Y Active!</b>	LED lights up on Multipad	Exposure in progress.
<b>Please wait</b>	▬▬▬▬▬	Unit waiting for operational readiness.
<b>Ready for exposure in XX seconds</b>	<b>XXs</b>	The cooling time countdown is running.

## 2.4 Error messages

The error messages are displayed as error codes (**Ex yy zz**) on the Easypad touchscreen (GALILEOS) or on the Multipad display (GALILEOS GAX5) as well as on the display of the remote control (if present). The codes provide you with error type, error location and troubleshooting information.

**Error code: Ex yy zz**

The error messages are encoded according to the following pattern:



The error messages are sorted by modules in the table on page 2-6.

## 2.4.1 Ex yy zz

Identifier x is supposed to help you quickly reach a decision on how to proceed with this error.

x	Description	Error group	Actions required
1	System warning; system message	This error group includes all errors that indicate still acceptable tolerance variations, or messages about states which do not directly affect system operation.	<ul style="list-style-type: none"> <li>Acknowledge the error message to continue system operation. If the error occurs repeatedly, switch the system OFF and back ON. If the error occurs again: Identify the error by proceeding as described in section 2.5.</li> </ul>
2	Errors caused by system overload	This error group includes states that indicate e.g. temporary overtemperatures or the like. The cause of the error disappears automatically after a certain waiting time.	<ul style="list-style-type: none"> <li>Acknowledge the error message.</li> <li>Repeat the procedure step after a certain waiting time. <ul style="list-style-type: none"> <li>If the error message reappears, prolong the waiting time.</li> <li>If the error state persists: Identify the error by proceeding as described in section 2.5.</li> </ul> </li> </ul>
3	The system detects that a key was pressed during power-on	This error group includes all errors that indicate invalid signal states of keys and safety signals during power-on.	<ul style="list-style-type: none"> <li>Switch unit OFF and ON again. If the error occurs again, identify the error by proceeding as described in section 2.5.</li> </ul>
4	Malfunction or mechanical obstruction of unit movements	This error group includes all errors that indicate problems with the motor-controlled movements on the outside of the unit.	<ul style="list-style-type: none"> <li>Acknowledge the error message and make sure that the movements of the unit are not obstructed.</li> <li>Repeat the last procedure step or exposure. If the error reoccurs without any identifiable cause: Identify the error by proceeding as described in section 2.5.</li> </ul>
5	Malfunction during the exposure or during exposure preparation	This error group includes all errors resulting from a certain system action triggered by the user which could not be performed because a required (internal) partial function (software or hardware) is not ready or fails.	<ul style="list-style-type: none"> <li>Acknowledge the error message.</li> <li>Repeat the last procedure step or exposure. If the error occurs again: Identify the error by proceeding as described in section 2.5.</li> </ul>
6	Error during system self-test	This error group includes all errors which may occur spontaneously and without any related operator action. They may be caused by system self-tests.	<ul style="list-style-type: none"> <li>Switch unit OFF and ON again. If the error occurs again, identify the error by proceeding as described in section 2.5.</li> </ul> <p><b>Note:</b> Operation of the unit may be continued.</p>
7	Unrecoverable sys- tem error	This error group includes all errors which may occur spontaneously and without any related operator action. They may be caused by system self-tests. In this case it is absolutely sure that continued system operation is not possible.	<ul style="list-style-type: none"> <li>Identify the error by proceeding as described in section 2.5.</li> </ul>

### 2.4.2 Ex yy zz

Identifier **yy** defines the location or logical function unit where the error has occurred.

yy	Location/Function unit	Board
06	X-ray tube assembly	DX6
07	Easypad user interface (GALILEOS)	DX7
71	Multipad user interface (GALILEOS GAX5)	DX71
10	System hardware	DX11/DX1
11	System software	DX11/DX1
12	CAN bus	DX11/DX1
13	Stand peripherals	DX11/DX1
14	Digital extension	DX11/DX1
15	Configuration/update (wrong software, wrong module constellation, etc...)	DX11/DX1
41	Media interface card	DX41
42	Remote control	DX42
89	X-ray detector	DX89

The location may be a DX module number standing for an entire HW function unit, or a logical SW function unit on board DX11 (central control).

### 2.4.3 Ex yy zz

Identifier **zz** constitutes a consecutive number with the error identification.

### 2.4.4 General handling of error messages

Error messages always must be acknowledged with the **R key**.

If failure-free operation is possible after the error is acknowledged, then no further action is necessary.

If error messages reoccur or occur frequently, identify the error as described in section 2.5 and take appropriate action to eliminate the corresponding error or fault.

In some cases, it may make sense to obtain more information on the history and frequency of errors via the error logging memory (S007) and **SIXABCON ‡ PROPERTIES ‡ EXTENDED DETAILS** (see section 1.7, on page 1-17) (see also section 3.1).

## 2.5 List of error messages

### **i** NOTE

In the following table, the error codes are sorted by the location or function unit where the error has occurred. For enhanced clarity, the corresponding ID in the error code is printed in bold type.

#### Location 06: X-ray tube assembly /

Error code	Description	Actions required	see page
E6 <b>06</b> 01	General error during module initialization	<ul style="list-style-type: none"> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> <li>● If the error occurs frequently, replace the X-ray tube assembly</li> </ul>	<b>1-12</b>  <b>6-26</b>
E6 <b>06</b> 02	Invalid system data or uninitialized module storage data	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<b>5-28</b>  <b>1-12</b>
E6 <b>06</b> 03	Invalid commanding of control data, CAN bus error  <b>Note:</b> This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<b>3-6</b>  <b>1-12</b>
E6 <b>06</b> 04	Data transfer error or dialog error to module (master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<b>3-6</b>  <b>1-12</b>
E6 <b>06</b> 05	Data transfer error or dialog error to bootloader of module  <b>Note:</b> Occurs only in connection with software update	<ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Checking the CAN bus</li> <li>● If the error occurs repeatedly or the module is no longer addressable, replace the tube assembly</li> </ul>	<b>1-12</b>  <b>3-6</b>  <b>6-26</b>
E6 <b>06</b> 06	Module failed in TTP* (detected on master side)  <b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● If the error occurs repeatedly or the module is no longer addressable, replace the tube assembly</li> </ul>	<b>3-6</b>  <b>1-12</b>  <b>6-26</b>

Error code	Description	Actions required	see page
E6 06 07	<p>TTP* timeout error (detected on slave side)</p> <p><b>Note:</b> The module was temporarily not addressed by the master:</p> <ul style="list-style-type: none"> <li>- Undervoltage on the master side</li> <li>- Procedure error in the software</li> <li>- Master (DX11) receives no return commanding from the module</li> </ul> <p><b>Note:</b> This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams). <ul style="list-style-type: none"> <li>– If 3.3 V are present, replace board DX11</li> <li>– If 3.3 V are not present, replace board DX1</li> </ul> </li> <li>– Check cable L6, replace if necessary</li> <li>– Check X-ray tube assembly replace if necessary</li> </ul>	<p>3-6</p> <p>6-42</p> <p>6-42</p> <p>3-19</p> <p>6-26</p>
E6 06 08	<p>General fault detected locally on module (slave side). CAN controller being reinitialized.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p>3-6</p> <p>5-35</p> <p>1-12</p> <p>1-12</p> <p>6-26</p>
E7 06 10	<p>Module is stuck in bootloader stage</p>	<ul style="list-style-type: none"> <li>● Check board DX6 (note LED states)</li> </ul> <p>If the board remains in the bootloader stage...</p> <ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p>3-13</p> <p>1-12</p> <p>6-26</p>
E7 06 12	<p>Unit is not ready for operation</p> <p><b>Note:</b> This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul> <p>If this error occurs in combination with other errors</p> <ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON. Repeat procedure and observe causal error messages.</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p>3-6</p> <p>6-26</p>
E6 06 13	<p>Error when writing to EEPROM</p> <p><b>Note:</b> Stored data may be lost</p>	<ul style="list-style-type: none"> <li>● Acknowledge error and repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<p>6-26</p>
E2 06 20	<p>Overtemperature of single tank/power pack</p>	<ul style="list-style-type: none"> <li>● Wait until the X-ray tube assembly has cooled down.</li> <li>● Check fan function using service routine S005.4; replace fan if necessary</li> <li>● Check temperature sensor in single tank using service routine S005.5, replace tube assembly if necessary</li> </ul>	<p>5-25</p> <p>6-30</p> <p>5-27</p> <p>6-26</p>

Error code	Description	Actions required	see page
E6 06 21	Hardware signal of release button not detected	<ul style="list-style-type: none"> <li>● Check cable L5 (fiber optic cable), replace if necessary</li> <li>● Replace board DX1</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>3-19</b></p> <p><b>6-42</b></p> <p><b>6-26</b></p>
E6 06 22	Broken temperature sensor	<ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<b>6-26</b>
E3 06 23	Hardware signal of release button applied during power-on	<ul style="list-style-type: none"> <li>● Check cable L5: <ul style="list-style-type: none"> <li>– Switch unit OFF</li> <li>– Pull cable L5 off of tube assembly</li> <li>– Switch the unit ON</li> <li>– Perform optical check of L5: <ul style="list-style-type: none"> <li>- If light is visible: Replace board DX1</li> <li>- If no light is visible, replace the tube assembly</li> </ul> </li> </ul> </li> </ul>	<p><b>6-42</b></p> <p><b>6-26</b></p>
E5 06 30	Total radiation time exceeded	<p>If a CAN bus error had been reported before...</p> <ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E5 06 31	Partial radiation time exceeded	<p>If a CAN bus error had been reported before...</p> <ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E5 06 32	Minimum preheating time not observed	<p>If a CAN bus error had been reported before...</p> <ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E1 06 40	Tolerance exceeded: Preheating (VH) - nom.	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b></p> <p><b>6-26</b></p>
E1 06 41	Tolerance exceeded: kV - nom.	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b></p> <p><b>6-30</b></p>
E1 06 42	Tolerance exceeded: mA - nom.	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b></p> <p><b>6-26</b></p>
E1 06 43	Tolerance exceeded: Preheating (VH) - act.	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b></p> <p><b>6-26</b></p>
E1 06 44	Tolerance exceeded: kV - act.	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b></p> <p><b>6-26</b></p>
E1 06 45	Tolerance exceeded: mA - act.	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b></p> <p><b>6-26</b></p>

Error code	Description	Actions required	see page
E6 06 50	Undervoltage in intermediate circuit (400 V)	<ul style="list-style-type: none"> <li>● Check fuse F201 on board DX6 (see wiring diagrams), replace if necessary</li> <li>● Check cable L3 (tube assembly), replace if necessary</li> <li>● Check electronic fuse on board DX32:               <ul style="list-style-type: none"> <li>– Switch unit OFF</li> <li>– Wait for at least 7 minutes (due to electronic fuse)</li> <li>– Switch unit back ON</li> <li>– Check functioning</li> </ul> </li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check board DX32, replace if necessary</li> </ul>	<p><b>3-19</b></p> <p><b>3-13</b> <b>6-42</b></p>
E6 06 51	VHmax	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b> <b>6-26</b></p>
E6 06 52	MAMax	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b> <b>6-26</b></p>
E6 06 53	KVmax	<ul style="list-style-type: none"> <li>● Perform service routines S005.8</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>5-28</b> <b>6-26</b></p>
E7 06 54	Basic heating pulses not applied	<ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<b>6-26</b>
E6 06 55	Anode voltage too low	<ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<b>6-26</b>
E6 06 56	Error during auto-compensation	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Let the tube assembly cool down for approx. 30 min and repeat this procedure.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>1-12</b></p> <p><b>6-26</b></p>
E6 06 60	TDI** signal from board DX11 to board DX6 is disrupted	<ul style="list-style-type: none"> <li>● Replace cable L15</li> <li>● Replace DX1</li> <li>● Replace the X-ray tube assembly</li> </ul>	<p><b>6-42</b> <b>6-26</b></p>
E6 06 65	Tube current or tube voltage is too high in standby mode	<ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<b>6-26</b>
E6 06 66	Impermissible tube type	<ul style="list-style-type: none"> <li>● Check the tube type of the X-ray tube assembly via               <ul style="list-style-type: none"> <li>- the extended detail query or by using</li> <li>- service routine S005.1</li> </ul> </li> </ul> <p>replace tube assembly if necessary</p>	<p><b>5-21</b></p> <p><b>6-26</b></p>

Error code	Description	Actions required	see page
E6 06 67	Light guide input TDI** is active when switching the unit on	<ul style="list-style-type: none"> <li>● Check TDI** signal:               <ul style="list-style-type: none"> <li>– Switch unit OFF</li> <li>– Disconnect cable L15 at board DX11</li> <li>– Switch the unit ON</li> <li>– Perform visual check at socket J5:                   <ul style="list-style-type: none"> <li>- If light is visible: Replace board DX11</li> <li>- If no light is visible, replace the tube assembly</li> </ul> </li> </ul> </li> </ul>	<p><b>6-42</b></p> <p><b>6-26</b></p>
E6 06 68	Tube assembly output after exposure does not match the expected value	<ul style="list-style-type: none"> <li>● Replace the X-ray tube assembly</li> </ul>	<b>6-26</b>

**Board DX6**\*) *TTP = Time Trigger Protocol*\*\*) *TDI = Signal to start synchronized readout sequence and to prepare the next exposure*



Error code	Description	Actions required	see page
E6 07 07	<p>TTP* timeout error (detected on slave side)</p> <p><b>Note:</b> The module was temporarily not addressed by the master:</p> <ul style="list-style-type: none"> <li>- Undervoltage on the master side</li> <li>- Procedure error in the software</li> <li>- Master (DX11) receives no return commanding from the module</li> </ul> <p><b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams). <ul style="list-style-type: none"> <li>– If 3.3 V are present, replace board DX11</li> <li>– If 3.3 V are not present, replace board DX1</li> </ul> </li> </ul>	<p><b>3-6</b></p> <p><b>6-42</b></p> <p><b>6-42</b></p>
E6 07 08	<p>General fault detected locally on module (slave side). CAN controller being reinitialized.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</li> <li>● Replace Easypad</li> <li>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	<p><b>3-6</b></p> <p><b>5-35</b></p> <p><b>1-12</b></p> <p><b>6-19</b></p> <p><b>1-12</b></p>
E7 07 10	<p>Module is stuck in bootloader stage</p> <p><b>Note:</b> Therefore, the error can be displayed only on the remote control (DX42).</p>	<ul style="list-style-type: none"> <li>● Check the Easypad</li> </ul> <p>If the board remains in the bootloader stage...</p> <ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Replace Easypad</li> </ul>	<p><b>1-12</b></p> <p><b>6-19</b></p>
E7 07 12	<p>Unit is not ready for operation</p> <p><b>Note:</b> Therefore, the error can be displayed only on the remote control (DX42).</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul> <p>This error is a sequential fault.</p> <ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Repeat procedure and observe causal error messages.</li> </ul>	<p><b>3-6</b></p>
E6 07 20	<p>Contact to DX11 interrupted during operation.</p>	<ul style="list-style-type: none"> <li>● Note error message on remote control (DX42) and check log memory (via extended details)</li> <li>● Checking the CAN bus</li> <li>● Check cable L9, replace if necessary</li> </ul>	<p><b>3-6</b></p> <p><b>3-19</b></p>

Error code	Description	Actions required	see page
E7 07 21	No CAN bus connection. DX11 does not start.  <b>Note:</b> Occurs after power-on in the start screen.	<ul style="list-style-type: none"> <li>Start the detail query via Sixabcon</li> </ul> If DX11 responds...	6-42
		<ul style="list-style-type: none"> <li>Check signal path to DX7, repair or replace cable/connector if necessary</li> <li>Replace DX1</li> </ul> If DX11 does not respond...	
E3 07 30	Height adjustment keys actuated during power-on	<ul style="list-style-type: none"> <li>Unit restart: Switch the unit OFF. Wait for 1 minute. Switch unit ON, making sure that the Easypad is not actuated during boot-up.</li> </ul> If the error occurs again...	6-19
E3 07 33	Light localizer key actuated during power-on		
E3 07 34	Test key actuated during power-on		
E3 07 35	Return key actuated during power-on		
E3 07 36	Touchscreen actuated during power-on		
E6 07 40	No valid language set found	<ul style="list-style-type: none"> <li>Check selected language set using service routine S017.5, correct if necessary</li> </ul>	1-12
		<p><b>i NOTE</b></p> <p><i>Check whether selected language set is already installed, perform software update if necessary.</i></p> <ul style="list-style-type: none"> <li>If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</li> </ul>	1-12

\*) TTP = Time Trigger Protocol

## Location 71 (GALILEOS GAX5): Multipad/Board DX71

Error code	Description	Actions required	see page
E6 71 01	General error during module initialization	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check board DX71 or replace Multipad</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b> <b>6-19</b></p>
E6 71 02	Invalid system data or uninitialized module storage data	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Acknowledge error and repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check board DX71 or replace Multipad</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b> <b>6-19</b></p>
E6 71 03	Invalid commanding or control data <b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E6 71 04	Data transfer error or dialog error to module (master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E6 71 05	Data transfer error or dialog error to bootloader of module <b>Note:</b> Occurs only in connection with software update	<ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Checking the CAN bus</li> <li>● Check board DX71 or replace Multipad</li> </ul>	<p><b>1-12</b></p> <p><b>3-6</b> <b>6-42</b> <b>6-19</b></p>
E6 71 06	Module failed in TTP* (detected on master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Replace board DX71</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>6-42</b></p> <p><b>1-12</b></p>

Error code	Description	Actions required	see page
E6 71 07	<p>TTP* timeout error (detected on slave side)</p> <p><b>Note:</b> The module was temporarily not addressed by the master:</p> <ul style="list-style-type: none"> <li>- Undervoltage on the master side</li> <li>- Procedure error in the software</li> <li>- Master (DX11) receives no return commanding from the module</li> </ul> <p><b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul>	<b>3-6</b>
		<ul style="list-style-type: none"> <li>● Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).</li> </ul>	
		<ul style="list-style-type: none"> <li>– If 3.3 V are present, replace board DX11</li> <li>– If 3.3 V are not present, replace board DX1</li> </ul>	<b>6-42</b> <b>6-42</b>
E6 71 08	<p>General fault detected locally on module (slave side). CAN controller being reinitialized.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul>	<b>3-6</b>
		<ul style="list-style-type: none"> <li>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</li> </ul>	<b>5-35</b> <b>1-12</b>
		<ul style="list-style-type: none"> <li>● Check board DX71 or</li> </ul>	<b>3-13</b>
		<ul style="list-style-type: none"> <li>● replace Multipad</li> </ul>	<b>6-19</b>
		<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<b>1-12</b>
E7 71 10	<p>Module is stuck in bootloader stage</p>	<ul style="list-style-type: none"> <li>● Check board DX71</li> </ul> <p>If the board remains in the bootloader stage...</p>	<b>3-13</b>
		<ul style="list-style-type: none"> <li>● Repeat software update</li> </ul>	<b>1-12</b>
		<ul style="list-style-type: none"> <li>● Check board DX71 or</li> <li>● replace Multipad</li> </ul>	<b>6-42</b> <b>6-19</b>
E7 71 12	<p>Unit is not ready for operation</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul> <p>This error is a sequential fault.</p>	<b>3-6</b>
		<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Repeat procedure and observe causal error messages.</li> </ul>	
E6 71 20	<p>Contact to DX11 interrupted during operation.</p>	<ul style="list-style-type: none"> <li>● Note error message on remote control (DX42) and check log memory (via extended details)</li> </ul>	
		<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul>	<b>3-6</b>
		<ul style="list-style-type: none"> <li>● Check cable L9,</li> <li>● replace if necessary</li> </ul>	<b>3-19</b> <b>6-66</b>



## Location 10: System hardware

Error code	Description	Actions required	see page
E7 10 01	EEPROM cannot be written.	<ul style="list-style-type: none"> <li>Acknowledge error and repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>Replace board DX11</li> </ul>	6-42
E7 10 02	FPGA* of DX1 is not addressable.	<ul style="list-style-type: none"> <li>Replace board DX1</li> </ul>	6-42
E1 10 03	<p>The flash file system must be formatted.</p> <p><b>Note:</b> Occurs after replacement of board DX11.</p>	<ul style="list-style-type: none"> <li>Acknowledge error</li> </ul> <p><b>i NOTE</b> <i>The flash file system is formatted and error message E1_10_04 is displayed.</i></p>	
E1 10 04	Flash file system formatting in progress.	<ul style="list-style-type: none"> <li>Wait until the message automatically disappears (approx. 2 - 3 min.)</li> </ul>	
E1 10 05	Flash file system is not ready for operation.	<ul style="list-style-type: none"> <li>Execute service routine S009.4 and format flash file system.</li> </ul> <p><b>! CAUTION</b> <i>The contents of the error memory and the calibration data are thus lost. Otherwise the system will require recalibration.</i></p> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>Replace board DX11</li> </ul>	5-39  6-42
E7 10 06	Incompatible DX1-FPGA* version for current operating mode	<ul style="list-style-type: none"> <li>Check the hardware version of DX1 for compatibility replace board DX1 if necessary</li> </ul>	6-42  6-42
E1 10 07	<p>The unit is not ready for operation.</p> <p><b>i NOTE</b> <i>Following longer periods of disuse (&gt;200 h), a preparation time of up to ten minutes is required for the sensor after the unit is switched on. During this period, the message "Sensor being prepared" or S150 is displayed. The unit is not ready for operation during this time. If exposure readiness is reached during this time, error message E1 10 07 appears.</i></p>	<p>If this error is displayed after a longer period of disuse and the attainment of exposure readiness...</p> <ul style="list-style-type: none"> <li>acknowledge the error and wait until the "Sensor being prepared" message goes out.</li> </ul> <p>If this error is displayed without attainment of exposure readiness...</p> <ul style="list-style-type: none"> <li>check cables: <ul style="list-style-type: none"> <li>Cable L13 between board DX11 and board DX89</li> <li>Cable L29 between the camera head and board DX89 (in the X-ray detector)</li> <li>Cable L27 (in the X-ray detector) and replace any defective cables</li> </ul> </li> <li>Replace board DX89</li> <li>Replace board DX1</li> <li>Replace X-ray detector</li> <li>Replace board DX11</li> </ul>	3-19  6-66 6-42 6-42 6-31 6-42

Error code	Description	Actions required	see page
E1 10 20	Board DX11 does not have valid data via the X-ray detector.	<ul style="list-style-type: none"> <li>● Perform service routine S009.7 (copy data from DX89 to board DX11)</li> </ul>	5-44
E1 10 21	Board DX11 does not have valid data via board DX89.	<ul style="list-style-type: none"> <li>● Perform service routine S009.7 (copy data from DX89 to board DX11)</li> </ul>	
E1 10 22	X-ray detector was replaced and must be registered in the system.	<ul style="list-style-type: none"> <li>● Perform service routine S009.7 (copy data from DX89 to board DX11)</li> <li>● Perform a system calibration</li> </ul>	
E1 10 23	Board DX89 does not have valid data via the X-ray detector.	<ul style="list-style-type: none"> <li>● Perform service routine S009.7 (copy data from DX11 to board DX89)</li> </ul>	6-31
E1 10 24	The X-ray detector has been replaced. Board DX89 does not have valid data via the X-ray detector.  <b>Note:</b> This error message should not occur in the application.	<ul style="list-style-type: none"> <li>● Replace X-ray detector</li> </ul> <hr/> <p><b>i</b> <b>NOTE</b> <i>Please report this event to the Customer Service Center to help us improve the product.</i></p> <hr/>	
E1 10 25	Board DX89 was replaced and must be registered in the system.	<ul style="list-style-type: none"> <li>● Perform service routine S009.7 (copy data from DX11 to board DX89)</li> </ul>	
E1 10 26	The X-ray detector has not been initialized. Board DX89 does not have valid data via the X-ray detector.  <b>Note:</b> This error message should not occur in the application.	<ul style="list-style-type: none"> <li>● Replace X-ray detector</li> </ul> <hr/> <p><b>i</b> <b>NOTE</b> <i>Please report this event to the Customer Service Center to help us improve the product.</i></p> <hr/>	6-31

\*) FPGA = Field Programmable Gate Array



Error code	Description	Actions required	see page
E7 11 14	The remote control does not match the system.	<ul style="list-style-type: none"> <li>● Replace remote control</li> </ul>	
E7 11 15	An X-ray tube assembly which does not match the unit was installed.	<ul style="list-style-type: none"> <li>● Install a matching X-ray tube assembly.</li> </ul>	6-26
E1 11 19	No image data available	<ul style="list-style-type: none"> <li>● Check TDI** signal/cable L13 Replace cable L13 if necessary</li> <li>● Replace board DX89</li> <li>● Replace board DX1</li> </ul>	3-19 5-35 5-35
E1 11 20	The calibration data of the system are invalid or do not match the serial numbers of the modules	<ul style="list-style-type: none"> <li>● Perform a system calibration</li> </ul> <p>If the error occurs again and no modules were replaced ...</p> <ul style="list-style-type: none"> <li>● Replace board DX11</li> </ul> <p>If the error occurs again and modules were replaced ...</p> <ul style="list-style-type: none"> <li>● This error is a sequential fault: watch for additional causal error messages and take the respective action.</li> </ul>	4-3 5-35
E2 11 22	The default iris table is write-protected	<ul style="list-style-type: none"> <li>● Check the compatibility of the SIDEXIS and system software, perform a software update if necessary</li> </ul>	1-10 1-12
E1 11 23	No matching iris diaphragm setting is available for the current program parameters	<ul style="list-style-type: none"> <li>● Check the compatibility of the SIDEXIS and system software, perform a software update if necessary</li> </ul>	1-10 1-12
E1 11 88	The unit is set to the demo mode  <b>Note:</b> Occurs when the unit is switched on.	<p>If the user mode is expressly required...</p> <ul style="list-style-type: none"> <li>● Switch the demo mode OFF</li> </ul> <p> <b>WARNING</b> <i>Radiation can be released after the demo mode is switched off!</i></p>	1-6

\*\* ) TDI = Signal to start synchronized readout sequence and to prepare the next exposure

## Location 12: CAN bus

Error code	Description	Actions required	see page
E6 12 01	CAN controller init error on DX1	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul>	<b>3-6</b>
E6 12 02	CAN malfunction (cannot be assigned to module)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> </ul>	<b>3-6</b>

## Location 13: Stand, peripherals

Error code	Description	Actions required	see page
E4 13 04	Error when positioning actuator 1	<ul style="list-style-type: none"> <li>● Restart the unit.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check the swivel arm connection on board DX1.</li> </ul>	
E4 13 21	Ring motor has not reached home position	<ul style="list-style-type: none"> <li>● Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</li> <li>● Check light barrier V1_3 (X804), replace if necessary</li> <li>● Replace board DX1</li> </ul>	<b>6-15</b> <b>3-17</b> <b>6-42</b>
E4 13 22	Ring motor has not left home position	<ul style="list-style-type: none"> <li>● Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</li> <li>● Check light barrier V1_3 (X804), replace if necessary</li> <li>● Replace board DX1</li> </ul>	<b>6-15</b> <b>3-17</b> <b>6-42</b>
E5 13 23	Malfunction of ring motor during operation	<ul style="list-style-type: none"> <li>● Acknowledge error</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace board DX1</li> </ul>	<b>6-42</b>
E4 13 24	Ring motor; position counter error	<ul style="list-style-type: none"> <li>● Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</li> <li>● Check light barrier V1_3 (X804), replace if necessary</li> </ul>	<b>6-15</b> <b>3-17</b>
E6 13 27	Ring motor is not ready for operation	<p>This error is a sequential fault.</p> <ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Repeat procedure and observe causal error messages.</li> </ul>	

Error code	Description	Actions required	see page
E6 13 28	Error when activating ring motor	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.</li> <li>● Repeat procedure and observe causal error messages</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<b>1-12</b>
E4 13 29	Inaccurate start position at the start of exposure	<ul style="list-style-type: none"> <li>● Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</li> <li>● Check light barrier V1_3 (X804), replace if necessary</li> </ul>	<b>6-15</b> <b>3-17</b>
E4 13 30	No height adjustment motor pulses	<ul style="list-style-type: none"> <li>● Check cable L16 (X402), replace if necessary</li> <li>● Check board DX1, replace if necessary</li> <li>● Check filter between HA motor and L16 (acc. to circuit diagram on filter) (current and voltage). replace if necessary</li> <li>● Check height adjustment motor incl. pulse generator, replace if necessary</li> <li>● Replace board DX1</li> </ul>	<b>3-19</b> <b>3-13</b> <b>6-42</b> <b>3-16</b> <b>6-5</b> <b>6-42</b>
E5 13 31	Unit has traveled to upper limit switch	<ul style="list-style-type: none"> <li>● Check max. travel height with service routine S018.2, adjust if necessary</li> <li>● Run HA motor in the other direction with the UP/DOWN keys and reference (value approx. 1500)</li> <li>● Check light barriers V1_4 replace if necessary</li> <li>● Check HA motor for overtravel, replace DX1 if necessary</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● check the limit switch or wiring, correct or replace the limit switch if necessary</li> </ul>	<b>5-73</b> <b>3-17</b> <b>6-42</b>

Error code	Description	Actions required	see page
E5 13 32	Unit has traveled to lower limit switch	● Run HA motor in the other direction with the UP/DOWN keys and reference (value approx. 1500)	5-73
		● Check light barriers V1_4 replace if necessary	3-17
		● Check HA motor for overtravel, replace DX1 if necessary	6-42
		If the error occurs again... ● check the limit switch or wiring, correct or replace the limit switch if necessary	
E5 13 33	Height adjustment motor position counter too small for current position <b>Note:</b> Error may occur after replacement of board (DX11)	● Run HA motor in the other direction with the UP/DOWN keys and reference (value approx. 1500)	5-73
		● Check max. travel height using service routine S018.2, adjust if necessary	
		● Check light barriers V1_4, replace if necessary	3-17
E5 13 34	Height adjustment motor position counter too large for current position <b>Note:</b> Error may occur after replacement of board (DX11)	● Move the height adjustment motor in the other direction with the UP/DOWN keys on the control panel and reference (value approx. 1500)	
		● Check light barriers V1_4, replace if necessary	3-17
		<b>i NOTE</b> <i>As an aid, the current switching state can be queried via service routine S018.4.</i>	5-77
E5 13 35	Height adjustment motor; wrong direction of rotation	● Check connector assignment on filter or in front of HA motor, correct if necessary ● Replace board DX1	6-42
E5 13 36	Software signal of key is applied, but hardware signal is not	● Check cables L9 and L10, replace if necessary	3-19
		● Check limit switches SE1_1 and SE1_2, replace if necessary	
		● Replacing the control panel	6-19
E7 13 37	Overtravel of HA motor occurs or height adjustment power transistor defective	● Check HA motor for overtravel, replace board DX1 if necessary	6-42
		● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.	
		● Replace board DX1	6-42
E6 13 38	Height adjustment motor is not ready for operation	This error is a sequential fault. ● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON. ● Repeat procedure and observe causal error messages.	

Error code	Description	Actions required	see page
E6 13 39	Error when activating height adjustment motor	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Replace board DX1</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E3 13 40	Release signal applied during power-on.	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait for 1 minute. Switch unit ON, making sure that the release button is not pressed during boot-up.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check the X-ray signal path</li> </ul>	<b>3-20, 3-27</b>
E3 13 41	Release signal not applied on DX11	<ul style="list-style-type: none"> <li>● Check signal path for interruption according to wiring diagrams, replace component if necessary</li> <li>● Deactivate remote control with service routine S017.6; connect release button directly to DX41 (instead of cable L17) and check for proper functioning</li> <li>● Check release button</li> </ul> <p>If the release button is functioning...</p> <ul style="list-style-type: none"> <li>● Check cable L17, replace if necessary</li> </ul> <p>If the release button is not functioning...</p> <ul style="list-style-type: none"> <li>● Check board DX41, replace if necessary</li> </ul>	<p><b>5-62</b></p> <p><b>3-19</b></p> <p><b>3-13</b> <b>6-42</b></p>
E6 13 42	The hardware signal for radiation release is applied on board DX1 during unit operation even when no actuated X-RAY release button is reported via the CAN bus.	<ul style="list-style-type: none"> <li>● Check the X-ray signal path</li> </ul>	<b>3-20, 3-27</b>
E5 13 43	The door was opened during the exposure.	<ul style="list-style-type: none"> <li>● Check the X-ray signal path</li> </ul>	<b>3-20, 3-27</b>
E5 13 44	Swivel arm was opened during the exposure	<ul style="list-style-type: none"> <li>● Close swivel arm</li> <li>● Check light barrier V1_2, replace light barrier if necessary</li> <li>● Check cable L29, replace if necessary</li> </ul>	<p><b>3-17</b></p> <p><b>3-19</b></p>

Error code	Description	Actions required	see page
E5 13 73	Malfunction of height adjustment during operation	<ul style="list-style-type: none"> <li>● Acknowledge error</li> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul> <p>If the error occurs repeatedly...</p> <ul style="list-style-type: none"> <li>● Replace board DX1</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E5 13 83	Error while generating pulse for sensor	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul> <p>If the error occurs repeatedly...</p> <ul style="list-style-type: none"> <li>● Replace board DX1</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E6 13 87	Error when activating pulse generation	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<b>1-12</b>

\*) FPGA = Field Programmable Gate Array

#### Location 14: Digital extension, SIDEXIS

Error code	Description	Actions required	see page
E5 14 01	Cancellation caused by SIDEXIS	<ul style="list-style-type: none"> <li>● Check the compatibility of the software versions of SIDEXIS and the unit (S008.2) and perform a software update if necessary.</li> <li>● Check and, if necessary, replace network components (PC network card, Cat5 cable, hub/switch/router, media converter, L25/26)</li> <li>● Perform network diagnosis in coordination with the SIRONA Customer Service Center</li> </ul>	<b>5-35</b>
E7 14 02	Interface version not compatible with SIDEXIS.	<ul style="list-style-type: none"> <li>● Check software versions of unit (S008.2) and SIDEXIS XG and perform software update if necessary</li> </ul>	<p><b>5-35</b></p> <p><b>1-12</b></p>
E6 14 03	Inappropriate or incorrect data input from SIDEXIS	<ul style="list-style-type: none"> <li>● Send Xab.ini to the SIRONA Customer Service Center (CSC) (check the binning setting) and coordinate with CSC.</li> </ul>	

Error code	Description	Actions required	see page
E5 14 04	The network connection was interrupted  <b>Note:</b> This error often occurs when SIDEXIS is selected and the unit is not yet ready for selection.	<ul style="list-style-type: none"> <li>Repeat procedure</li> </ul> If the error occurs again... <ul style="list-style-type: none"> <li>Switch unit OFF and ON again and repeat the process.</li> <li>Check the compatibility of the software versions of SIDEXIS and the unit and perform a software update if necessary</li> <li>Check and, if necessary, replace network components (PC network card, Cat5 cable, hub/switch/router, media converter, L25/26)</li> <li>Perform network diagnosis in coordination with the SIRONA Customer Service Center</li> </ul>	
E6 14 05	Service of DHCP server is not available.	<ul style="list-style-type: none"> <li>Have network configuration of dental practice checked by the administrator in charge</li> <li>Ensure proper functioning of the DHCP server</li> </ul>	
E6 14 06	The bootline of board DX11 had to be preassigned with default values.	<ul style="list-style-type: none"> <li>Reconfiguration of network data via SIXABCon.exe required.</li> </ul>	
E6 14 10	Clock signals for sensor image transfer not received on board DX1/ DX11.	<ul style="list-style-type: none"> <li>Check cable L13 for crushing and kinking as well as plug-in connections replace cable if necessary</li> <li>Check board DX89, replace if necessary</li> <li>Check board DX1, replace if necessary</li> </ul>	<p><b>3-19</b></p> <p><b>3-13</b> <b>6-42</b></p> <p><b>3-13</b> <b>6-42</b></p>
E6 14 12	Faulty detection of sensor image transfer data signals on board DX1/ DX11; repeated.	<ul style="list-style-type: none"> <li>Check cable L13 for crushing and kinking as well as plug-in connections replace cable if necessary</li> <li>Check board DX89, replace if necessary</li> <li>Check board DX1, replace if necessary</li> </ul>	<p><b>3-19</b></p> <p><b>3-13</b> <b>6-42</b></p> <p><b>3-13</b> <b>6-42</b></p>

## Location 15: Configuration, update

Error code	Description	Actions required	see page
E7 15 01	Wrong memory modules.	If a DRAM memory module is plugged into board DX11... <ul style="list-style-type: none"> <li>● Replace memory module or DX11</li> </ul> If no DRAM memory module is plugged into board DX11... <ul style="list-style-type: none"> <li>● Replace DX11</li> </ul>	6-42 6-42
E7 15 03	Wrong software constellation of modules.	<ul style="list-style-type: none"> <li>● Check software versions of unit (info screen or service routine S008.2) and of SIDEXIS XG and</li> </ul> Perform or repeat software update or downgrade if necessary	5-35 1-12
E6 15 04	Product activation keys invalid or not available.  <b>Note:</b> Occurs after replacement of tube assembly (DX6) or DX11 and possibly after software updates.  See also chapter "Measures following replacement of boards" starting on page 6-45.	<ul style="list-style-type: none"> <li>● Enter the release key</li> </ul>	see GBA*
E6 15 05	Unit serial number invalid or not available.  <b>Note:</b> Occurs during first power-on after replacement of board DX6 or DX11.  See also chapter "Measures following replacement of boards" starting on page 6-45.	<ul style="list-style-type: none"> <li>● Execute service routine S008.3 and confirm or enter the unit serial number at the unit.</li> </ul>	5-37
E6 15 10	Update file for module is unreadable	<ul style="list-style-type: none"> <li>● Obtain current update file from the SIRONA CSC or the SIRONA home page and perform software update</li> </ul>	1-12

\* GBA = Operating instructions

## Location 41: Media interface card

Error code	Description	Actions required	see page
E6 41 01	General module initialization error	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Replace board DX41</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E6 41 02	Invalid system data or uninitialized module storage data	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Acknowledge error and repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace board DX41</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E6 41 03	Invalid commanding or control data <b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E6 41 04	Data transfer error or dialog error to module (master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E6 41 05	Data transfer error or dialog error to bootloader of module <b>Note:</b> Occurs only in connection with software update	<ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Checking the CAN bus</li> <li>● Replace board DX41</li> </ul>	<p><b>1-12</b></p> <p><b>3-6</b></p> <p><b>6-42</b></p>
E6 41 06	Module failed in TTP* (detected on master side) <b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Replace board DX41</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>6-42</b></p> <p><b>1-12</b></p>

Error code	Description	Actions required	see page
E6 41 07	<p>TTP* timeout error (detected on slave side)</p> <p><b>Note:</b> The module was temporarily not addressed by the master:</p> <ul style="list-style-type: none"> <li>- Undervoltage on the master side</li> <li>- Procedure error in the software</li> <li>- Master (DX11) receives no return commanding from the module</li> </ul> <p><b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams). <ul style="list-style-type: none"> <li>– If 3.3 V are present, replace board DX11</li> <li>– If 3.3 V are not present, replace board DX1</li> </ul> </li> </ul>	<p><b>3-6</b></p> <p><b>6-42</b></p> <p><b>6-42</b></p>
E6 41 08	General fault detected locally on module (slave side). CAN controller being reinitialized.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</li> <li>● Replace board DX41</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>5-35</b></p> <p><b>1-12</b></p> <p><b>6-42</b></p> <p><b>1-12</b></p>
E6 41 09	DX41 sends a signal although it is not included in the configuration	<ul style="list-style-type: none"> <li>● Check the configuration via service routine S017.9 and reconfigure if necessary</li> </ul>	<b>5-66</b>
E7 41 10	Module is stuck in bootloader stage	<ul style="list-style-type: none"> <li>● Check operating status of board (note LED states)</li> </ul> <p>If the board remains in the bootloader stage...</p> <ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Replace board DX41</li> </ul>	<p><b>3-13</b></p> <p><b>1-12</b></p> <p><b>6-42</b></p>
E7 41 12	Unit is not ready for operation	<p>This error is a sequential fault.</p> <ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Check unit configuration (with or without DX41) via service routine S017.9, configure correctly if necessary</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Repeat procedure and observe causal error messages.</li> </ul>	<p><b>5-66</b></p> <p><b>5-66</b></p>

Error code	Description	Actions required	see page
E3 41 20	Release signal applied during power-on	<ul style="list-style-type: none"> <li>Unit restart: Switch the unit OFF. Wait for 1 minute. Switch unit ON, making sure that the release button is not pressed during boot-up.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>Check signal path for short circuit according to wiring diagrams (see section "Error analysis of X-RAY control signal path: up to unit serial number 3199 (with board DX41)"), replace component if necessary</li> </ul>	<b>3-20</b>
E6 41 21	CAN bus connection to board DX41 interrupted.  Board DX41 cannot address board DX42 via the separate CAN bus connection.	<ul style="list-style-type: none"> <li>Check cable L17, replace if necessary</li> <li>Check board DX42, replace if necessary</li> <li>Check board DX41, replace if necessary</li> </ul>	<b>3-19</b>  <b>3-13</b> <b>6-42</b> <b>3-13</b> <b>6-42</b>
E6 41 23	Hardware fault at controller input on board DX41.  Board DX41 detects a wrong signal level of the hardware signal for radiation release.	<ul style="list-style-type: none"> <li>See section "Error analysis of X-RAY control signal path: from unit serial number 3201 (without board DX41)"</li> </ul>	<b>3-23</b>
E6 41 24	Short circuit in radiation release signal path between board DX42 and board DX41 (cable L17).  The release signal was detected on boards DX11 and DX41 but not on board DX42.	<ul style="list-style-type: none"> <li>See section "Error analysis of X-RAY control signal path: up to unit serial number 3199 (with board DX41)"</li> </ul>	<b>3-20</b>
E6 41 25	X-Ray hardware signal present, software signal not present	<ul style="list-style-type: none"> <li>Check cable L17, replace if necessary</li> <li>Check board DX42, replace if necessary</li> <li>Check board DX41, replace if necessary</li> </ul>	<b>3-19</b>  <b>3-13</b> <b>6-42</b> <b>3-13</b> <b>6-42</b>

\*) TTP = Time Trigger Protocol

## Location 42: Remote control, board DX42

Error code	Description	Actions required	see page
E6 42 01	General module initialization error <b>Note:</b> Error generated during module self-test	<ul style="list-style-type: none"> <li>● Check unit configuration (with or without DX41) via service routine S017.9, configure correctly if necessary</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Replace board DX42</li> </ul>	<p>5-66</p> <p>5-66</p> <p>1-12</p> <p>6-42</p>
E6 42 02	Invalid system data or uninitialized module storage data	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Acknowledge error and repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace board DX42</li> </ul>	<p>1-12</p> <p>6-42</p>
E6 42 03	Invalid commanding or control data <b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Check software version of DX42 (in comparison to overall software version) via service routine S008.2, perform a software update if necessary</li> <li>● Checking the CAN bus</li> <li>● Check the signal path from board DX1 to board DX42, replace module DX42 if necessary</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p>5-35</p> <p>1-12</p> <p>3-6</p> <p>6-42</p> <p>1-12</p>
E6 42 04	Data transfer error or dialog error to module (master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p>3-6</p> <p>1-12</p>
E6 42 05	Data transfer error or dialog error to bootloader of module <b>Note:</b> Occurs only in connection with software update	<ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Checking the CAN bus</li> <li>● Replace board DX42</li> </ul>	<p>1-12</p> <p>3-6</p> <p>6-42</p>
E6 42 06	Module failed in TTP* (detected on master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check the signal path from board DX1 to board DX42, replace module DX42 if necessary</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p>3-6</p> <p>6-42</p> <p>1-12</p>

Error code	Description	Actions required	see page
E6 42 07	<p>TTP* timeout error (detected on slave side)</p> <p><b>Note:</b> The module was temporarily not addressed by the master:</p> <ul style="list-style-type: none"> <li>- Undervoltage on the master side</li> <li>- Procedure error in the software</li> <li>- Master (DX11) receives no return commanding from the module</li> </ul> <p><b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check power supply (3.3 V) of board DX11, replace board DX1 or DX11 if necessary</li> <li>● Check the signal path from board DX1 to board DX42, replace module DX42 if necessary</li> </ul>	<p><b>3-6</b></p> <p><b>6-42</b></p> <p><b>6-42</b></p>
E6 42 08	<p>General fault detected locally on module (slave side). CAN controller being reinitialized.</p> <p><b>Note:</b> Occurs if software of boards is incompatible.</p>	<ul style="list-style-type: none"> <li>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</li> <li>● Checking the CAN bus</li> <li>● Replace board DX42</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>5-35</b></p> <p><b>1-12</b></p> <p><b>3-6</b></p> <p><b>6-42</b></p> <p><b>1-12</b></p>
E7 42 10	<p>Module is stuck in bootloader stage</p> <p><b>Comment:</b> display on control panel only.</p>	<ul style="list-style-type: none"> <li>● Check board DX42 (note LED states)</li> </ul> <p>If the board remains in the bootloader stage...</p> <ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Replace remote control, see installation instructions</li> </ul>	<p><b>3-13</b></p> <p><b>1-12</b></p>
E7 42 12	<p>Unit is not ready for operation</p>	<p>This error is a sequential fault.</p> <ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Check unit configuration (with or without DX41) via service routine S017.9, configure correctly if necessary</li> <li>● Repeat procedure and observe causal error messages.</li> <li>● Check the signal path from board DX1 to board DX42, replace module DX42 if necessary</li> </ul>	<p><b>5-66</b></p> <p><b>5-66</b></p> <p><b>6-42</b></p>

Error code	Description	Actions required	see page
E6 42 20	Contact to DX11 interrupted during operation  <b>Comment:</b> display on remote control only.	<ul style="list-style-type: none"> <li>● Check signal path via DX41 or cable, replace module if necessary</li> <li>● Check connection of remote control, see installation instructions</li> <li>● Checking the CAN bus</li> <li>● Check cable L17, replace if necessary</li> <li>● Check board DX42, replace if necessary</li> <li>● Check board DX41, replace if necessary</li> </ul> <hr/> <p><b>i NOTE</b> <i>If the error cannot be eliminated immediately, the unit can be temporarily reconfigured and operated with a release button located directly on the unit (see installation instructions)</i></p>	<p>3-6</p> <p>3-19</p> <p>3-13</p> <p>6-42</p> <p>3-13</p> <p>6-42</p>
E7 42 21	No CAN bus connection. DX11 does not start.  <b>Note:</b> Occurs after power-on in the start screen. Error message displays on remote control only.	<ul style="list-style-type: none"> <li>● Check configuration (with or without DX41) via service routine S017.9, configure correctly if necessary</li> <li>● Check the signal path from board DX1 to board DX42, replace module if necessary</li> <li>● Checking the CAN bus</li> <li>● Check remote control via service routine 17.6, configure if necessary</li> <li>● Start the detail query via Sixabcon</li> </ul> <p>If DX11 responds...</p> <ul style="list-style-type: none"> <li>● Check the signal path to DX42, repair or replace cable/connector if necessary</li> <li>● Replace DX1</li> </ul> <p>If DX11 does not respond...</p> <ul style="list-style-type: none"> <li>● Replace DX11 if this error persists</li> </ul>	<p>5-66</p> <p>5-66</p> <p>3-6</p> <p>5-62</p> <p>6-42</p> <p>6-42</p>
E3 42 30	R key actuated during power-on	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait for 1 minute. Switch unit ON, making sure that the remote control is not actuated during boot-up.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace remote control, see installation instructions</li> </ul>	
E3 42 31	Release button actuated during power-on.  The hardware signal for radiation release is applied on board DX42 when the unit is switched on.	<ul style="list-style-type: none"> <li>● See section "Error analysis of X-RAY control signal path: up to unit serial number 3199 (with board DX41)" or "Error analysis of X-RAY control signal path: from unit serial number 3201 (without board DX41)"</li> </ul>	3-20, 3-23

## Location 89: X-ray detector

Error code	Description	Actions required	see page
E6 89 01	General error during module initialization	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p><b>1-12</b></p> <p><b>6-31</b></p>
E6 89 02	Invalid system data or uninitialized module storage data	<ul style="list-style-type: none"> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> <li>● Acknowledge error and repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p><b>1-12</b></p> <p><b>6-31</b></p>
E6 89 03	Invalid commanding or control data <b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E6 89 04	Data transfer error or dialog error to module (master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>1-12</b></p>
E6 89 05	Data transfer error or dialog error to bootloader of module <b>Note:</b> Occurs only in connection with software update	<ul style="list-style-type: none"> <li>● Repeat software update</li> <li>● Checking the CAN bus</li> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p><b>1-12</b></p> <p><b>3-6</b></p> <p><b>6-31</b></p>
E6 89 06	Module failed in TTP* (detected on master side)	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check the X-ray detector, replace if necessary</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p><b>3-6</b></p> <p><b>6-31</b></p> <p><b>1-12</b></p>

Error code	Description	Actions required	see page
E6 89 07	<p>TTP* timeout error (detected on slave side)</p> <p><b>Note:</b> The module was temporarily not addressed by the master: - Undervoltage on the master side - Procedure error in the software - Master (DX11) receives no return commanding from the module</p> <p><b>Note:</b> This error may also occur in connection with other causal error messages. Please also observe the causal error message! It appears only after you acknowledge the first error message.</p>	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check cable L13, replace if necessary</li> <li>● Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams). <ul style="list-style-type: none"> <li>– If 3.3 V are present, replace board DX11</li> <li>– If 3.3 V are not present, replace board DX1</li> </ul> </li> </ul>	<p>3-6</p> <p>3-19</p> <p>6-42</p> <p>6-42</p>
E6 89 08	General fault detected locally on module (slave side). CAN controller being reinitialized.	<ul style="list-style-type: none"> <li>● Checking the CAN bus</li> <li>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</li> <li>● Check board DX89, replace if necessary</li> <li>● Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary.</li> </ul>	<p>3-6</p> <p>5-35</p> <p>1-12</p> <p>3-13</p> <p>6-42</p> <p>1-12</p>
E7 89 10	Module is stuck in bootloader stage	<p>Check if board DX89 is in the boot loader (observe LED status)...</p> <ul style="list-style-type: none"> <li>● Perform a software update</li> <li>● Check board DX89, replace if necessary</li> </ul>	<p>1-12</p> <p>3-13</p> <p>6-42</p>
E7 89 12	Unit is not ready for operation	<p>This error is a sequential fault.</p> <ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Repeat procedure and observe causal error messages.</li> </ul>	
E5 89 13	<p>Error when writing to EEPROM</p> <p><b>Note:</b> Stored data may be lost</p>	<ul style="list-style-type: none"> <li>● Acknowledge error and repeat procedure</li> <li>● Perform a software update</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check log memory (via extended details)</li> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p>1-12</p> <p>6-31</p>
E6 89 20	Faulty voltage supply of DX89	<ul style="list-style-type: none"> <li>● Check cable L13, replace if necessary</li> </ul>	3-19
E6 89 21	File system error	<ul style="list-style-type: none"> <li>● Check board DX89, replace if necessary</li> </ul>	<p>3-13</p> <p>6-42</p>

Error code	Description	Actions required	see page
E5 89 22	The power supply of the X-ray detector does not respond or is the wrong version.	<ul style="list-style-type: none"> <li>● Check board DX89, Replace board DX89, if applicable</li> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p><b>3-13</b></p> <p><b>6-42</b></p> <p><b>6-31</b></p>
E5 89 23	Camera head in the X-ray detector does not respond or wrong version.	<ul style="list-style-type: none"> <li>● Check board DX89, replace board DX89 if necessary</li> <li>● Replace X-ray detector</li> </ul>	<p><b>3-13</b></p> <p><b>6-42</b></p>
E7 89 25	Image memory error.	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch the unit ON and watch for additional error messages during initialization.</li> <li>● Perform a software update</li> <li>● Check the attachment of the memory modules on board DX89, replace board DX89 if necessary.</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E7 89 26	Total exposure time was exceeded	<ul style="list-style-type: none"> <li>● Check cable L13 (CAN bus), replace if necessary</li> </ul>	<b>3-19</b>
E7 89 27	At least 10 image segments are defective	<ul style="list-style-type: none"> <li>● Check cable L13 (CAN bus), replace if necessary</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check board DX89, replace if necessary</li> <li>● Replace X-ray detector</li> </ul>	<p><b>3-19</b></p> <p><b>3-13</b></p> <p><b>6-42</b></p> <p><b>6-31</b></p>
E7 89 28	FPGA* on board DX89 is defective or does not respond	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Perform a software update</li> <li>● Replace board DX89</li> </ul>	<p><b>1-12</b></p> <p><b>6-42</b></p>
E7 89 29	Memory test error during system boot-up	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> <li>● Check the attachment of the memory modules on board DX89, replace board DX89 if necessary.</li> </ul>	<b>6-42</b>
E7 89 30	Flash memory component does not respond	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace board DX89</li> </ul>	<b>6-42</b>
E6 89 32	TDI** impulses are missing during exposure	<ul style="list-style-type: none"> <li>● Check cable L13, replace if necessary</li> <li>● Check board DX89, replace if necessary</li> <li>● Check board DX1, replace if necessary</li> </ul>	<p><b>3-19</b></p> <p><b>6-42</b></p> <p><b>3-13</b></p> <p><b>6-42</b></p> <p><b>3-13</b></p> <p><b>6-42</b></p>

Error code	Description	Actions required	see page
E6 89 33	Board DX89 has detected an image signal at the wrong point of time.	<ul style="list-style-type: none"> <li>● Check cable L13, replace if necessary</li> <li>● Check board DX89, replace if necessary</li> <li>● Check board DX1, replace if necessary</li> </ul>	<p><b>3-19</b></p> <p><b>6-42</b></p> <p><b>3-13</b></p> <p><b>6-42</b></p> <p><b>3-13</b></p> <p><b>6-42</b></p>
E1 89 34	X-ray detector voltages inaccurate	<ul style="list-style-type: none"> <li>● Check cable L27, (DX89/power supply), replace cable if necessary</li> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p><b>3-19</b></p> <p><b>6-31</b></p>
E2 89 35	Error in iris diaphragm positioning	<ul style="list-style-type: none"> <li>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Check the X-ray detector, replace if necessary</li> </ul>	<p><b>6-31</b></p>
E7 89 37	Video intensification outside tolerance	<ul style="list-style-type: none"> <li>● Check board DX89, replace if necessary</li> </ul>	<p><b>3-13</b></p> <p><b>6-42</b></p>
E2 89 38	Faulty image signal during exposure	<ul style="list-style-type: none"> <li>● Check cable L13, replace cable if necessary</li> <li>● Check board DX89, replace if necessary</li> <li>● Check board DX1, replace if necessary</li> </ul>	<p><b>3-19</b></p>
E1 89 39	Error during X-ray detector preparation	<ul style="list-style-type: none"> <li>● Repeat procedure</li> </ul> <p>If the error occurs again...</p> <ul style="list-style-type: none"> <li>● Replace X-ray detector</li> </ul>	<p><b>6-31</b></p>

\*) FPGA = Field Programmable Gate Array

\*\*) TDI = Signal to start synchronized readout sequence and to prepare the next exposure

## 2.6 List of available service routines

Routine	Description	Required...	see page
S002	Radiation without rotary movement: Max. radiation time selectable  <b>Test step 5:</b> Long-term exposure with fixed radiation intervals from any position	<ul style="list-style-type: none"> <li>for system test, final testing, tube voltage measurement, reproducibility measurement, equivalent dose measurement</li> </ul>	5-17
S005	General X-ray tube assembly service  <b>Test step 1:</b> Read/select X-ray tube assembly and tube type  <b>Test step 4:</b> Fan test  <b>Test step 5:</b> Temperature sensor test  <b>Test step 8:</b> automatic adjustment of pulse preheating	<ul style="list-style-type: none"> <li>after error messages or component replacement</li> </ul>	5-20
S007	Error logging memory  <b>Test step 1:</b> Display error logging memory  <b>Test step 2:</b> Clear error logging memory	<ul style="list-style-type: none"> <li>after error messages</li> </ul>	5-30
S008	Update service  <b>Test step 2:</b> Display of module software version statuses  <b>Test step 3:</b> Input/confirmation of unit serial number	<ul style="list-style-type: none"> <li>for checking the configuration</li> <li>after error messages</li> </ul>	5-35
S009	Flash file system  <b>Test step 4:</b> Format flash file system  <b>Test step 5:</b> Test flash file system  <b>Test step 7:</b> Trigger save/restore function of DX89 data	<ul style="list-style-type: none"> <li>after error messages</li> </ul>	5-39
S011	Dosimetry  <b>Test step 9:</b> Current measurement (unpulsed)  <b>Test step 12:</b> Dosimetry (pulsed)	<ul style="list-style-type: none"> <li>after error messages</li> </ul>	5-47

Routine	Description	Required...	see page
<b>S012</b>	CAN bus service  <b>Test step 1:</b> Presence display of modules	<ul style="list-style-type: none"> <li>● on suspicion of unstable CAN bus</li> <li>● in case of accumulated error messages EX yy 12; Ex yy 06, Ex yy 07, Ex yy 03</li> <li>● not suitable as an accompanying measure e.g. "check connector of CAN bus" and "check bus terminations"</li> </ul>	<b>5-51</b>
<b>S017</b>	Configuration service  <b>Test step 2:</b> Configure hardware version  <b>Test step 3:</b> Enter the country group code  <b>Test step 4:</b> Select language index within language set  <b>Test step 5:</b> Select language set index within language set  <b>Test step 6:</b> Activate/deactivate remote control  <b>Test step 7:</b> Configuring a swivel arm switching plate  <b>Test step 9:</b> Activate/deactivate operation with board DX41  <b>Test step 13:</b> Activate/deactivate welcome screen  <b>Test step 14:</b> Activate/deactivate text in the welcome screen  <b>Test step 15:</b> Activating/deactivating the acoustic signal for the end of exposure	<ul style="list-style-type: none"> <li>● for changing the configuration</li> <li>● for installation and removal of remote control</li> <li>● When changing the DX11 board.</li> <li>● in case of component replacement or software updates</li> <li>● At the customer's request: Switching the welcome screen on and off</li> <li>● At the customer's request or compliant to legal regulations: Configure the appearance of the welcome screen.</li> <li>● At the customer's request: Switch the acoustic signal for the end of exposure ON or OFF.</li> </ul>	<b>5-53</b>
<b>S018</b>	Set travel height  <b>Test step 2:</b> Limit maximum travel height  <b>Test step 3:</b> Undo limit of maximum travel height setting  <b>Test step 4:</b> Test of the height adjustment sensor system	<ul style="list-style-type: none"> <li>● if room height is lower than 2.27 m (2.30 m with floor stand)</li> <li>● Check of the sensor system for the height adjustment (upper and lower limit switches, correction switch, pulse counter)</li> </ul>	<b>5-73</b>

Routine	Description	Required...	see page
<b>S037</b>	Network service, PC service <b>Test step 1:</b> Display network data <b>Test step 2:</b> Delete network addresses or set them to factory defaults <b>Test step 3:</b> Configure boot mode <b>Test step 4:</b> Configure network data	<ul style="list-style-type: none"><li>● for problems with exposure readiness</li><li>● for changing the network configuration</li></ul>	<b>5-79</b>

# 3 Troubleshooting

GALILEOS

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## 3

# Troubleshooting

**DANGER**

**PERILOUS SHOCK HAZARD.** It is essential to switch the unit off and to wait at least another 1 minute before taking off a cover!

**CAUTION**

- Switch the X-ray unit OFF before connecting a measuring instrument.
- Select the correct current/voltage type and adjust the measuring range to match the expected readings.
- Perform continuity tests only on units which are switched OFF.
- Observe the prescribed cool-down intervals if several exposures must be taken to check a measurement.

**CAUTION**

Please observe the usual precautionary measures for handling printed circuit boards (ESD).

Touch a ground point to discharge static electricity before touching any boards.

**CAUTION**

**CAN bus cable:** When unplugging CAN bus cables, it is essential to unplug the power supply as well.

### 3.1 Error logging memory

The error logging memory is a component of the **EXTENDED DETAILS** (see section 1.7 on page 1-17).

----- Error Logging Data DX 11 -----		
Timestamp	Categorie	Message
2006-03-06, 19:57:40	[Message]	Logbook started
2006-03-06, 20:13:02	[Message]	Recording started - Value: 9000
2006-03-06, 20:13:22	[Message]	Recording stopped
2006-03-06, 20:48:34	[Message]	Recording started - Value: 9000
2006-03-06, 20:48:54	[Message]	Recording stopped
2006-03-07, 15:45:38	[Error Sidexis]	E5 14 04 (ERR_SOCKET) SidErr: ERR_SOCKET_ERROR SockErr: EPIPE
2006-03-07, 08:57:05	[Message]	Logbook started
2006-03-07, 08:58:30	[Message]	Recording started - Value: 104
2006-03-07, 08:58:49	[Message]	Recording stopped
2006-03-07, 09:03:26	[Message]	Recording started - Value: 104
2006-03-07, 09:03:45	[Message]	Recording stopped
2006-03-07, 09:05:16	[Message]	Recording started - Value: 104
2006-03-07, 09:05:35	[Message]	Recording stopped
2006-03-07, 09:07:27	[Message]	Recording started - Value: 101
2006-03-07, 09:07:35	[Message]	Recording cancelled
2006-03-07, 09:52:44	[Message]	Recording started - Value: 9641
2006-03-07, 09:52:58	[Message]	Recording stopped

System time	Entry type	Entry data

Data which might be expected to occur in the logging memory are explained below to help you interpret them better:

#### 3.1.1 Example of error logging data

<b>System time</b>	2006-03-06, 20:13:02	:	System time (clock on DX11)
<b>Entry type</b>	[Message]	:	General system event
	[Error]	:	Error event
	[Error Sidexis]	:	Network error event
	[Stringname]	:	Free status texts
	[Stringsegment]	:	Additional data (string names)
	[RTC Date/Time Change]	:	Date and time for a Sidexis PC
	[PC Date/Time]	:	Set date and time for DX11

<b>Entry data [Message]</b>	Recording started	:	Beginning of a recording
	Value: 9000	:	Sequence ID of recording
	Recording stopped	:	End of a recording
	Recording cancelled	:	Recording cancellation
	Logbook started	:	Corresponds to switch-on of unit
	Image state switched to Released	:	Recording has been delivered to and confirmed by SIDEXIS
Other entry data which document the occurrence of a rescue event include:			
<ul style="list-style-type: none"> <li>– Image state switched to Rescue</li> <li>– Rescue request Sidexis Error</li> <li>– Rescue request Sidexis TrackEpilogue</li> <li>– Rescue request Sidexis Timeout</li> </ul>			
<p>These entry data may also occur after "Recording stopped" or "Cancel" and indicate exceptional circumstances. You can supply important information for error diagnosis in coordination with the Sirona Customer Service Center.</p>			
<b>Entry data [Error]</b>	E6 07 06	:	Error code
	ERR_DX7_TTP_LOST	:	Cleartext display of error
<b>Entry data [Error Sidexis]</b>	SidErr: ERR_SOCKET_ERROR	:	Detail of network error (for Sirona only)
	SockErr:	:	Detail of network error (for Sirona only)
<b>Entry data [Stringname]</b>	Key Act	:	Activation transaction
	Key Ok	:	Activation transaction
<b>Entry data [Stringsegment]</b>	7YFWDUFV-E4MMRJBW	:	e.g. activation or confirmation code (for activation transaction)
	061-00133	:	e.g. counter (ID counter reading)
<b>Entry data [RTC Date/Time Change]</b>	Tried to change to: YYYY-MM-DD, HH:MM:SS	:	e.g. Tried to change to: 2006-Nov-30, 11:32:13
<b>Entry data [RTC Date/Time]</b>	YYYY-MM-DD, HH:MM:SS	:	2006-Nov-30, 11:32:13

## 3.2 Checking the CAN bus

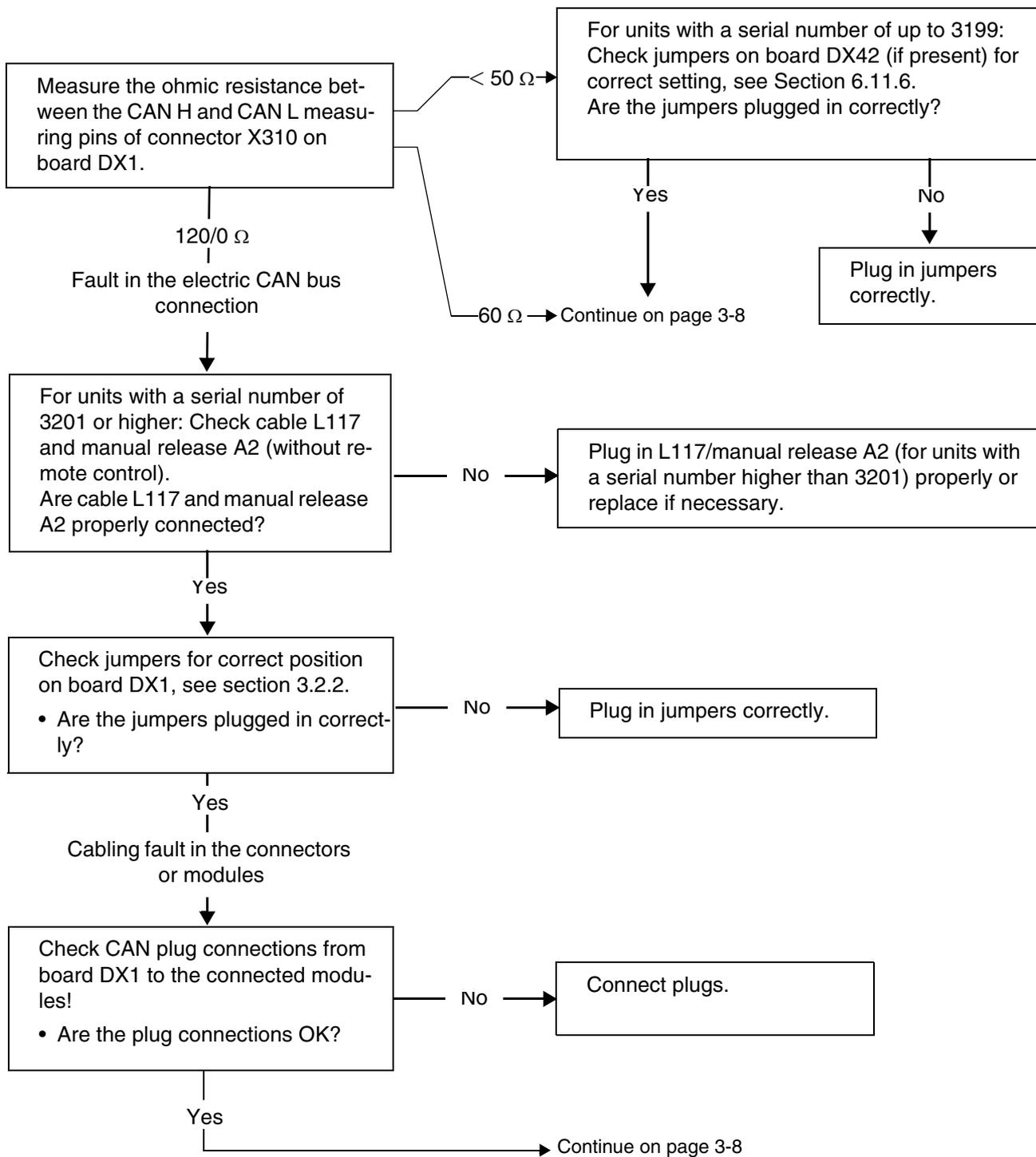
For troubleshooting, you can either disconnect the CAN bus cable and/or leave it on and observe the (unit's) behavior.

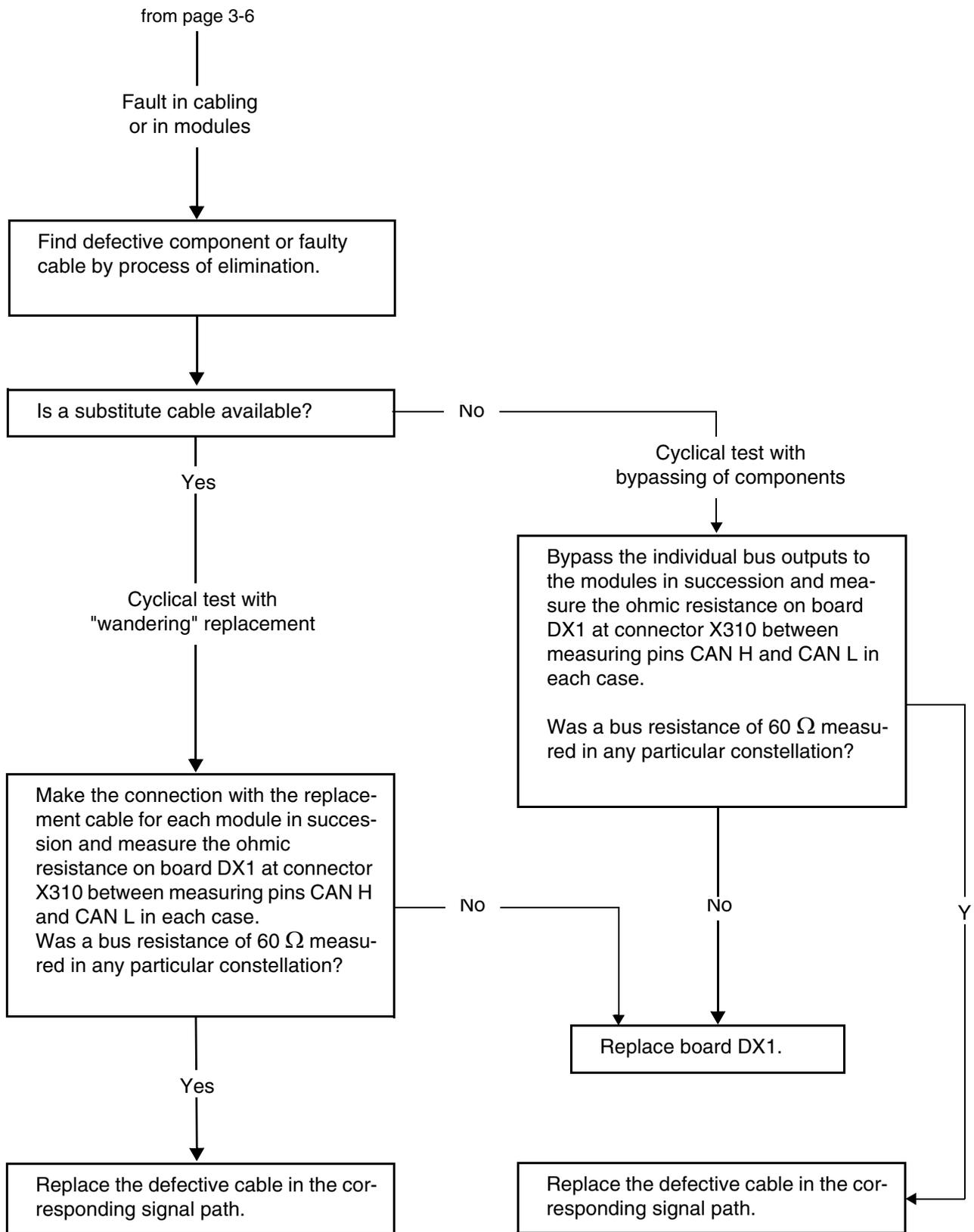


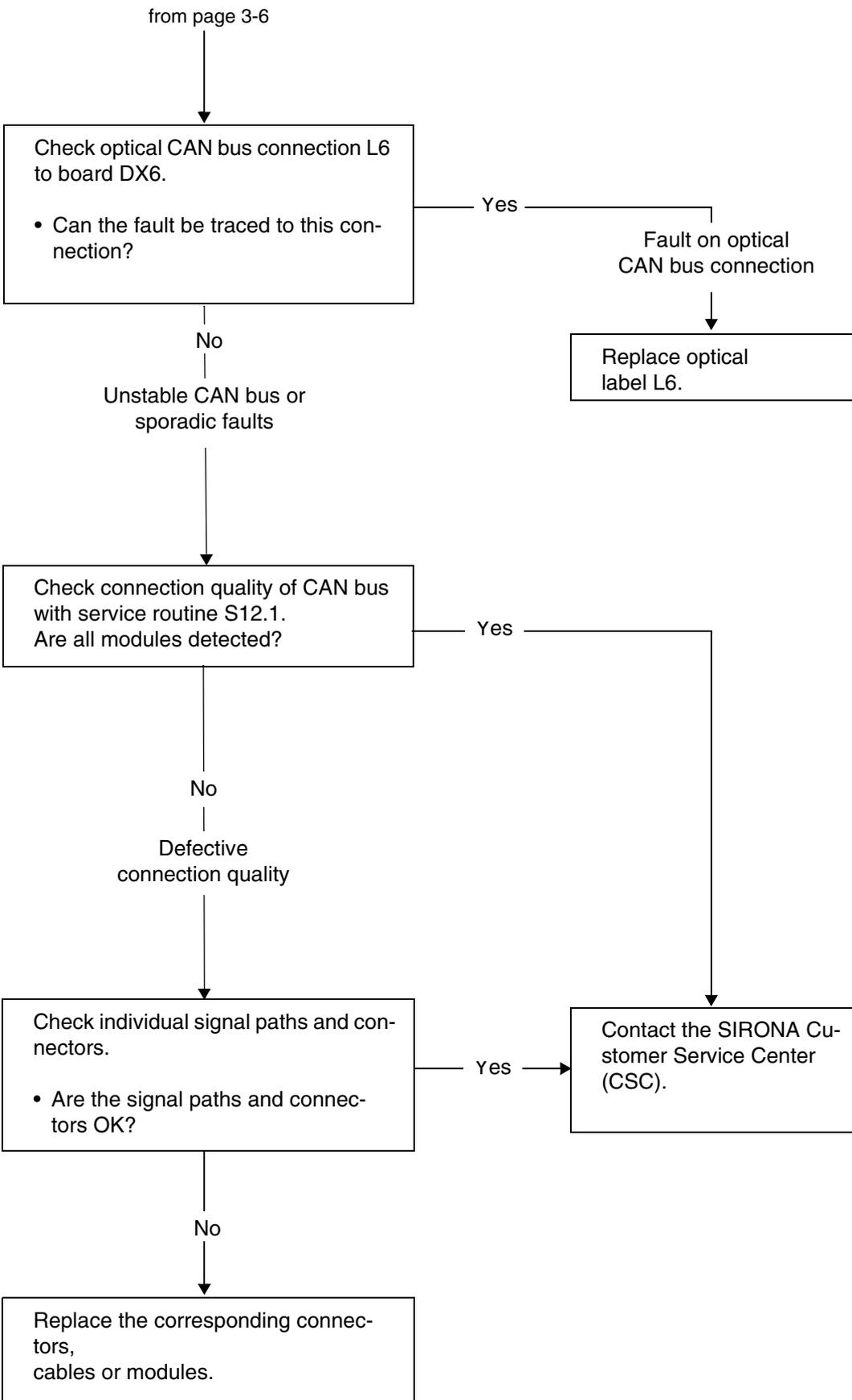
### **CAUTION**

*The power supply absolutely must be plugged in and switched on. E.g. if no power cable is connected to the DX91 Ceph, the module has no ground connection to the unit and the voltage potential is not equal. If the CAN cable is plugged in in this case, the CAN transceiver (IC on the DX91) can be destroyed by the voltage difference. I.e. CAN cables may be plugged in only to modules that are connected to the power source and ground with the unit switched on.*

---







### 3.2.1 Checking the CAN bus with the diagnostic function of board DX1

Board DX1 features a diagnostic function for diagnosing malfunctions of the CAN bus via LEDs V700 and V701 (see wiring diagrams). The following table indicates the operating status of the CAN bus and the recommended error correction measures:

V700	V701	Operating status of CAN bus	Error correction measures
Slow flashing	Slow flashing	CAN bus OK	Not required
Fast flashing	Off	CAN error, no communication with board DX7, i.e. no display of error messages	<ul style="list-style-type: none"> <li>● Check cabling</li> <li>● Check CAN jumper (see section 3.2.2)</li> </ul>
Fast flashing	Fast flashing	CAN error, no physical communication with CAN bus possible; there is probably a short circuit in the CAN cable or on the board of a module.	<ul style="list-style-type: none"> <li>● Disconnect CAN cables successively (set jumper to inner position!) until the CAN bus functions again (V700 and V701 flash slowly)</li> <li>● Replace defective module</li> </ul>
Off	Fast flashing	CAN error, CAN bus TTP* disturbed by defective, constantly transmitting board (bus-heavy)	<ul style="list-style-type: none"> <li>● Disconnect CAN cables successively (set jumper to inner position!) until the CAN bus functions again (V700 and V701 flash slowly)</li> <li>● Replace defective module</li> </ul>
Off	Off	System did not power up (DX11)	<ul style="list-style-type: none"> <li>● Switch unit OFF and ON again and wait until end of power-up time</li> </ul>

\*) TTP = Time Trigger Protocol

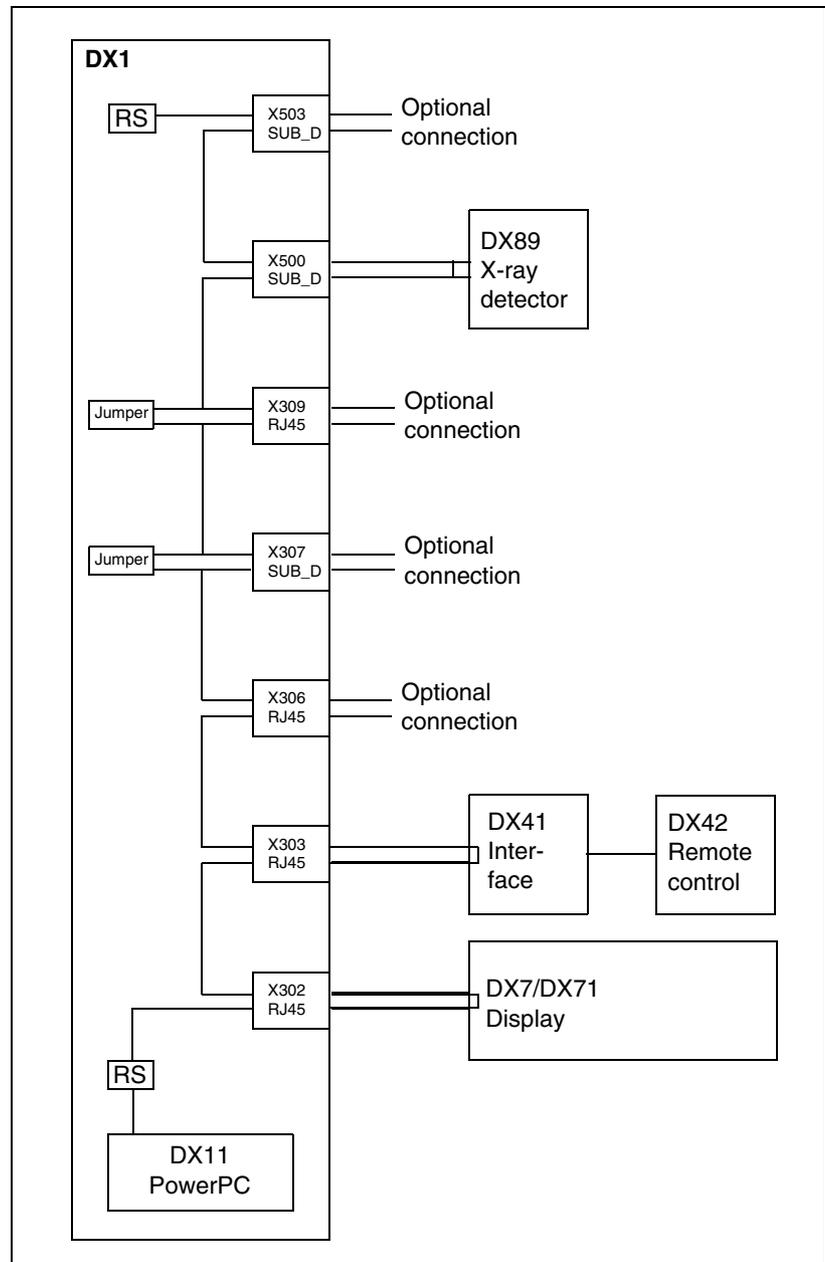
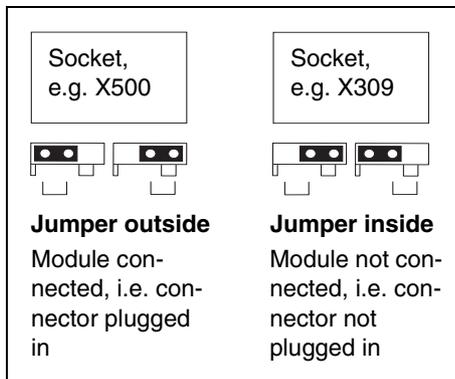
### 3.2.2 Jumper positions in the CAN bus

The jumpers are located on board DX1 at sockets X302, X303, X306, X307, X309, X500 and X503 (see also wiring diagrams).

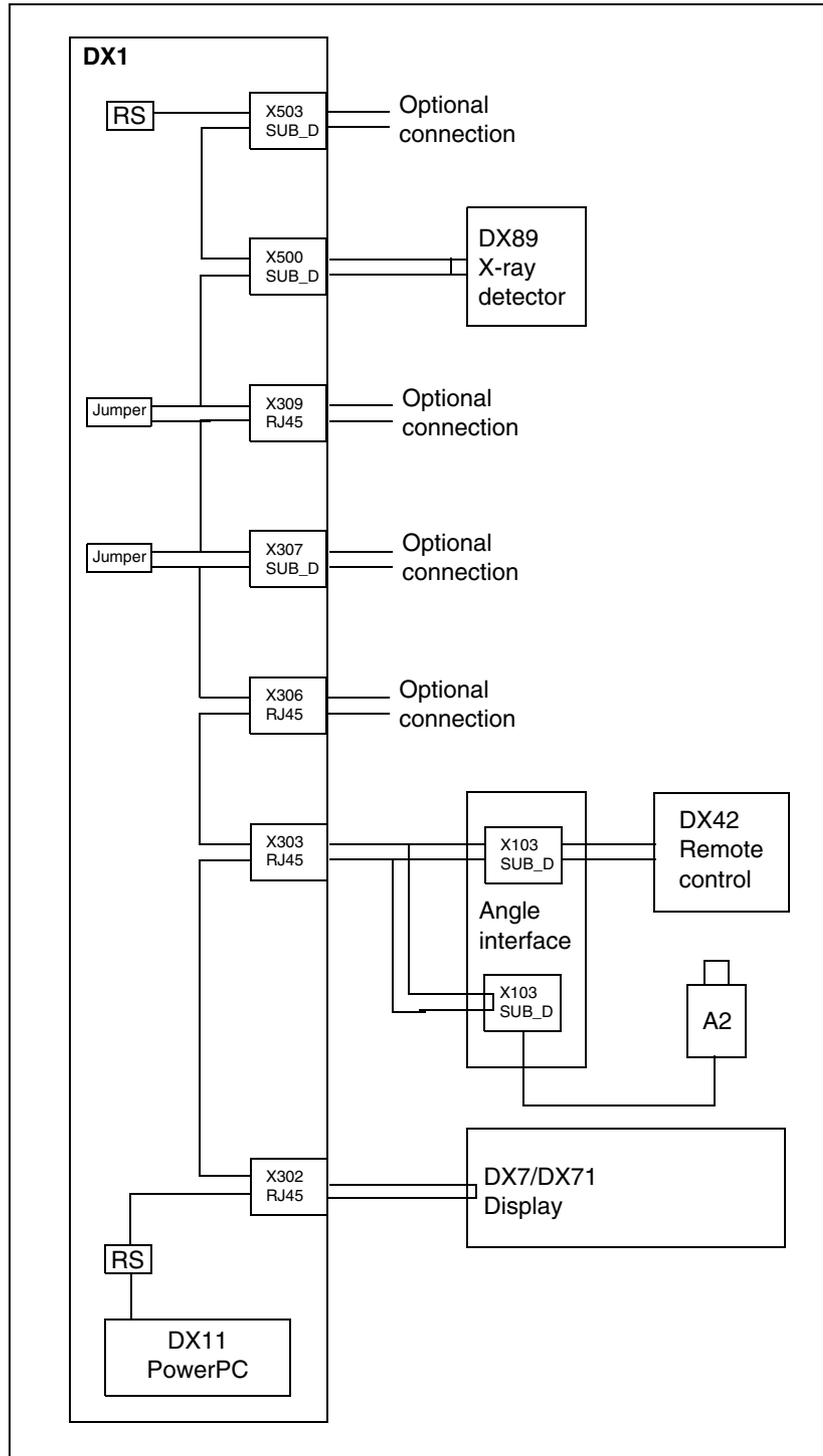
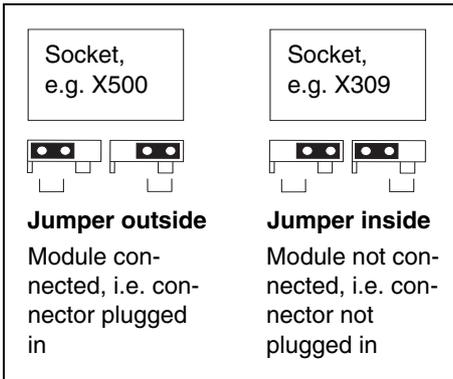
If a cable is plugged into the socket, the corresponding jumpers must be set to the outer position. If no cable is plugged in, the jumpers must be set to the inner position.

If a jumper is not set to the inner position with a cable plugged in, the CAN bus is interrupted at this location. Modules located behind this location can no longer be connected to the CAN bus, and therefore do not function.

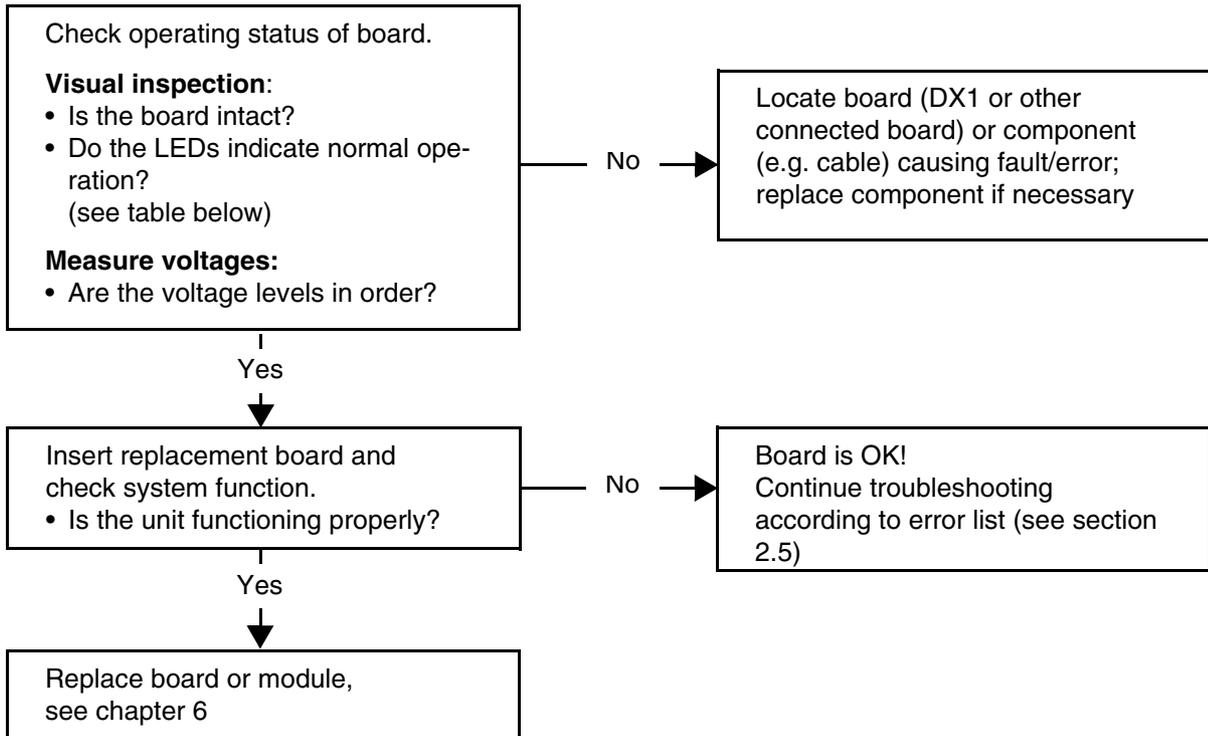
#### Up to unit serial number 3199



From unit serial number 3201



### 3.3 Checking the boards

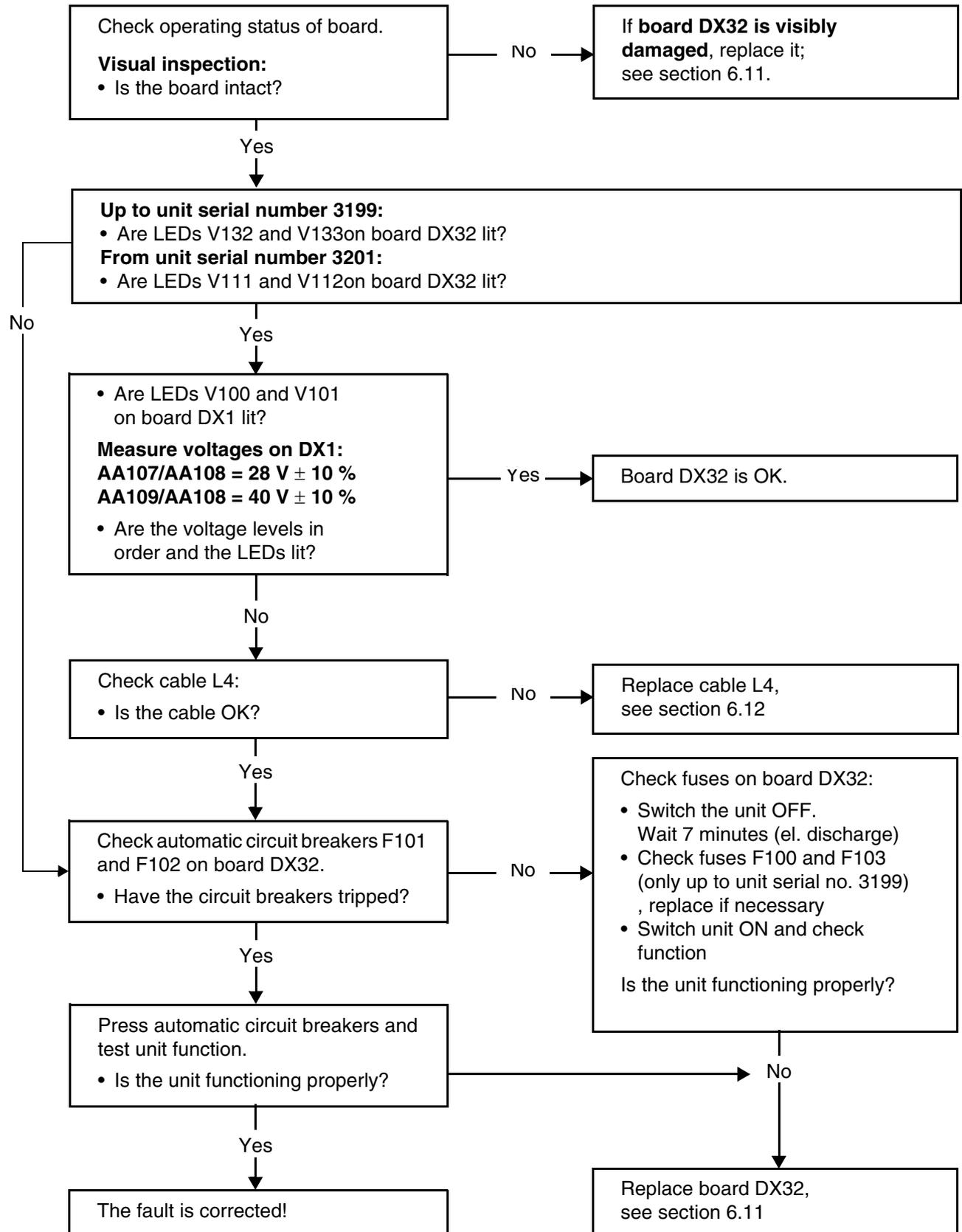


3.3

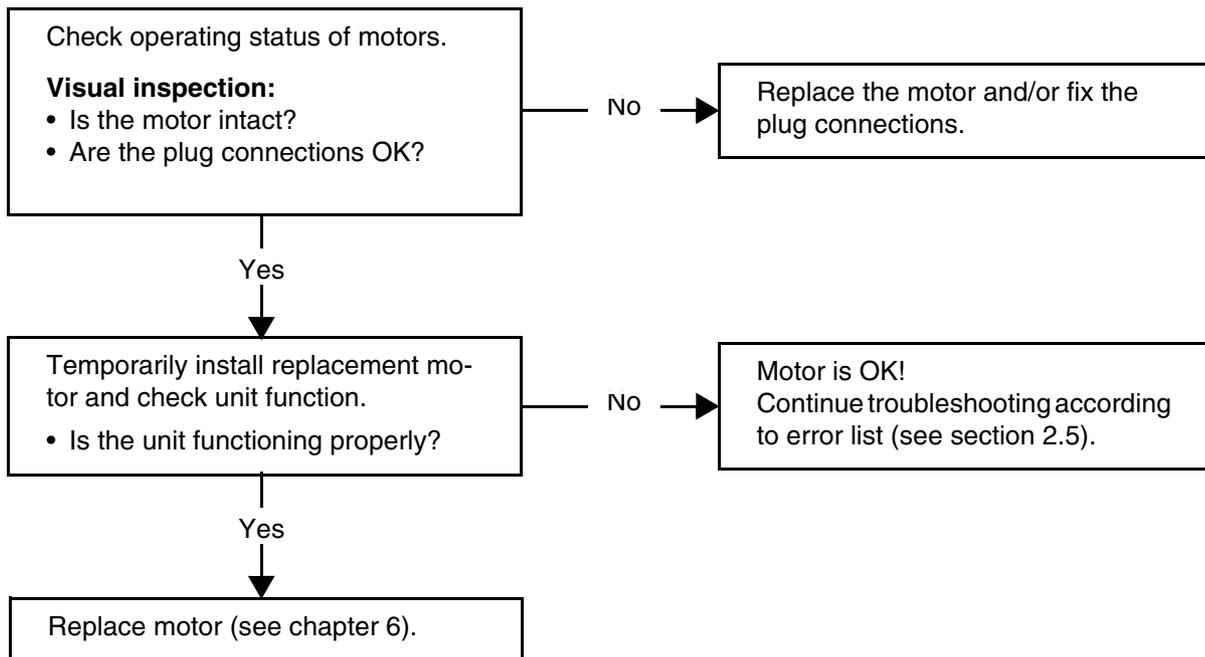
## Important LEDs on the boards (see also wiring diagrams)

Board	LEDs	Normal operation	Malfunction	Bootloader
DX1	V100	lit	not lit	
	V101	lit	not lit	
	V108	lit	not lit	
	V110	lit	not lit	
	V610	lit	not lit	
DX6	V1	flashing at 1 Hz	not lit	flashing at 2 Hz
	V203	lit	not lit	
DX7	V100	lit	not lit	
	V101	lit	not lit	
	V102	lit	not lit	
DX71	V101	lit	not lit	
	V103	lit	not lit	
	V107	flashing at 1 Hz	not lit	flashing at 2 Hz
DX32	V132	lit	not lit	
	V133	lit	not lit	
DX41	V103	flashing at 1 Hz	not lit	flashing at 2 Hz
	V202	lit	not lit	
	V204	lit	not lit	
DX42	V101	lit	not lit	
	V103	lit	not lit	
DX89	V201	lit	not lit	
	V202	lit	not lit	
	V203	lit	not lit	
	V204	flashing at 1 Hz	not lit	flashing at 2 Hz
	V205	lit	not lit	
	V207	lit	not lit	

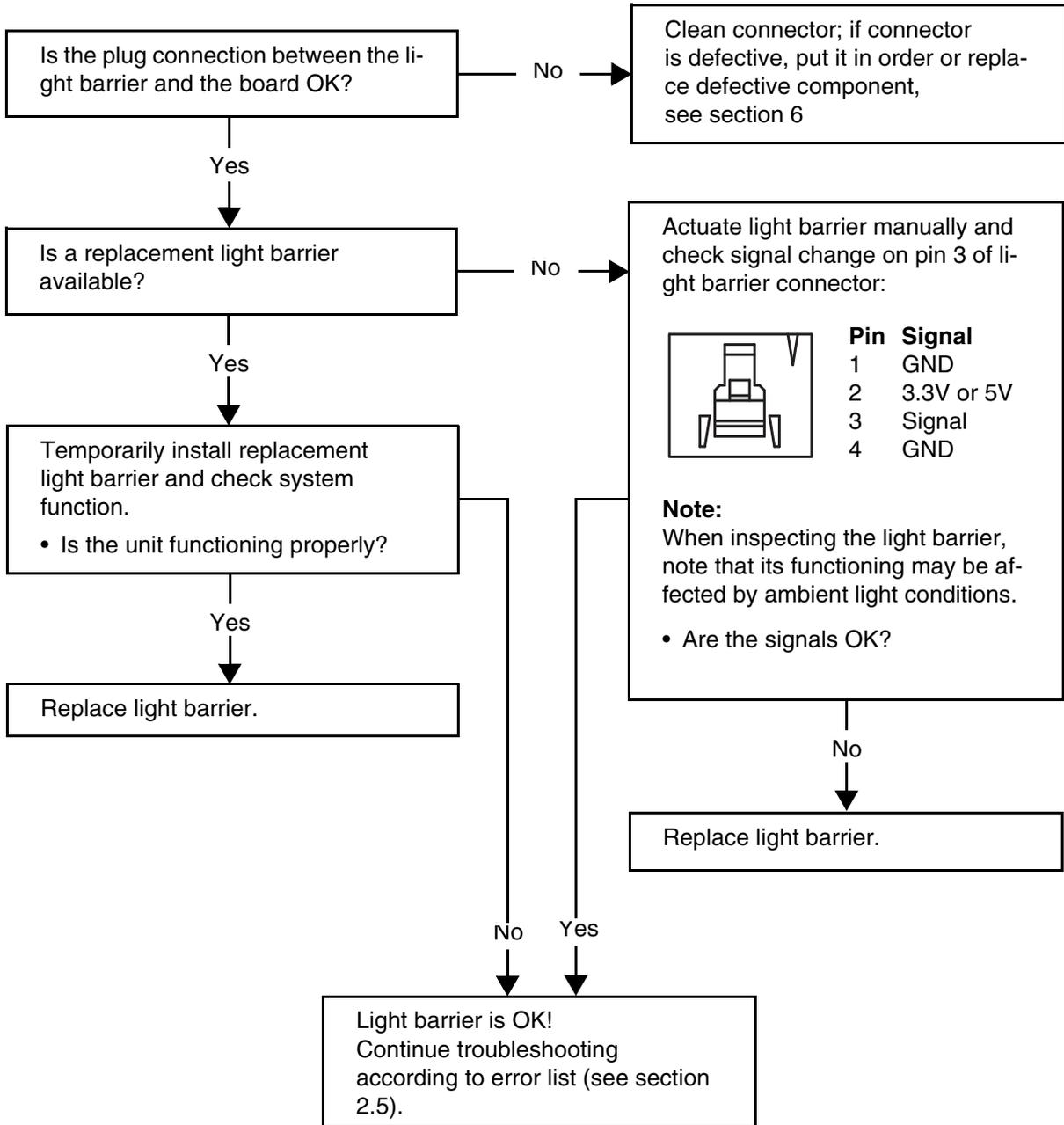
3.3.1 Checking board DX32



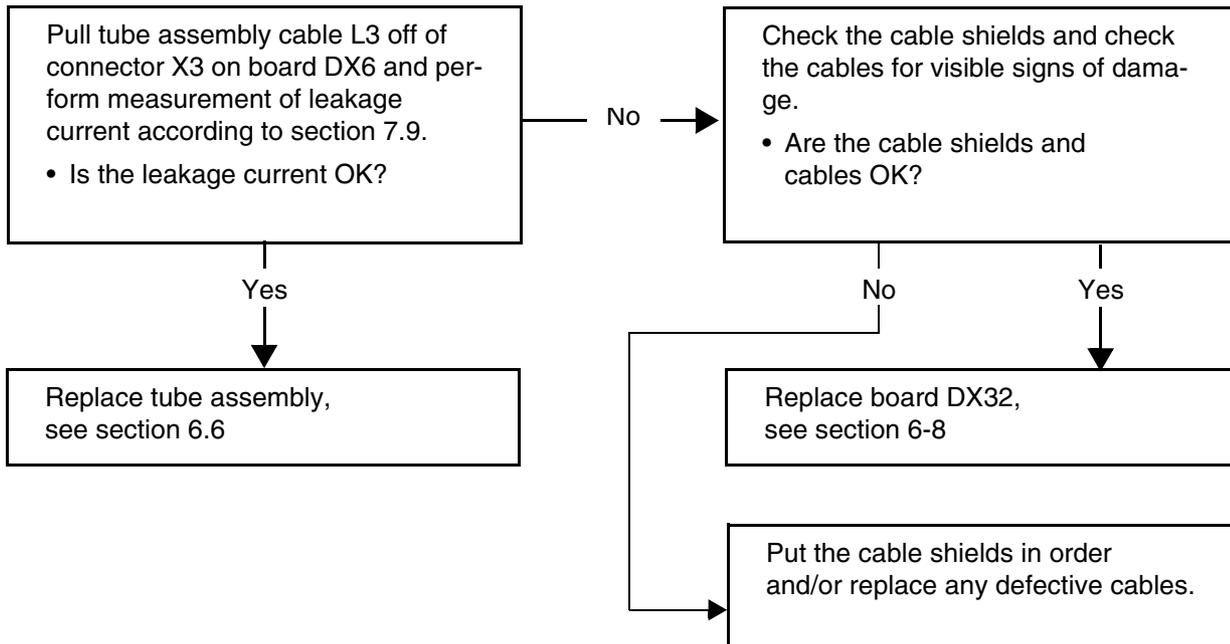
## 3.4 Checking the motors



### 3.5 Checking the light barriers



### 3.6 Device leakage current too high



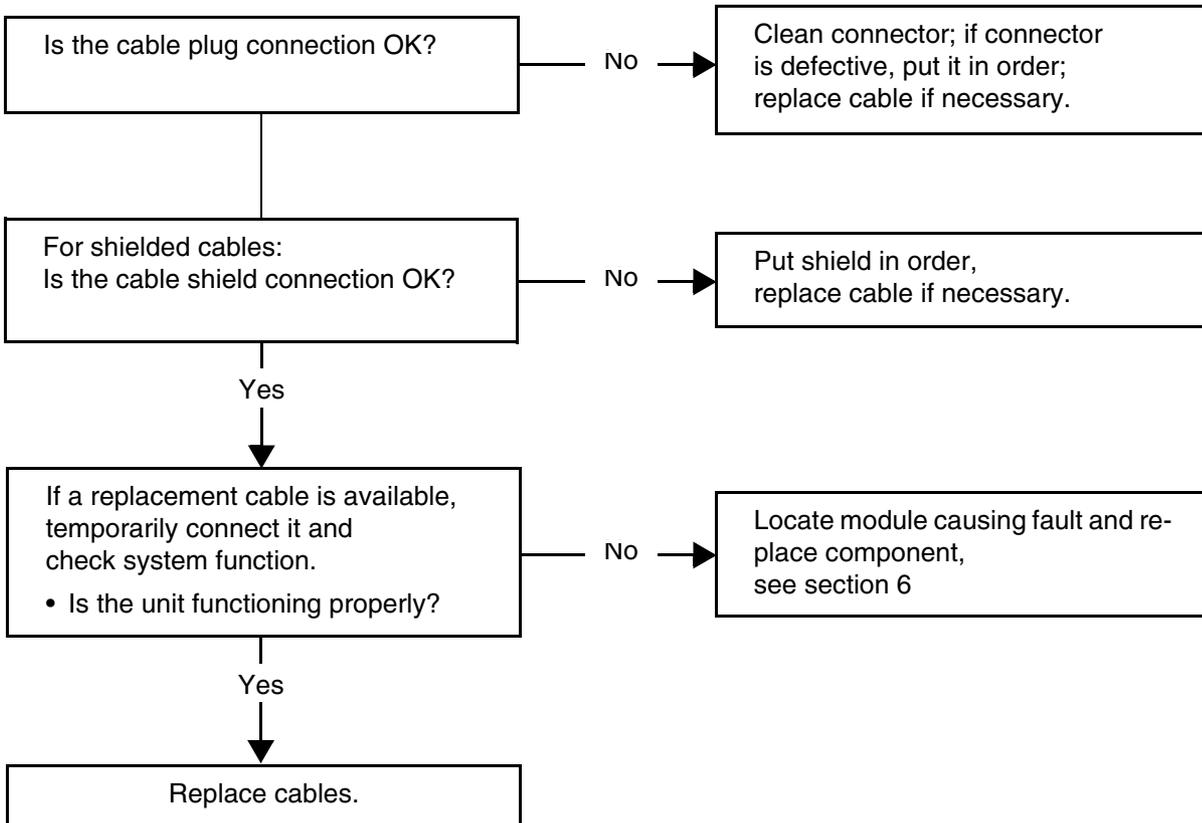
### 3.7 Checking the cables

**i NOTE**

You can use a standard Cat5 cable as a test cable for L8\*, L10, L12, L40 and L37. Caution! This cable must not be permanently installed.

**i NOTE**

Most cables have the same plug at both ends and are connected 1:1.



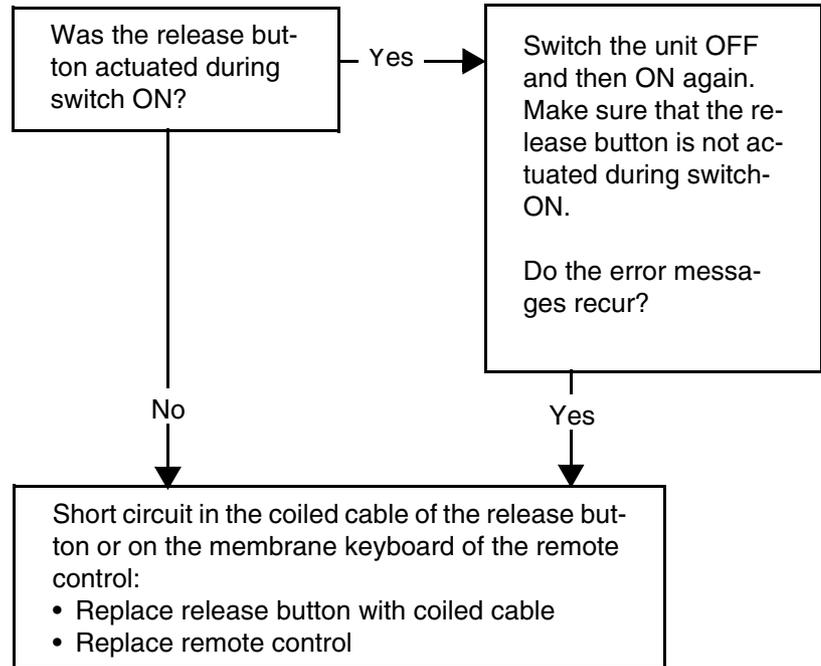
\* up to unit serial number 3201

**3.8 Error analysis of X-RAY control signal path**

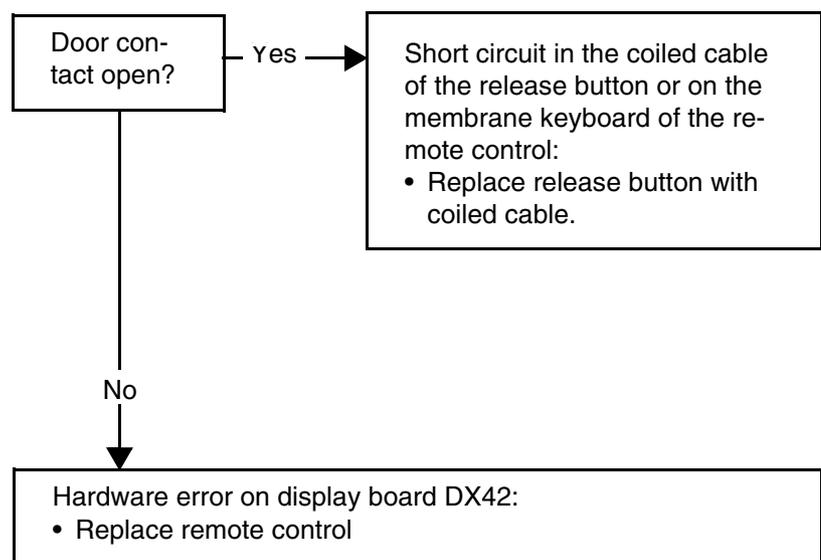
**3.8.1 Error analysis of X-RAY control signal path: up to unit serial number 3199 (with board DX41)**

**Error and help messages *with remote control installed***

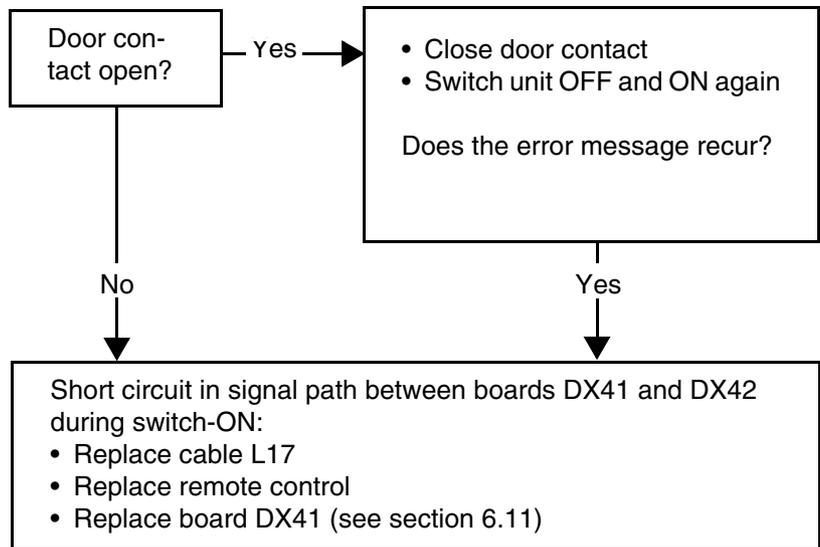
**E3 42 31 + E3 13 40 + E3 41 20**  
 occur in combination after the unit is switched ON with the door contact closed.



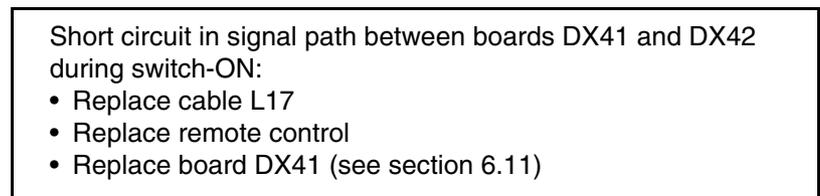
**E3 42 31**  
 occurs once after the unit is switched ON.



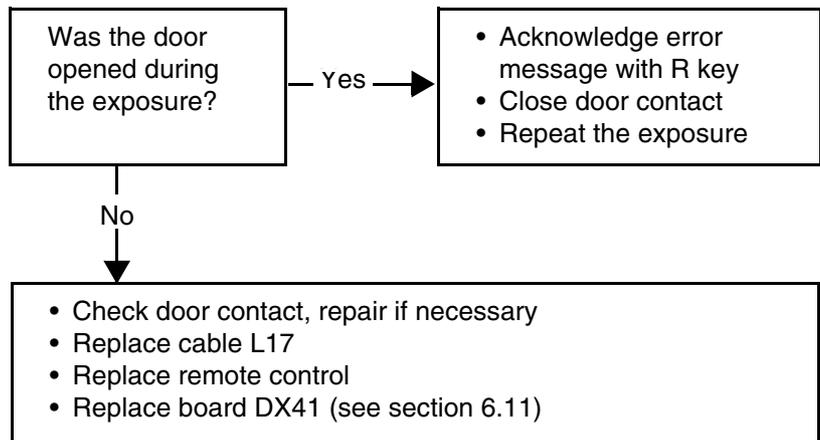
**E3 41 20**  
occurs once after the unit is switched ON.



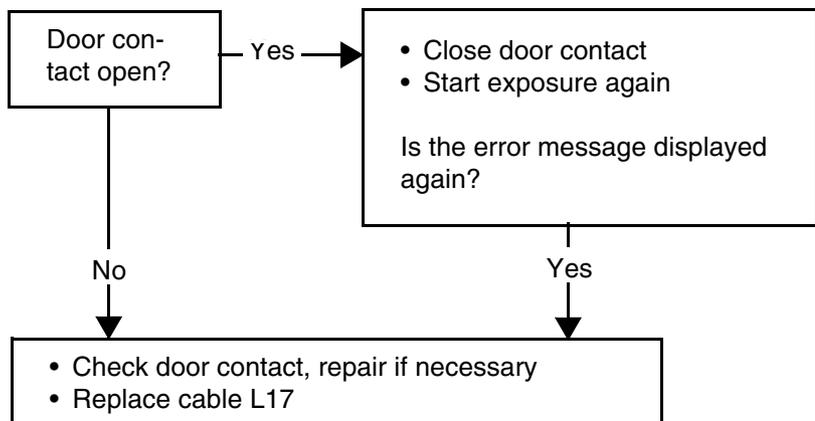
**E3 41 24**  
occurs once during operation of the unit.



**E6 13 43**  
occurs once during operation of the unit.



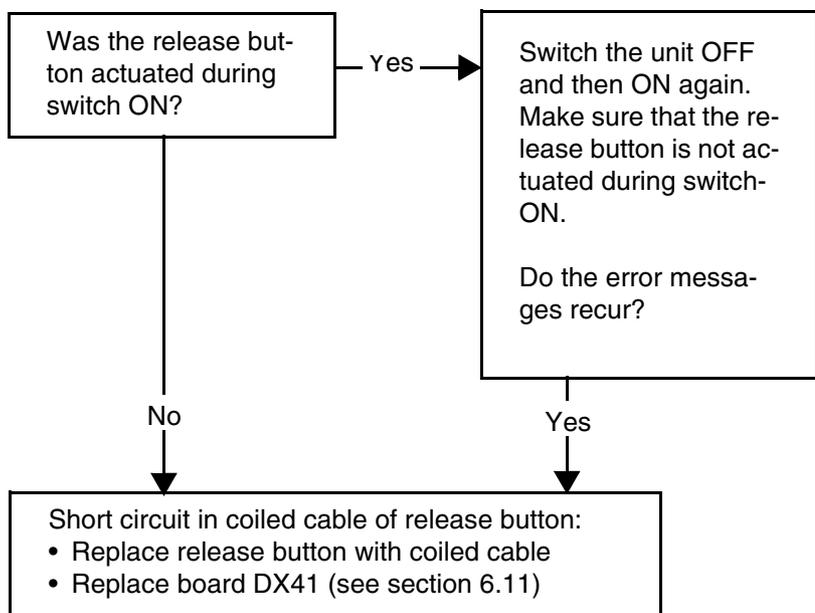
**H321**  
is triggered at start of exposure.




---

#### **Error messages *without installed remote control***

**E3 13 40 + E3 41 20**  
occur in combination after the unit  
is switched ON.



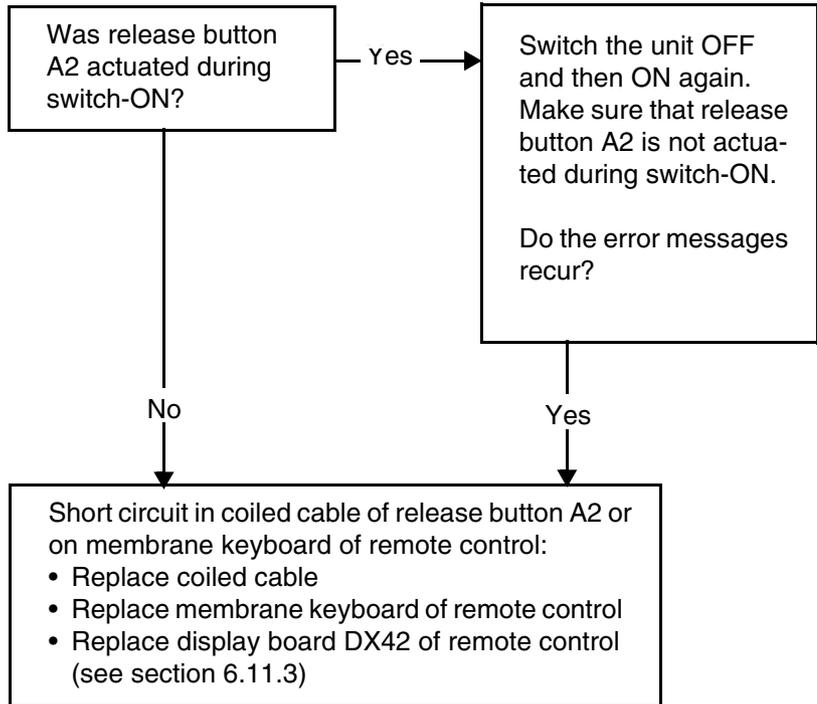
**Error messages *with and without installed remote control***

<b>Error code</b>	<b>Description</b>	<b>Actions required</b>	<b>see page</b>
E3 41 20	Faulty detection of release signal by DX41 processor when the unit is switched ON.	<ul style="list-style-type: none"> <li>● Replace board DX41</li> </ul>	6-42
E6 41 23	Faulty detection of release signal by DX41 processor during operation of the unit.	<ul style="list-style-type: none"> <li>● Replace board DX41</li> </ul>	6-42
E6 41 25	The DX41 detects no release signal when the exposure is started.	<ul style="list-style-type: none"> <li>● Replace board DX41</li> </ul>	6-42
E3 13 40	Short circuit in signal path between boards DX11 and DX41 during switch-ON.	<ul style="list-style-type: none"> <li>● Replace cable L7</li> <li>● Replace board DX41</li> <li>● Replace board DX1</li> <li>● Replace board DX11</li> </ul>	6-42
E6 13 41	Release signal missing on board DX11 at start of exposure.	<ul style="list-style-type: none"> <li>● Replace cable L7</li> <li>● Replace board DX41</li> <li>● Replace board DX1</li> <li>● Replace board DX11</li> </ul>	6-42
E3 13 42	Short circuit in signal path between boards DX11 and DX41 during operation of the unit.	<ul style="list-style-type: none"> <li>● Replace cable L7</li> <li>● Replace board DX41</li> <li>● Replace board DX1</li> <li>● Replace board DX11</li> </ul>	6-42

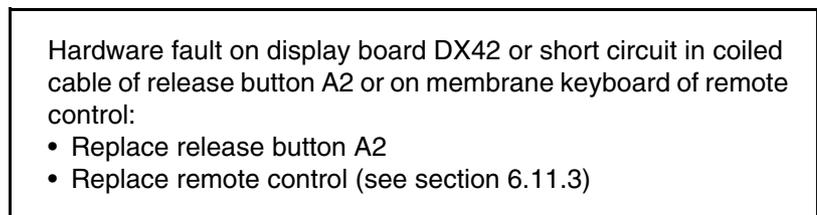
**3.8.2 Error analysis of X-RAY control signal path: from unit serial number 3201 (without board DX41)**

**Error and help messages *with remote control installed***

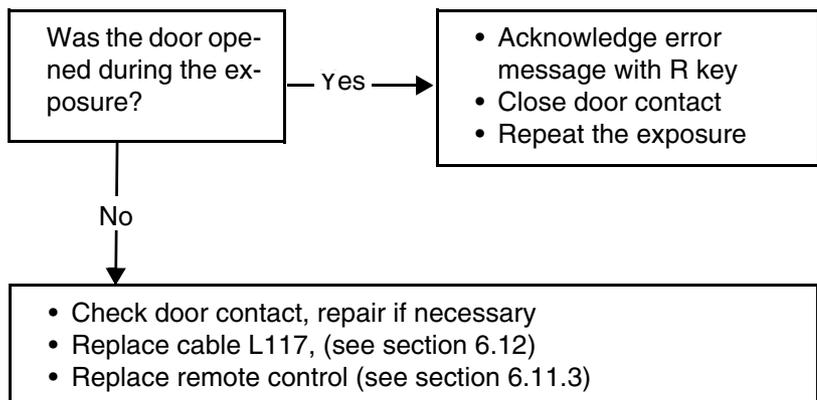
**E3 42 31 + E3 13 40**  
 occur in combination after the unit is switched ON with the door contact closed.



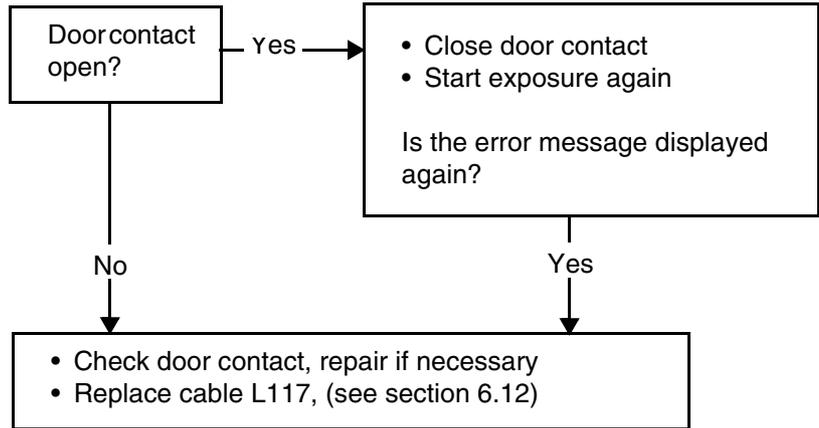
**E3 42 31**  
 occurs once after the unit is switched ON.



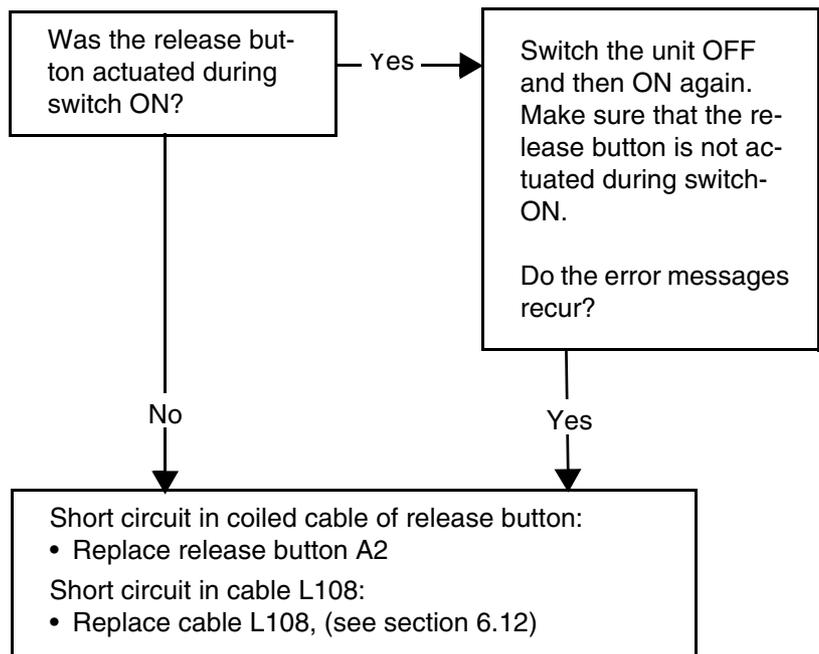
**E6 13 43**  
 occurs once during operation of the unit.



**H321**  
is triggered at start of exposure.



**E3 13 40**  
occurs after the unit is switched ON.



**Error messages *with and without installed remote control***

<b>Error code</b>	<b>Description</b>	<b>Actions required</b>	<b>see page</b>
E3 13 40	Short circuit in signal path between release button A2 and board DX11 during switch-ON.	<ul style="list-style-type: none"> <li>● Replace cable L117 or L108</li> <li>● Replace board DX1</li> <li>● Replace board DX11</li> </ul>	<p><b>6-68</b></p> <p><b>6-42</b></p>
E6 13 41	Release signal missing on board DX11 at start of exposure.	<ul style="list-style-type: none"> <li>● Replace cable L117 or L108</li> <li>● Replace board DX1</li> <li>● Replace board DX11</li> </ul>	<p><b>6-68</b></p> <p><b>6-42</b></p>
E3 13 42	Short circuit in signal path between release button A2 and board DX11 during unit operation.	<ul style="list-style-type: none"> <li>● Replace cable L117 or L108</li> <li>● Replace board DX1</li> <li>● Replace board DX11</li> </ul>	<p><b>6-68</b></p> <p><b>6-42</b></p>

### 3.9 Fault diagnosis of the X-ray detector and on board DX89

**CAUTION**

*The image tube of the X-ray detector is sensitive to mechanical stress, and therefore must be handled with extreme care. Avoid bumps and jolts. Please consider this point during transport and installation.*

For error messages in connection with board DX89, it is important to determine whether the fault concerned is attributable to a defect on board DX89 or to a defect in the X-ray detector.

To do this, proceed as follows:

1. Perform unit shutdown (see the Operating Instructions).
2. Switch the unit OFF.
3. Remove the covers of the X-ray detector (see section 1.11).
4. Carefully pull the cover plate upwards to remove it from the X-ray detector (see section 6.8).

**CAUTION**

*Risk of injury! The cover plate has sharp edges.*

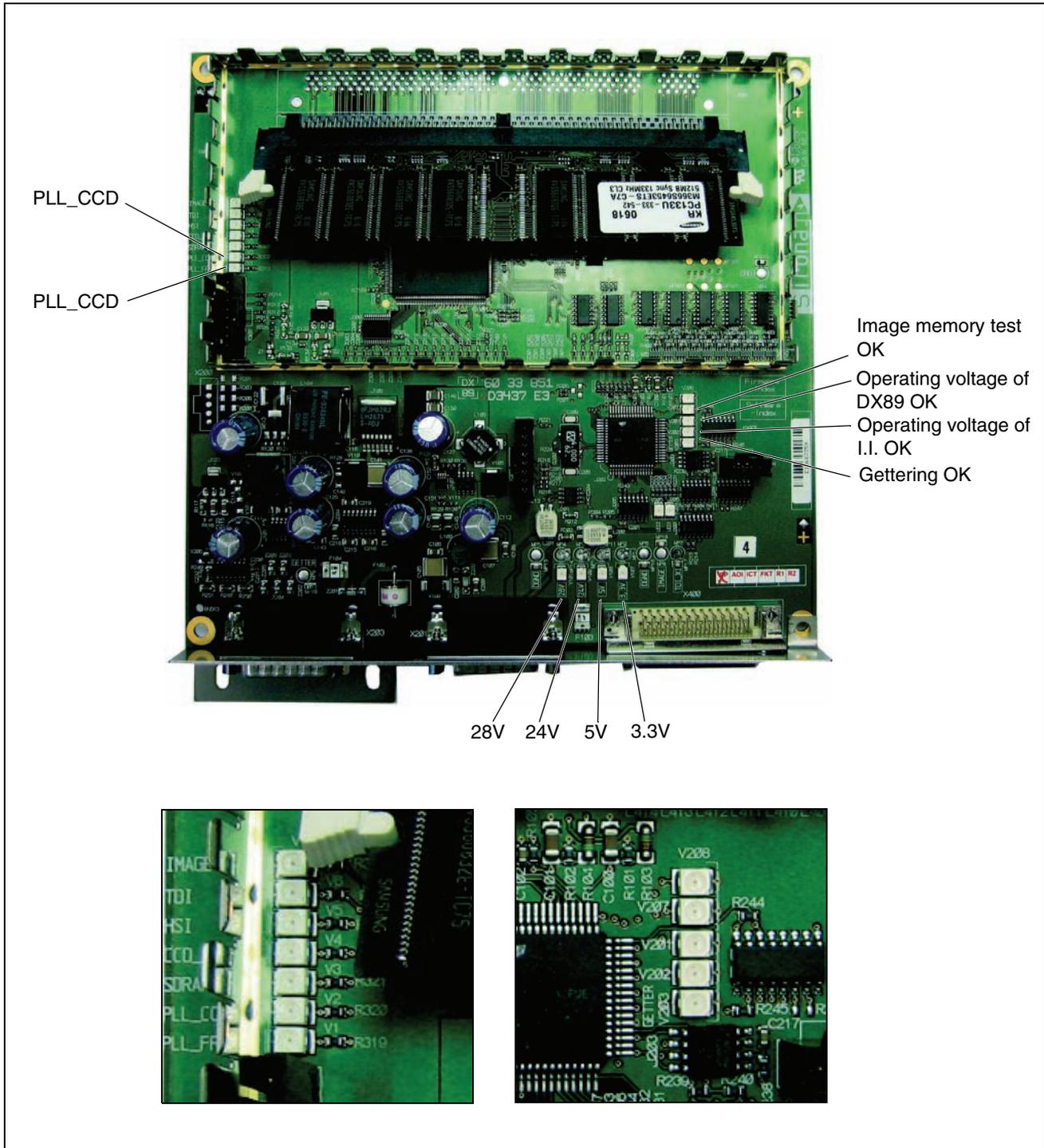
5. Remove the cover plate of board DX89.
6. Switch the unit ON again.

**DANGER**

**PERILOUS SHOCK HAZARD. Do not touch any live parts while observing board DX89.**

The LEDs on the board can provide you with information concerning the possible cause of the fault (see Section 3.9.1).

3.9.1 LEDs on board DX89



Pay special attention to the "PLL\_FPGA", "PLL\_CCD", "Getting OK" and "Image memory test OK" diodes.

### 3.9.2 LED statuses and their significance in case of an error

For X-ray detector errors, it is usually necessary to send the extended details of the GALILEOS unit (see Section 1.7) from the unit to the Sirona Customer Service Center (CSC). The results of the LED inquiry described below also must be added to the extended details.

---

**i** **NOTE**

*The LED statuses specified here apply to the booted system.*

---

#### PLL\_FPGA on DX89

**LED ON:** FPGA started properly on DX89.

**LED OFF:** FPGA did not start properly on DX89.

**Action:**

- Format flash file system via service routine S009.4
- Perform a software update
- If this step does not lead to the desired result, board DX 89 must be replaced

---

**i** **NOTE**

*If all LEDs light up after the power-up phase, this leads to conclusions concerning a defect on board DX89. See the procedure outlined above for troubleshooting.*

---

#### PLL\_CCD on DX89

**LED ON:** There is a connection to the CCD sensor in the camera head.

**LED OFF:** There is NO connection to the CCD sensor in the camera head.

**Action:**

- Check the connection cable between board DX89 and the X-ray detector and replace it if necessary.

---

**!** **CAUTION**

*The unit must be switched OFF before disconnecting any plugs or cables.*

---

**i** **NOTE**

*If all LEDs light up after the power-up phase, this indicates that there is a defective FPGA on board DX89. For troubleshooting, see the action under "LED OFF for PLL\_FPGA".*

---

**GETTERING OK****LED ON:** Gettering is OK**LED FLASHING (after a waiting period of 12 minutes):**  
Gettering is NOT OK

Action: – Replace X-ray detector

**i NOTE**

The free ions are pumped out of the vacuum of the X-ray detector by the getters (hence the name "getter pump"). The getter current is measured during operation. If it does not drop below a specific value within 12 minutes, the gettering is not OK. In this case, the cause of the fault is probably a defective X-ray tube.

**Image memory test OK****LED ON:** Image memory test OK**LED OFF:** Based on the PLL\_FPGA LED, check whether the FPGA started properly on DX89 (see page 3-29)

PLL\_FPGA LED OFF: See the actions under "LED OFF for PLL\_FPGA".

PLL\_FPGA LED ON: Replace board DX89

**3.9.3 LEDs of operating voltages****Operating voltages  
(28V, 24V, 5V, 3.3V)**

The four LEDs are powered directly by the four operating voltages and all must light up after the system start.

If this is not the case, check connector X201 for firm seating. If the connector is OK and the LED nevertheless does not light up, then replace the X-ray detector.

**⚠ CAUTION**

The unit must be switched OFF before disconnecting any plugs or cables.

Supply voltage [V]	Light emitting diode
28	V101
24	V109
5	V108
3,3	V107

**Operating voltages on DX89 and X-ray detector OK**

These two LEDs must light up following the system start. If this is not the case, the X-ray detector must be replaced.

# 4 **Calibrating the unit**

GALILEOS

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## 4

# Calibrating the unit

## 4.1 Important information concerning calibration

**DANGER: RADIATION**

*When performing the following tests, be sure to observe the radiation protection regulations applicable in your country (see operating instructions).*

**DANGER: RADIATION**

*“Radiation” is signaled with the message “X-RAY active!”, a beep and an X-ray LED.*

**NOTE**

*You will need the GALILEOS service set to perform unit calibration (Order No. 61 46 562).*

**CAUTION**

*If the calibration is to be performed immediately after a software update, the unit must be rebooted **before** beginning the calibration procedure. To do this, switch the unit off at the main switch. Wait for approx. 2 minutes. Switch the unit on again.*

**NOTE**

*If you encounter problems with unit calibration, check whether the required EMC conditions have been met. No heavy-duty electric equipment (e.g. air conditioners, fan motors, etc.) should be present in the vicinity of the GALILEOS.*

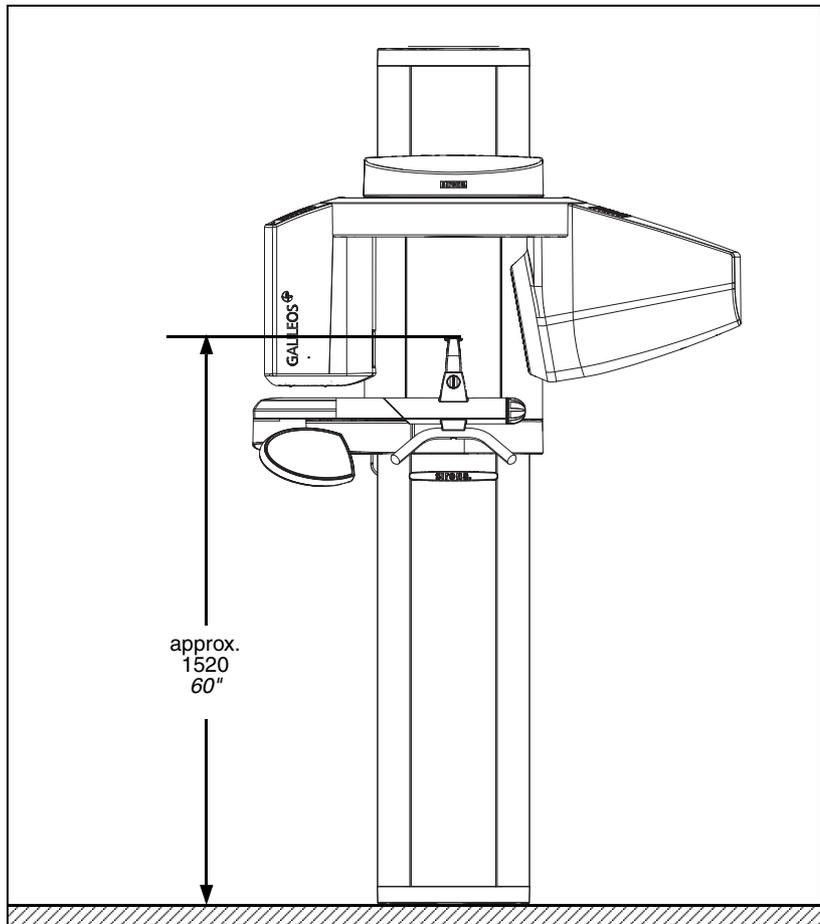
**CAUTION**

*After every calibration of the unit the reference values for the constancy measurement must be redetermined and entered in the “Test results” form, “Reference value” column (see section 4.5).*

**i NOTE**

Move the unit to a typical working height (bite block height approx. 1520 mm (60")) with the Up/Down keys of the control panel **before starting the calibration**.

Starting with unit software version V 03.04.00, you can also adjust the unit height during calibration. When the unit is ready for an exposure (after the **IMAGE ACQUISITION** button is pressed in the SIDEXIS service menu) the corresponding service routine (S002.6/S010.10-14/S011.8 and S030.5) is displayed on the control panel. All of these service routines offer the possibility of opening the height adjustment menu via the **Test key**  . The current unit height is displayed in selection field 1 there. You can then set the unit to the desired height using the Up/Down keys on the control panel. You can quit the height adjustment menu by pressing the **Service key**   or the **double arrow key**  (GALILEOS) or by actuating the **up arrow key**  via selection field 3 (GALILEOS GAX5).



Check the mechanical unit adjustment first (see Section 4.2). It is the prerequisite for the following system calibration.

Please adhere to the following order when calibrating the system:

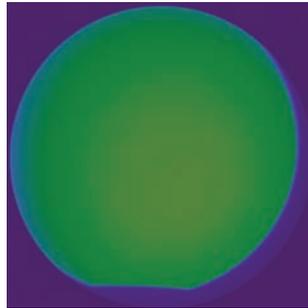
- Checking the system adjustment (see pages 4-7 ff.)
- Diaphragm image/GALILEOS diaphragm adjustment (see pages 4-15 ff.)
- Checking the beam field (see pages 4-26 ff.)
- Dosimetry (see page 4-28)
- Sensor calibration(see page 4-30)
- Iris calibration(see page 4-32)
- Shading calibration(see page 4-34)
- Distortion calibration (see pages 4-36 ff.)
- Geometry calibration (see pages 4-39 ff.)

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**i** **NOTE**

*Tip: It may be helpful to use the coloring function of SIDEXIS to evaluate the image.*

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**i** **NOTE**

*If you encounter problems with unit calibration, check whether the required EMC conditions have been met. No heavy-duty electric equipment (e.g. air conditioners, fan motors, etc.) should be present in the vicinity of the GALILEOS.*

---

### 4.1.1 Displays and help messages during calibration

#### Help messages during the calibration procedure

The most frequent help messages during adjustment are the following:

H301: Move the unit into starting position † Press the **R key**  

H403: SIDEXIS is not ready for exposure † Make unit ready for exposure

#### Status displays during the calibration procedure

The most frequent status displays during calibration are the following:

GALILEOS (Easypad)	GALILEOS GAX5 (Multipad)
Ready for exposure/XRAY	no special display; kV level and mAs are displayed
Exposure not possible	S110
Please wait	▯▯▯▯▯
Ready for exposure in XX seconds	XXs
X-RAY active!	LED lights up on Multipad

#### **NOTE**

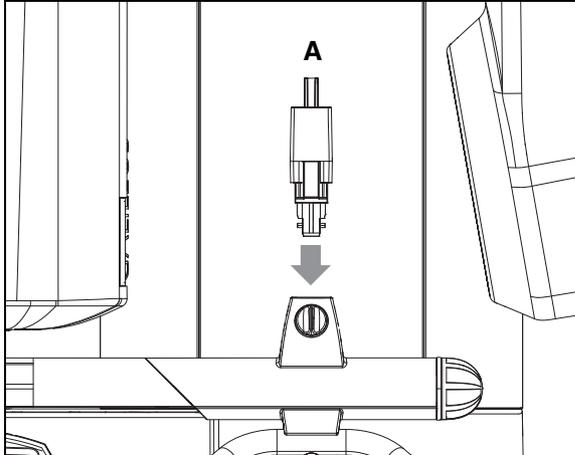
*If error message E1 11 20 is displayed on the control panel and/or the remote control during the calibration process, this does not necessarily indicate an equipment error. This error message only indicates that the calibration data of the unit are incomplete at this point.*

*Acknowledge the error message with the R key, if applicable, and continue the calibration procedure.*

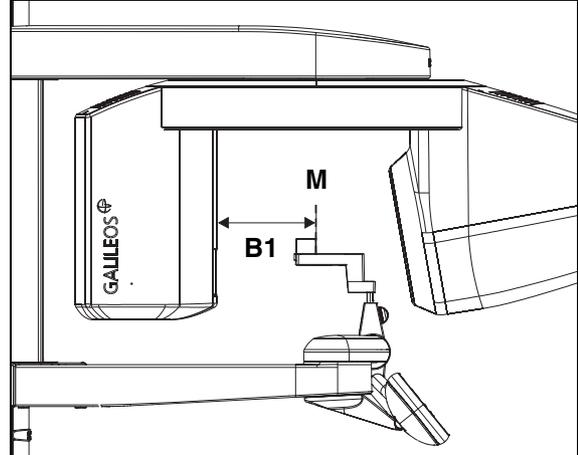
*Please refer to Section 2 of this Service Manual for assistance with other help messages or error messages displayed during the calibration process.*

4.2 Checking the system adjustment

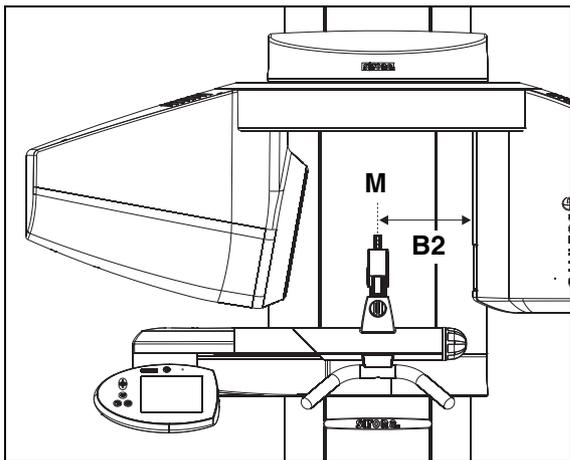
1.



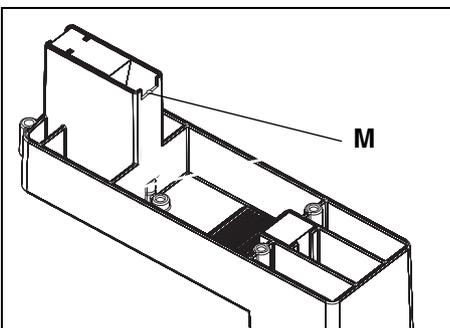
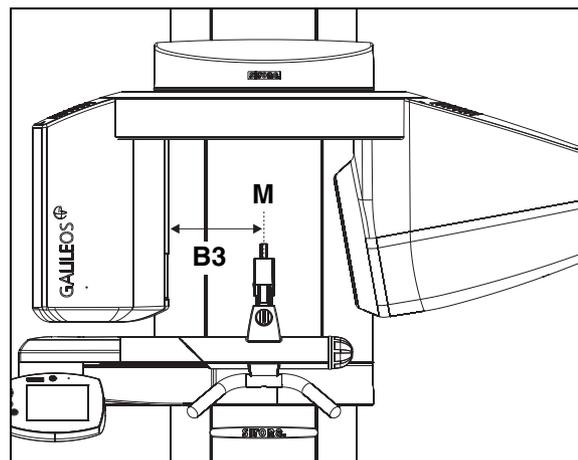
2. Position 1



2. Position 2



2. Position 3

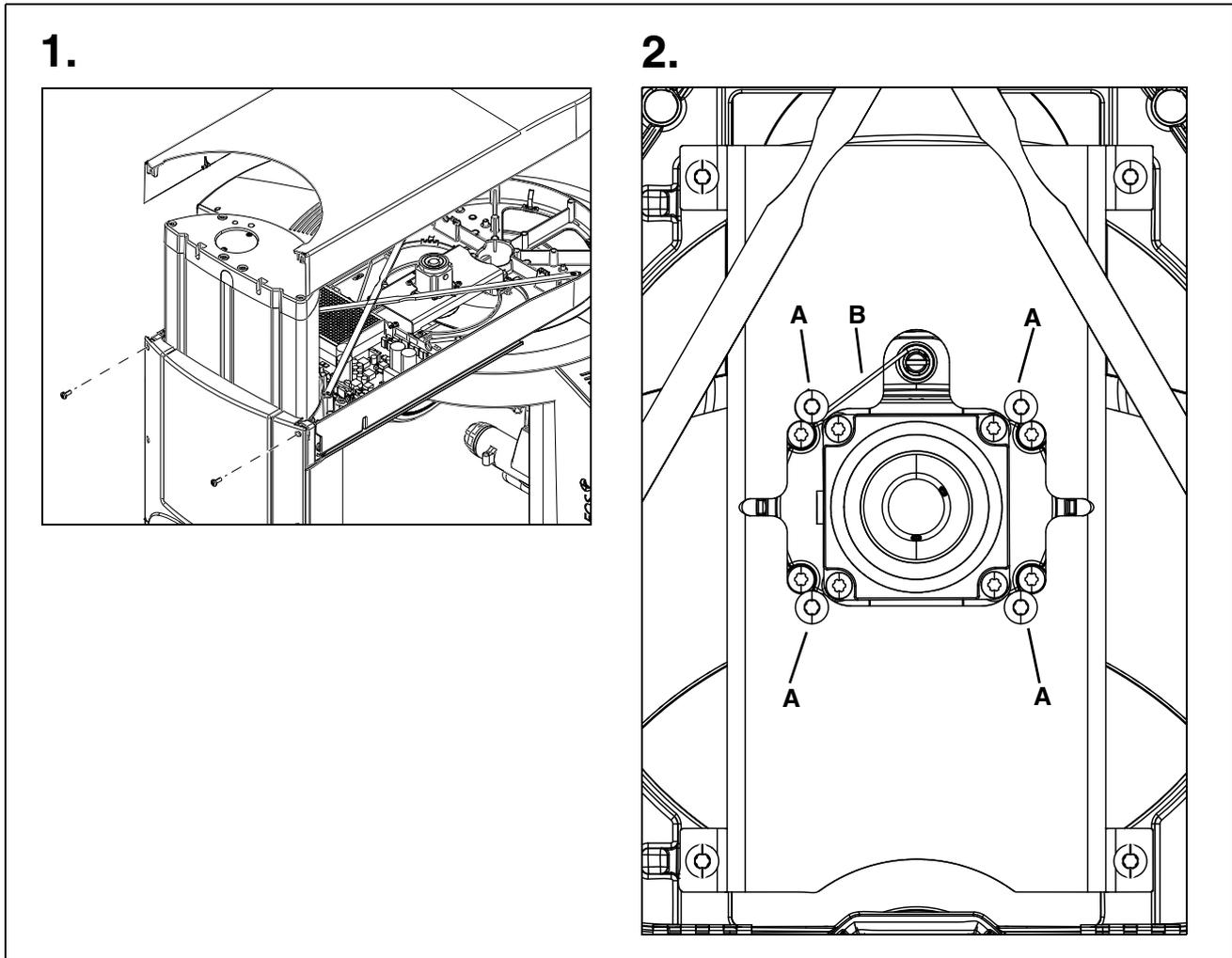


1. Insert test phantom **A** in the bite block holder of the unit.
2. Measure distances **B1**, **B2** and **B3** between the tube assembly housing and measuring point **M** on the constancy test phantom (**positions 1, 2 and 3**) using the steel tape measure from the service set.
- Then calculate the ideal distance between the tube assembly and measuring point **M** as follows:

$$\left| \frac{B2 + B3}{2} \right| = \text{ideal distance}$$

Distances **B1**, **B2** and **B3** must not deviate more than  $\pm 2$  mm from the calculated ideal distance. Where there are deviations more than  $\pm 2$ mm, the unit must be mechanically adjusted via the positioning of the ring motor (see page 4-8).

## 4.2.1 Adjust center point of ring (if necessary)



**!** **CAUTION**

Perform the adjustment only if the measured values are outside of tolerance (see page 4-7).

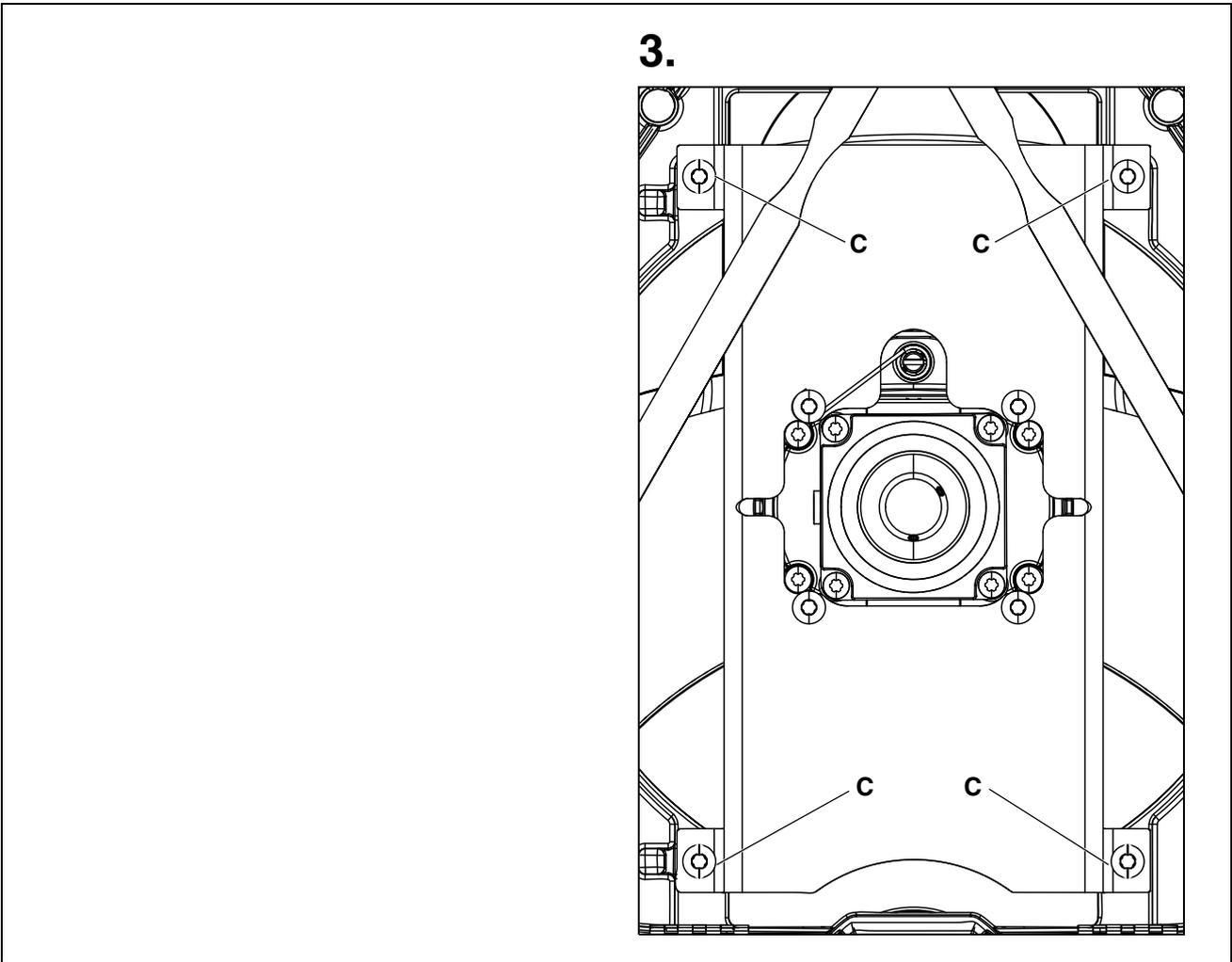
1. Remove the covers:
  - Arm
2. Loosen the four screws **A** slightly (Note: Do not unscrew completely!).

**!** **CAUTION**

Make sure that spring **B** does not pop out. This spring has a defined prestress!

- Correct the position carefully and then retighten the screws.

**Moving the ring center to the left or right**



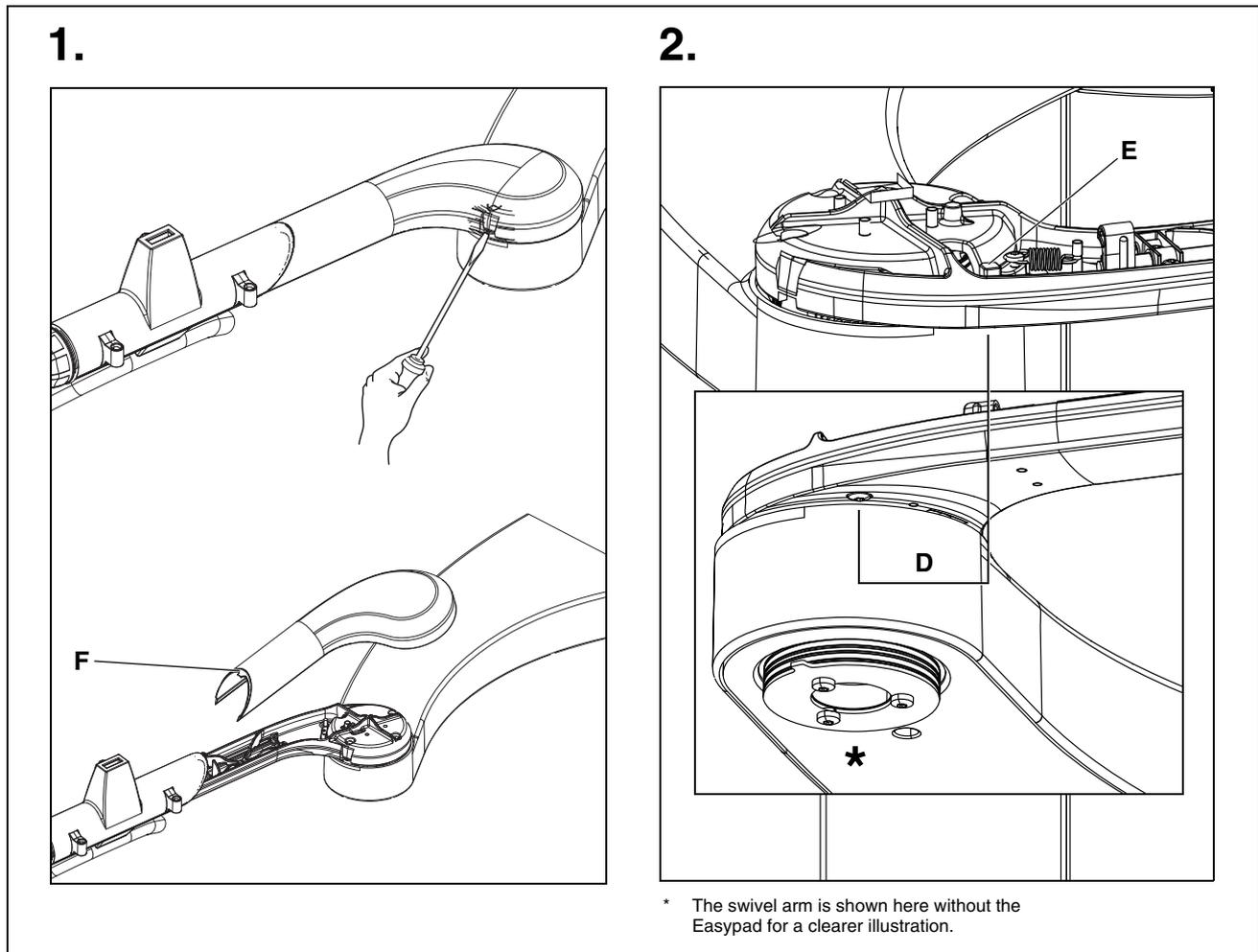
**Moving the ring center to the front or rear**

3. Loosen the four screws **C** slightly  
(Note: Do not unscrew completely!).
  - Correct the position carefully and then retighten the screws.
  - Reattach the covers.

**i** **NOTE**

*If the center of the ring cannot be fully adjusted using the screws **C** then proceed with adjusting the swivel arm (see page 4-10). Otherwise, the mechanical adjustment is now complete and you may begin calibration.*

## 4.2.2 Adjusting the swivel arm (if necessary)



## 1. Remove the covers:

- Swivel arm

Move the swivel arm to the entry position, loosen the internal grid, slightly bend the housing upwards and remove it by pulling towards the pivot joint of the swivel arm.

2. Slightly loosen screw **D** and adjust the swivel arm via eccentric screw **E**. Hold the eccentric screw securely in place and tighten screw **D** again.

**CAUTION**

*Do not forget to tighten screw **D** again. Otherwise, the clearance and play of the swivel arm is not ensured!*

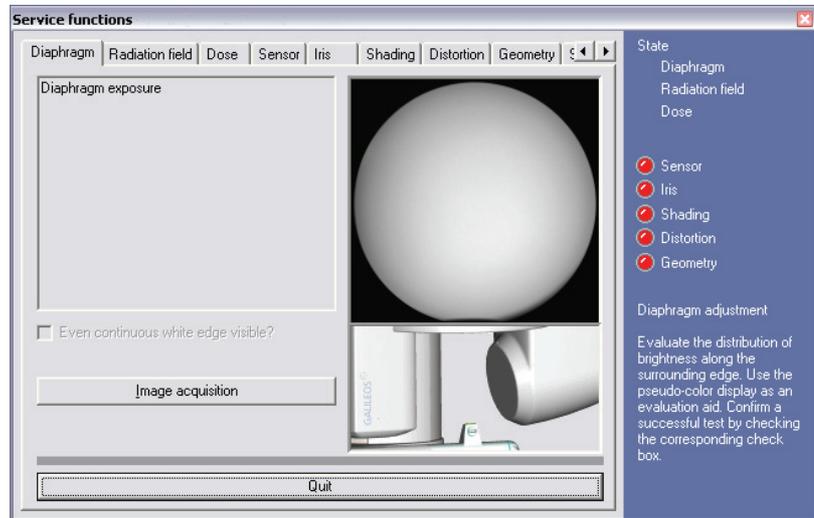
- Reattach the covers.

Position nose **F** in the nut of the swivel arm and press the housing until it snaps in place.

Continue with the calibration.

## 4.3 Unit calibration via SIDEXIS

### 4.3.1 Service Functions menu



Menu: Service Functions

The **SERVICE FUNCTIONS** menu (1.) will guide you through the calibration process. This service routine is started from **SIDEXIS XG**:

**EXTRAS ± CONSTANCY TEST± 3D ± (SELECT X-RAY DEVICE) ± SERVICE EXPOSURE ± password query ± (SELECT X-RAY COMPONENT) ± SERVICE FUNCTIONS menu**

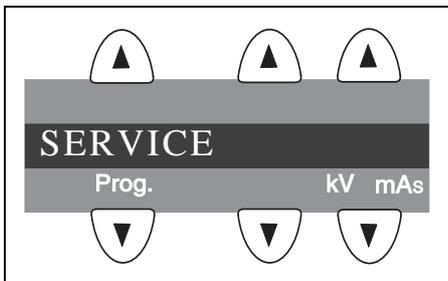
#### **i** NOTE

The queries **SELECT X-RAY UNIT** and **SELECT X-RAY COMPONENT** will only be enabled if several devices are configured in **SIDEXIS**.

#### **i** NOTE

The **SERVICE FUNCTIONS** menu is password-protected. As password, enter the first four digits of the current system date (PC) in reverse order.

Example: On 05/30/2004, the service password is **5003**

**For GALILEOS****For GALILEOS GAX5****i NOTE**

When you open the **SERVICE FUNCTIONS** menu, the unit switches from the user mode to the PC service mode logged by the PC.

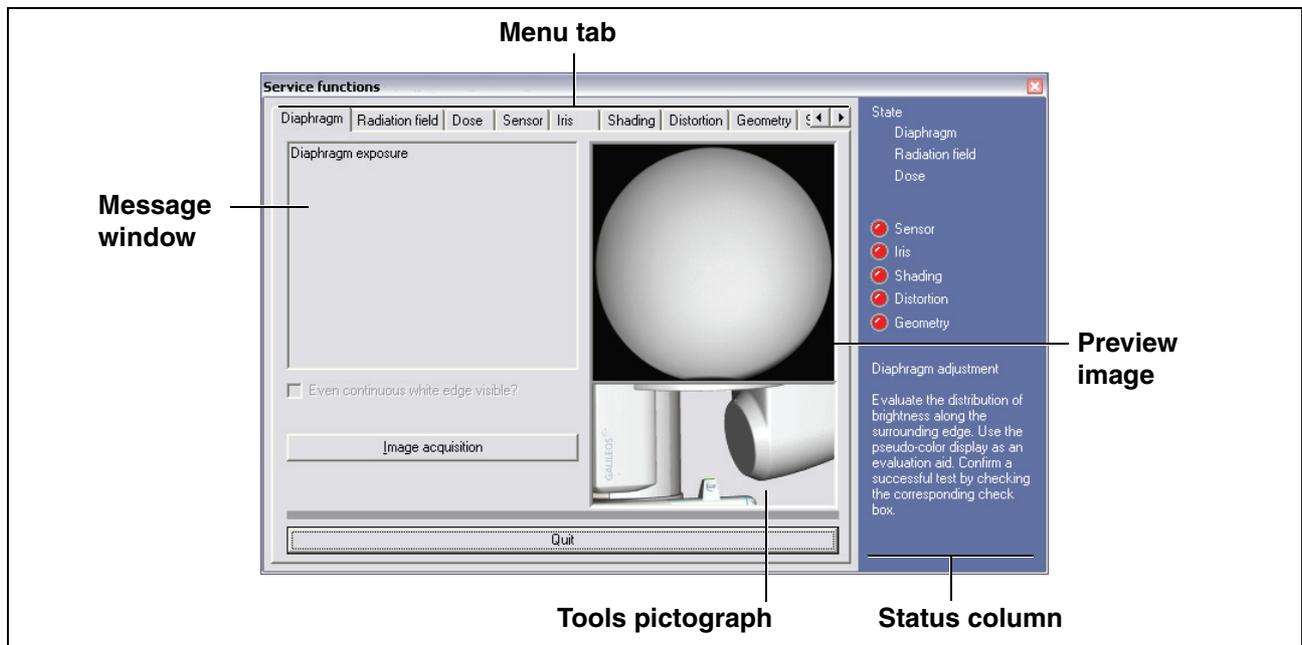
**For GALILEOS:**

This mode is displayed on the Easypad via the PC service image (2.).

**For GALILEOS GAX5:**

This mode is displayed on the Multipad via the "SERVICE" display (3.).

In the **PC service mode** the control options that are available on the control panel are determined by SIDEXIS XG and the currently selected service routine. General control of the unit by means of the control panel (as in the user mode) is not possible in this mode.



### Sub-menus

The **SERVICE FUNCTIONS** menu contains 9 sub-menus that can be selected using the **menu tabs**:

- Diaphragm (see pages 4-15 ff.)
- Beam field (see pages 4-26 ff.)
- Dose (see pages 4-28 ff.)
- Sensor (see pages 4-30 ff.)
- Iris (see pages 4-32 ff.)
- Shading (see pages 4-34 ff.)
- Distortion (see pages 4-36 ff.)
- Geometry (see pages 4-39 ff.)
- Service (see pages 4-42 ff.)

### Tools pictograph

The tools pictograph shows which (if any) test phantom should be used for this particular adjustment step.

### Message window

The message window displays text messages regarding the adjustment process.

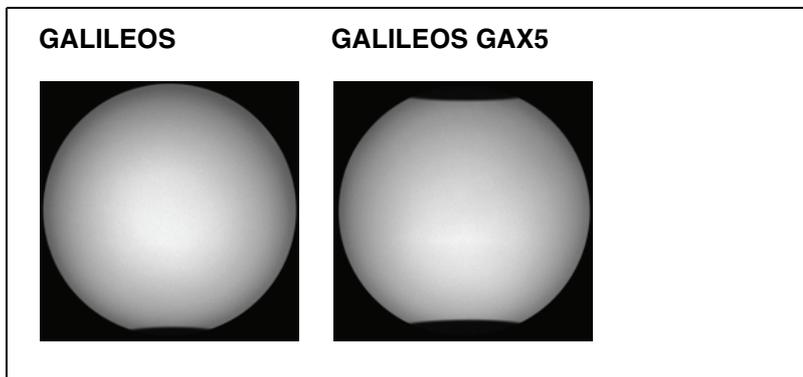
**Status column**

To the right of the menu you can see the **status column**. This column provides information about the system's current calibration state.

✓	green and checked	valid data record; <i>calibration is in progress.</i> <b>No calibration required!</b>
●	green	calibration data record present; <i>calibration has not been performed, calibration may not be sufficient.</i>
●	red	invalid data record or no record present <b>Calibration required!</b>

Additionally, the status column provides information about the current calibration step.

Click **CANCEL** to quit the **SERVICE FUNCTIONS** menu.

**Preview image**

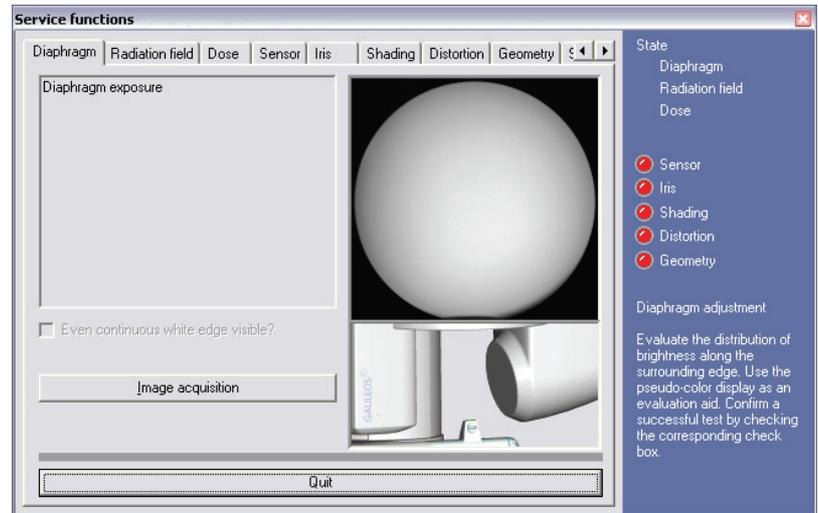
The **DIAPHRAGM** and **SHADING** submenus each contain a preview image that symbolizes the exposure to be taken during the calibration step.

Due to the varying geometry of the GALILEOS and the GALILEOS GAX5 diaphragms, the preview images displayed in these sub-menus differ slightly (see illustrations above).

We use only the display of the GALILEO in these instructions, unless explicit reference is made to the GALILEOS GAX5.

Click **CANCEL** to quit the **SERVICE FUNCTIONS** menu.

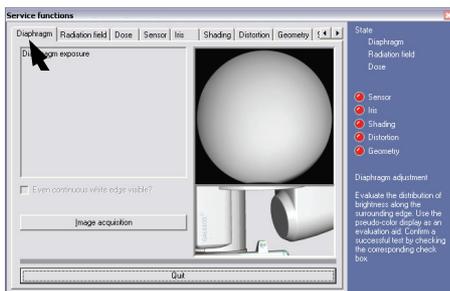
### 4.3.2 Diaphragm image/GALILEOS diaphragm adjustment



Menu: Diaphragm (GALILEOS)

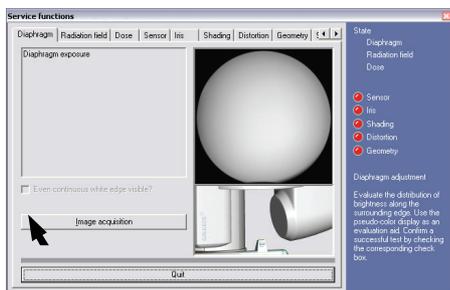
- Open the **SERVICE FUNCTIONS** menu (see page 70).

#### Selecting the DIAPHRAGM menu

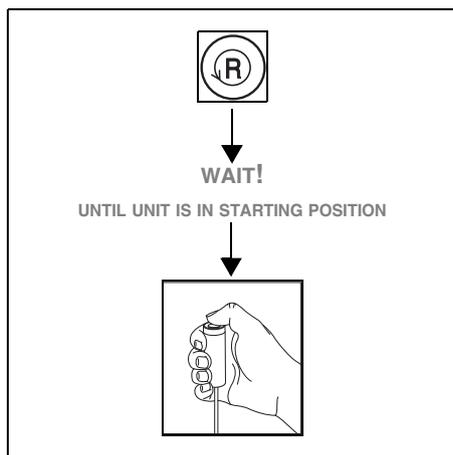


1. Select the **DIAPHRAGM** sub-menu.

#### Enabling exposure readiness



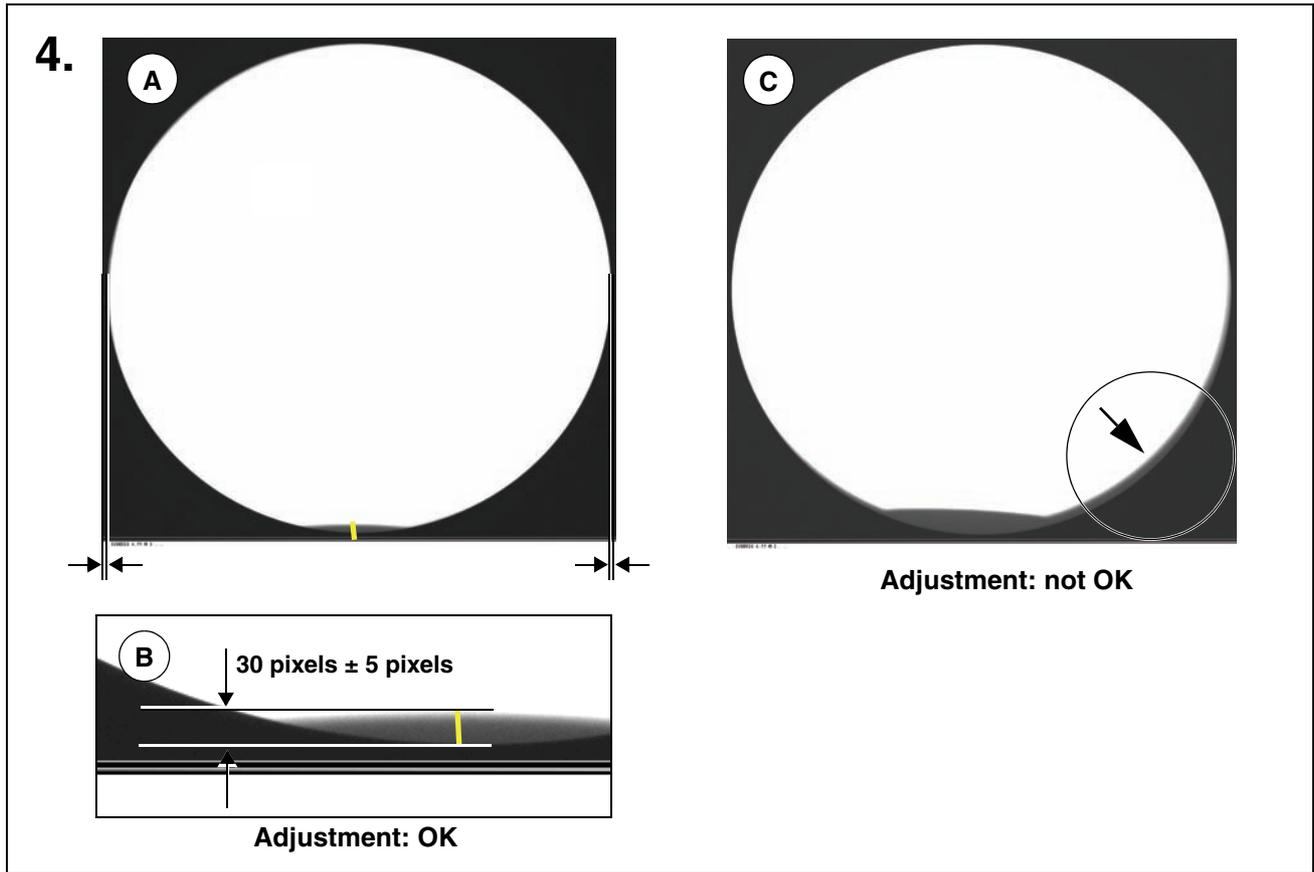
2. To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis.  
Service routine **S030.5** is displayed on the Easypad touchscreen.

**Starting the exposure**

3. Take an exposure (85 kV/21 mAs):
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.

## Evaluating the image

## 4. Evaluate the image.

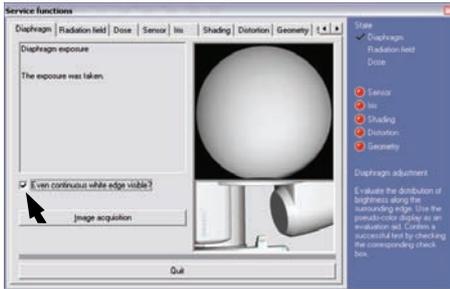


- The brightness distribution along the border surrounding the image on all sides must be uniform (**A**).
- The distance between the bottom edge and the lowest point in the image should be  $30 \pm 5$  pixels (measure with SIDEXIS scale)

**i** **NOTE**

If the distance between the bottom edge and the lowest point in the image is out of tolerance (**B**) or the brightness distribution along the surrounding border is not uniform (**C**), the diaphragm must be adjusted mechanically (see page 4-19).

### Confirming the calibration



5. If the exposure is OK (**A+B**), confirm this by clicking the check box underneath the message window.  
The box will appear checked.

- Diaphragm adjustment is now completed.
- Continue the calibration procedure with the beam field check (see page 4-26).

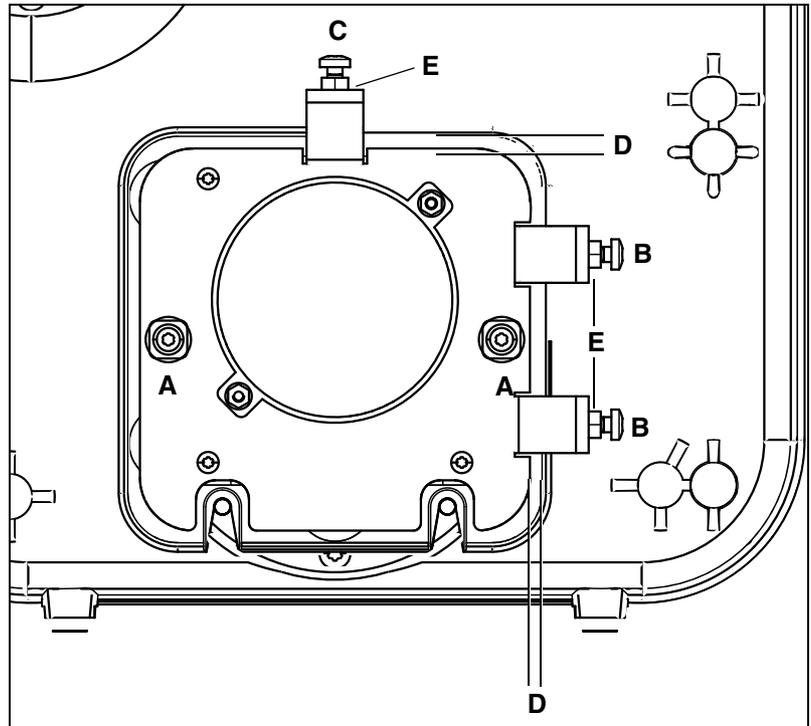
## Mechanical adjustment of the GALILEOS diaphragm

### Removing the tube assembly cover

- Remove the covers (see page 1-31):
  - Tube assembly, front
  - Tube assembly, rear

### Adjusting the diaphragm

6. Adjust the diaphragm as follows:



- Loosen both screws **A** slightly (approx. 1 turn).
- Adjust the diaphragm position by using the screws **B** (horizontal adjustment) and **C** (vertical adjustment). Depending on the adjustment direction of the diaphragm, it may be necessary to slightly loosen the corresponding locknuts **E** before the adjustment.

#### **i** NOTE

**Turning the screws to the right:** Diaphragm moves to **the right or upward**

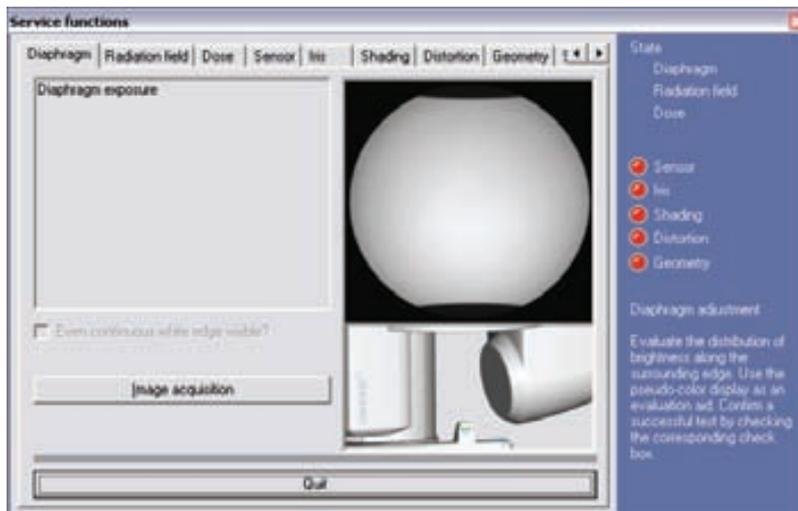
**Turning the screws to the left:** Diaphragm moves to **the left or downward**

#### **i** NOTE

To measure the shift, refer to the gap between the plastic support and the lead diaphragm (**D**).

- Retighten the screws (**A**) and the locknuts (**E**).
- Take another diaphragm exposure (see page 4-15).

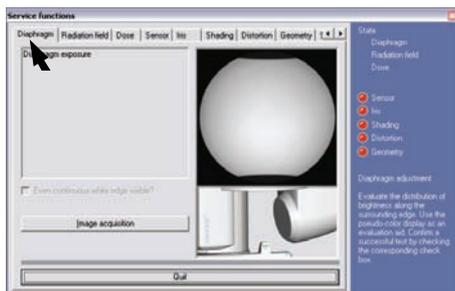
### 4.3.3 Diaphragm image/GALILEOS GAX5 diaphragm adjustment



Menu: Diaphragm (GALILEOS GAX5)

- Open the **SERVICE FUNCTIONS** menu (see page 70).

#### Selecting the DIAPHRAGM menu

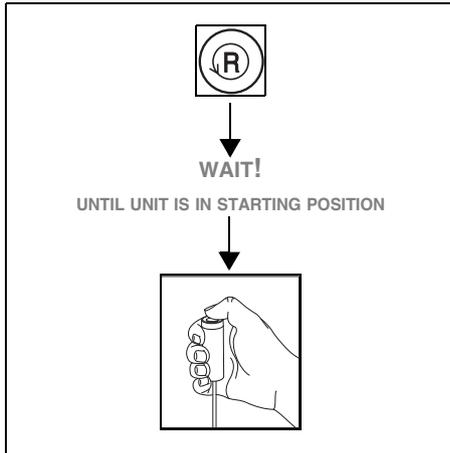


1. Select the **DIAPHRAGM** sub-menu.

#### Enabling exposure readiness



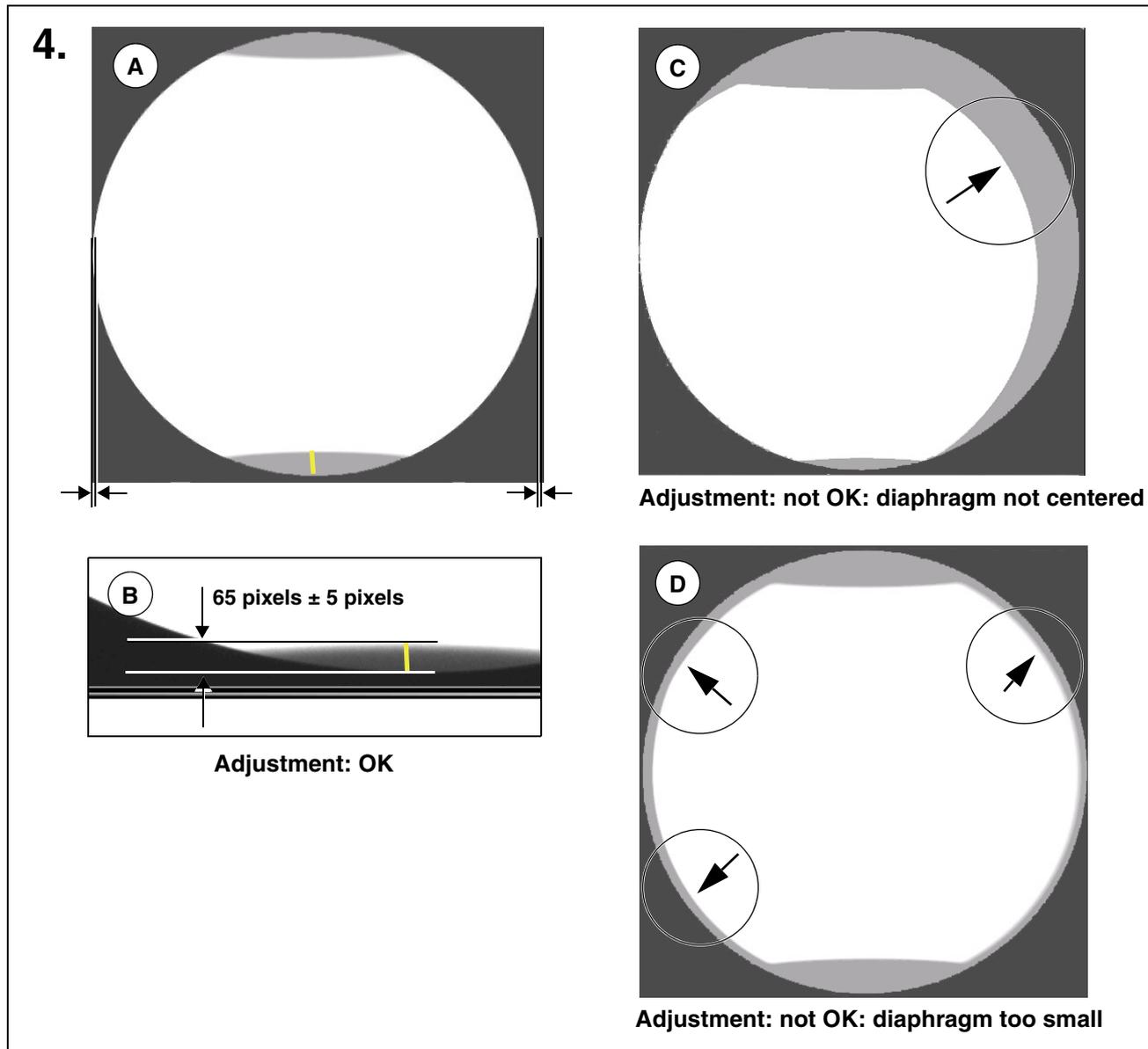
2. To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis.  
Service routine **S030.5** is displayed on the Multipad.

**Starting the exposure**

3. Take an exposure (85 kV/21 mAs):
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.

## Evaluating the image

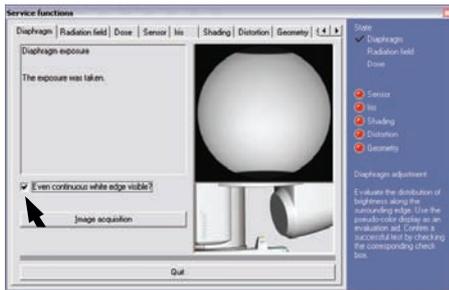
## 4. Evaluate the image.



- The brightness distribution along the border surrounding the image on all sides must be uniform (A).
- The distance between the bottom edge and the lowest point in the image should be  $65 \pm 5$  pixels (B) (measure with SIDEXIS scale)
- The brightness distribution along the surrounding border must be uniform (A).  
A shadow in the image indicates horizontal or vertical displacement of the diaphragm.
- No surrounding gray shadow should be visible (D).  
A surrounding gray shadow in the image indicates that the diaphragm is too small.

**i NOTE**

If the distance between the bottom edge and the lowest point in the image is out of tolerance (**B**) or the brightness distribution along the surrounding border is not uniform (**C**) or a surrounding gray shadow is visible in the image (diaphragm opening too small) (**D**), the diaphragm must be adjusted mechanically (see page 4-24).

**Confirming the calibration**

5. If the exposure is OK (**A+B**), confirm this by clicking the check box underneath the message window.

The box will appear checked.

- Diaphragm adjustment is now completed.
- Continue the calibration procedure with the beam field check (see page 4-26).

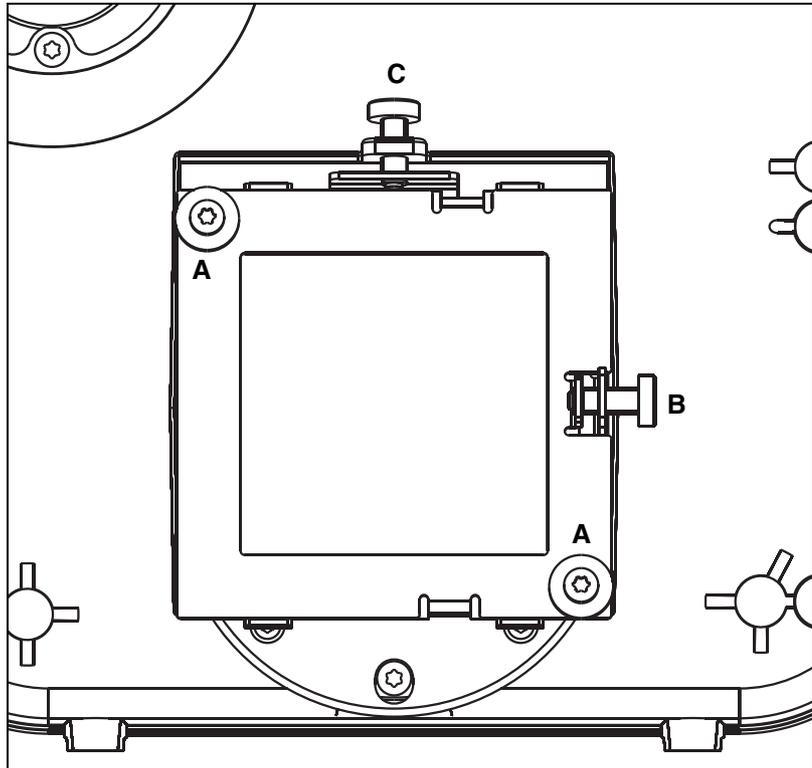
## Mechanical adjustment of the GALILEOS GAX5 diaphragm

### Removing the tube assembly cover

- Remove the covers (see page 1-31):
  - Tube assembly, front
  - Tube assembly, rear

### Horizontal and vertical diaphragm adjustment

6. Adjust the diaphragm as follows:



- Loosen both screws **(A)** slightly (approx. 1 turn).
- Adjust the diaphragm position by using screws **B** (horizontal adjustment) and **C** (vertical adjustment).

#### **i** NOTE

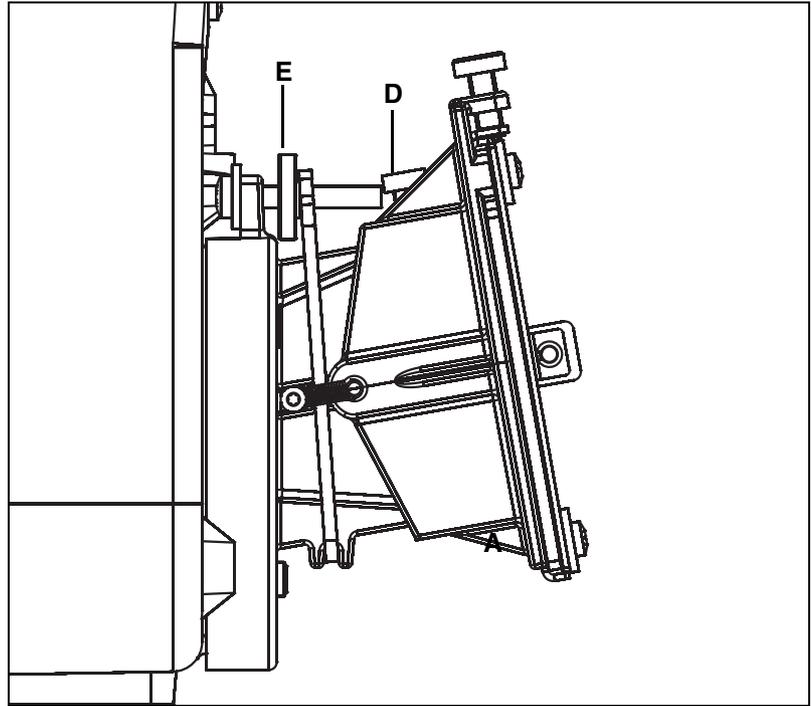
**Turning the screws to the right:** Diaphragm moves to the right or upward

**Turning the screws to the left:** Diaphragm moves to the left or downward

- Tighten screws **A** again.

**Adjusting the diaphragm size**

7. In order to adjust the size of the diaphragm opening, adjust the diaphragm distance:



- Loosen both screws **D** slightly (approx. 1 turn).
- Adjust the diaphragm distance with knurled nut **E**.

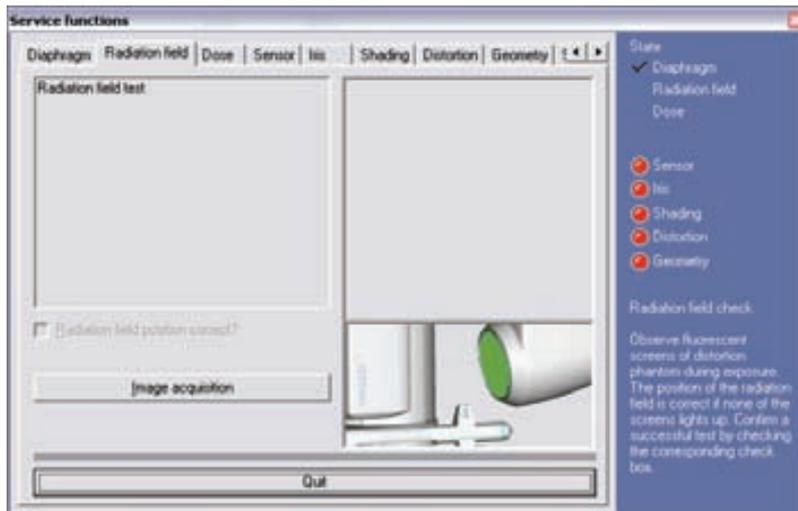
**i NOTE**

Turn the knurled nut **toward the rear**:  
the image on the X-ray detector becomes **larger**.

Turn the knurled nut **toward the front**:  
the image on the X-ray detector becomes **smaller**.

- Tighten the screw (**D**) firmly.
- Take another diaphragm exposure (see page 4-20).

## 4.3.4 Checking the beam field

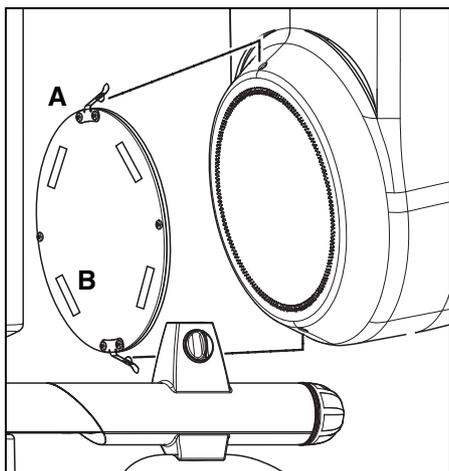


Menu: Beam Field

**i** NOTE

*Illumination must be checked once the diaphragm has been adjusted.*

## Clipping on the distortion phantom



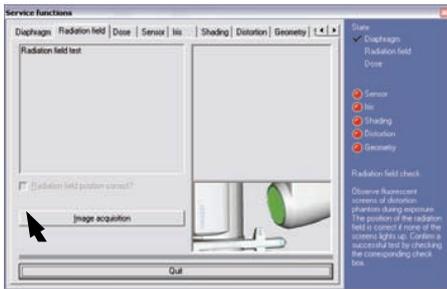
1. Clip distortion phantom **A** onto the X-ray detector cover.

## Selecting the BEAM FIELD menu



2. Go to the **BEAM FIELD** sub-menu.

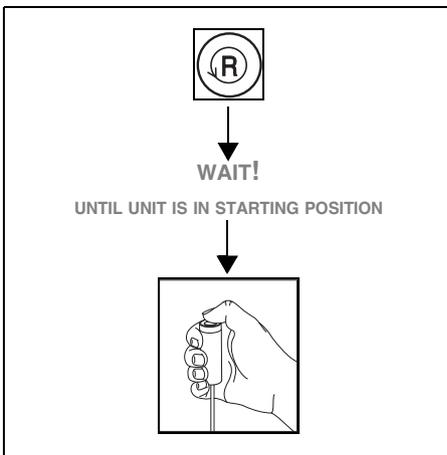
**Enabling exposure readiness**



- To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**

The exposure dialog box showing the exposure status appears in Sidexis. Service routine **S002.6** is displayed on the control panel touchscreen.

**Checking the beam field**

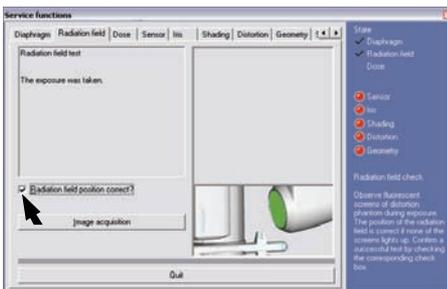


- To check the beam field:
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button while checking the distortion phantom. Lighting strips **B** on the distortion phantom **must not light up!**

**i NOTE**

*If the strips on the phantom light up at all, the system is overexposed, and you cannot continue the adjustment. In this case, repeat the diaphragm adjustment procedure and then check the beam field again. If the lighting strips still light up during the re-check of the beam field, contact the SIRONA Customer Service Center (KSC) to solve the problem.*

**Confirming the calibration**



- To confirm that the lighting strips on the distortion phantom are not lit, click the check box underneath the message window.

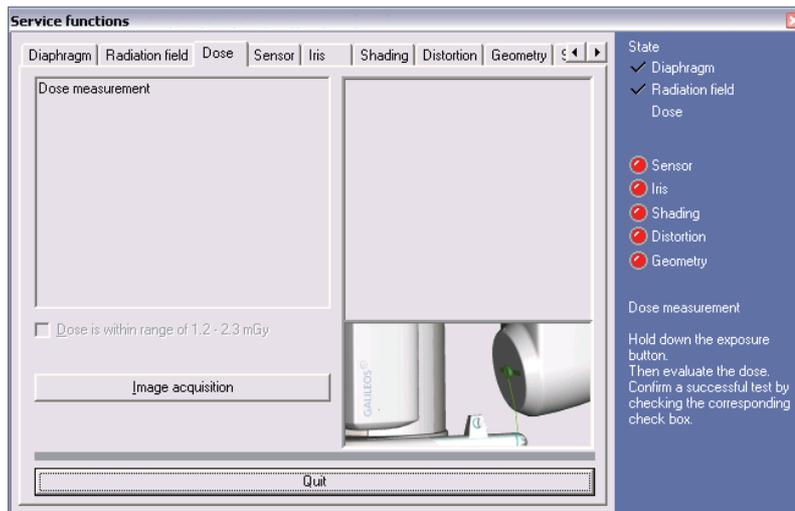
The box will appear checked.

- The beam field check is now completed.
- Continue the calibration with dosimetry (see page 4-28).

**i NOTE**

*Leave the distortion phantom on the unit for the next calibration step.*

## 4.3.5 Dosimetry



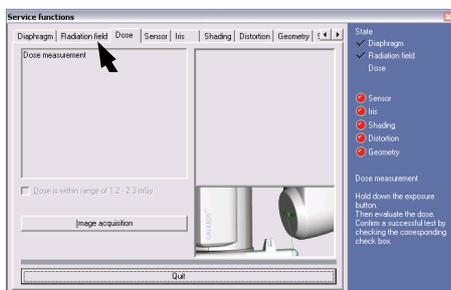
Menu: Dose

### **i** NOTE

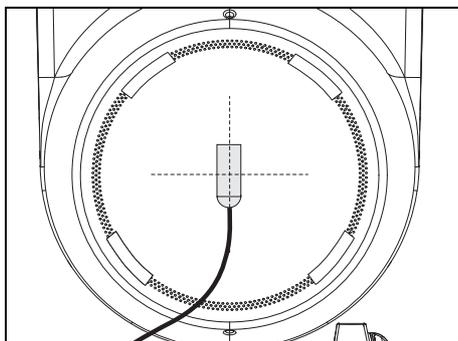
A dose measurement device (e.g. Mult-O-Meter type 510L) is required for dosimetry.

The distortion phantom should be clipped onto the X-ray detector cover during the dose measurement process for protection against scratching.

#### Selecting the DOSE menu



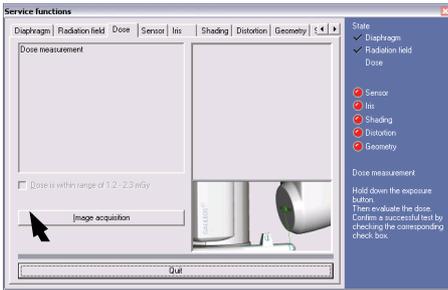
#### Connecting the sensor and Mult-O-Meter



1. Go to the **DOSE** submenu.

2. Attach the Mult-O-Meter sensor approximately in the middle of the distortion phantom mounted on the X-ray detector.

**Enabling exposure readiness**

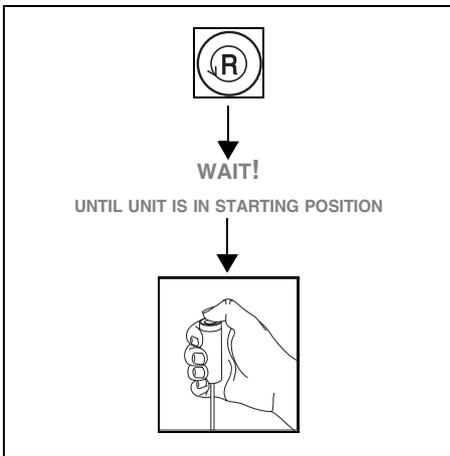


- To make SIDEXIS XG ready for exposure:

Click **IMAGE ACQUISITION**

The exposure dialog box showing the exposure status appears in Sidexis. Service routine **S011.8** is displayed on the control panel.

**Releasing radiation**



- To release radiation (85 kV/28 mAs):

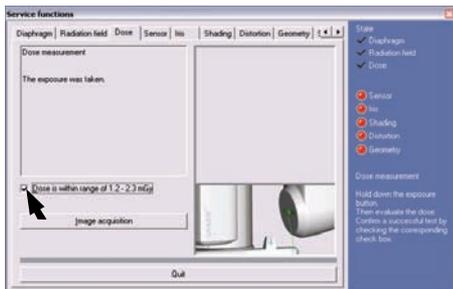
- Press the **R key** to move the unit back to the starting position.
- Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard. Read the dose shown on the Mult-O-Meter.

The value must be between 1.2 and 2.3 mGray.

**i NOTE**

*If the value is outside the permissible range (1.2 to 2.3 mGray), check the X-ray tube assembly.*

**Confirming the calibration**

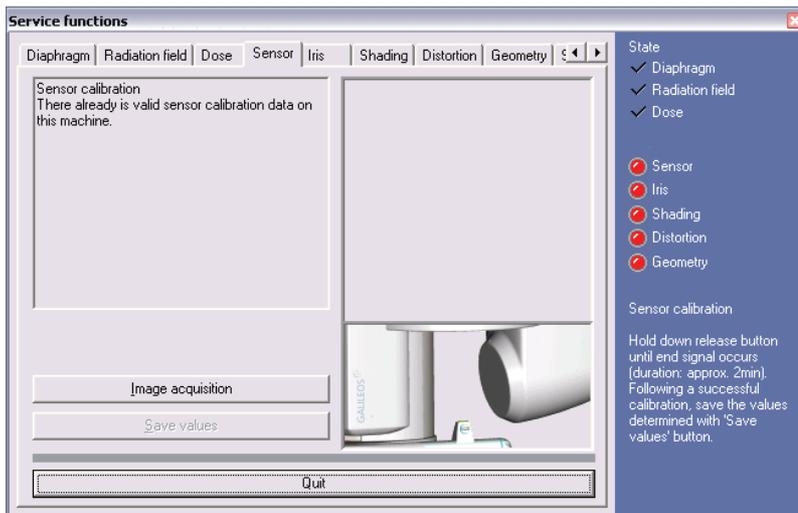


- To confirm that the dose is within the **permissible range between 1.2 and 2.3 mGray**, click the check box underneath the message window.

The box will appear checked.

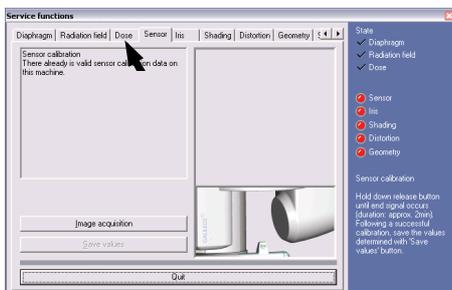
- Remove the sensor from the distortion phantom and take the phantom off the X-ray detector.
- Dosimetry is now complete.
- Continue the calibration with sensor calibration (see page 4-30).

## 4.3.6 Sensor calibration



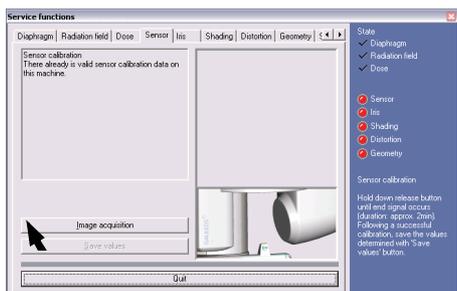
Menu: Sensor

## Selecting the SENSOR menu



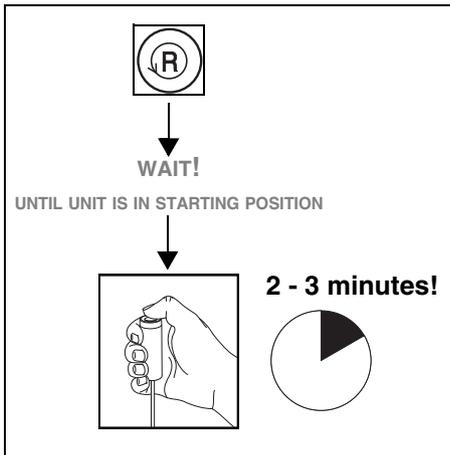
1. Go to the **SENSOR** submenu.

## Enabling exposure readiness



2. To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis.  
Service routine **S010.14** is displayed on the control panel touchscreen.

**Starting the exposure**



3. Take an exposure:
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal for end of exposure (double beep) sounds – **this takes approx. 2 - 3 minutes!**

The unit transfers the acquired images to the Reconstruction and Control Unit (RCU). This process can take 2 – 3 minutes.

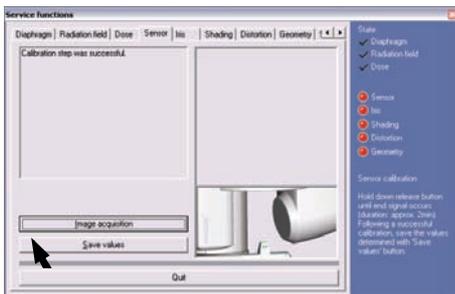
Once the transfer is complete, the evaluation of the sensor calibration is displayed in the message window.

**i NOTE**

*If the information in the message window indicates that calibration is not ok and/or not possible, keep repeating the procedure starting with Step 2 until calibration is ok and/or possible.*

*If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center (CSC).*

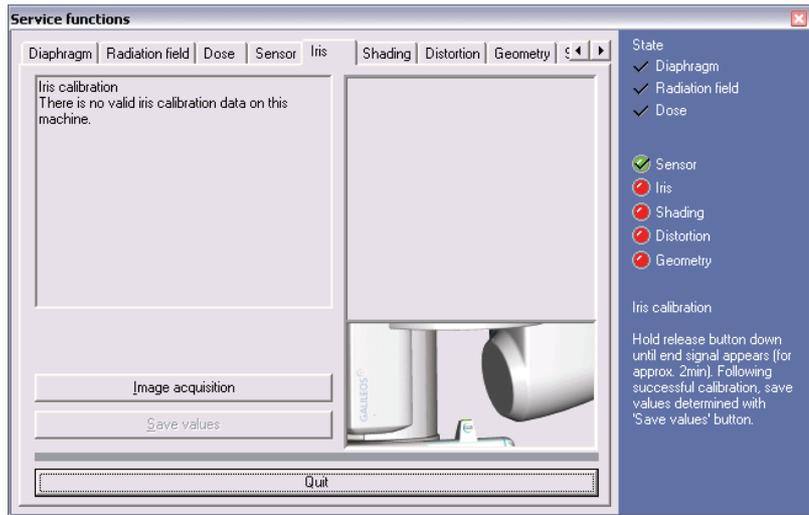
**Saving the values**



4. If the calibration is OK or possible (see left), save the calibration by clicking **SAVE VALUES**.

- The sensor calibration is now complete.
- Continue the calibration with iris calibration (see page 4-32).

### 4.3.7 Iris calibration

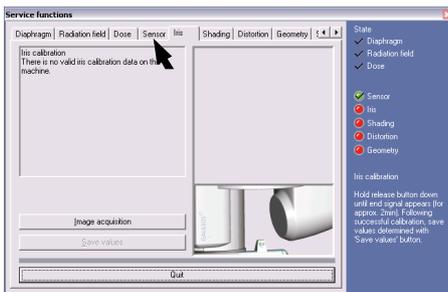


Menu: Iris

**i** **NOTE**

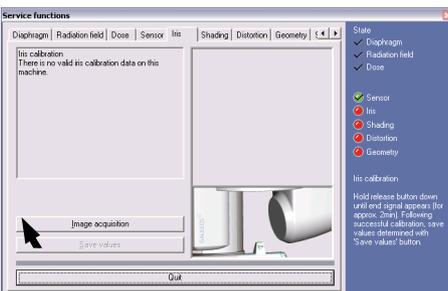
When a new iris calibration is saved, all calibration data in the list are set to "invalid" (red LEDs).

#### Selecting the IRIS menu



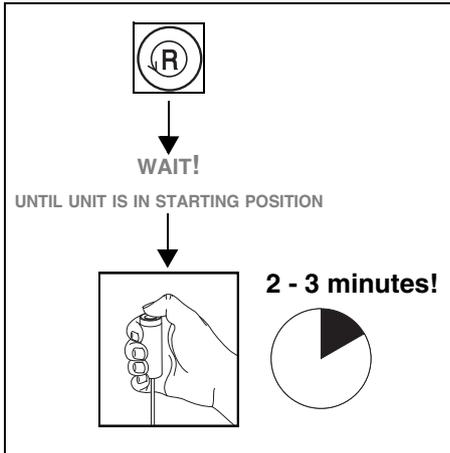
1. Go to the IRIS submenu.

#### Enabling exposure readiness



2. To make SIDEXIS XG ready for exposure: Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis. Service routine **S010.10** is displayed on the control panel touchscreen.

### Starting the exposure



### 3. Take an exposure:

- Press the **R key** to move the unit back to the starting position.
- Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.

The unit transfers the acquired images to the Reconstruction and Control Unit (RCU) – **this takes approx. 2 - 3 minutes!**

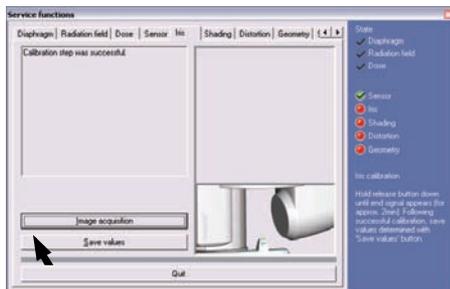
Once the transfer is complete, the evaluation of the iris calibration is displayed in the message window.

### **i** NOTE

*If the information in the message window indicates that calibration was not successful, keep repeating the procedure starting with step 2 until calibration is ok.*

*If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center.*

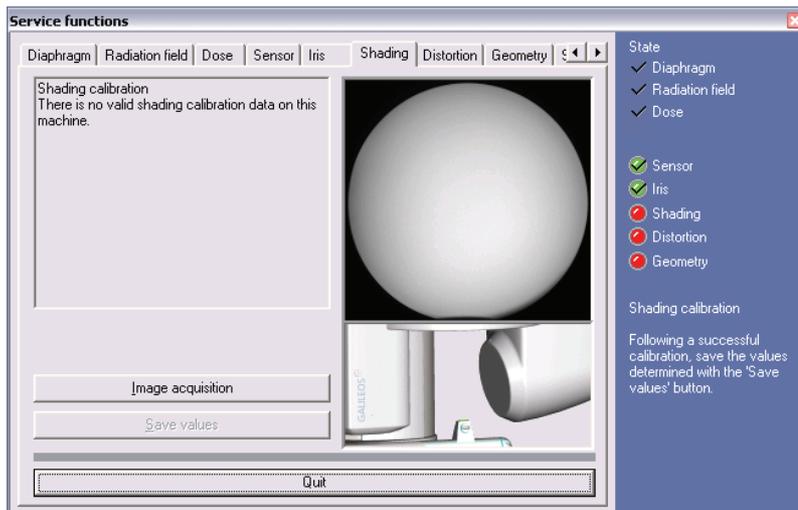
### Saving the values



### 4. If calibration was successful, click **SAVE VALUES** to save the calibration.

- The iris calibration is now complete.
- Continue the calibration with shading calibration (see page 4-34).

## 4.3.8 Shading calibration

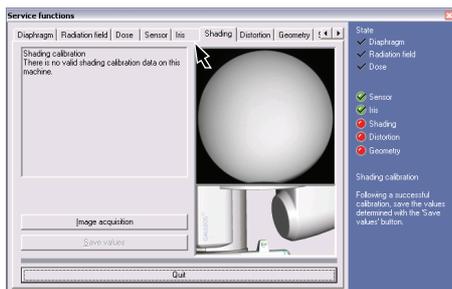


Menu: Shading

### **i** NOTE

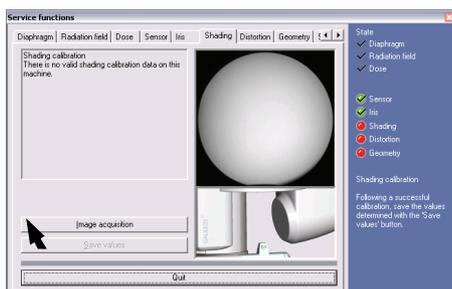
When a new shading calibration is saved, all calibration data in the list are set to "invalid" (red LEDs).

#### Selecting the SHADING menu



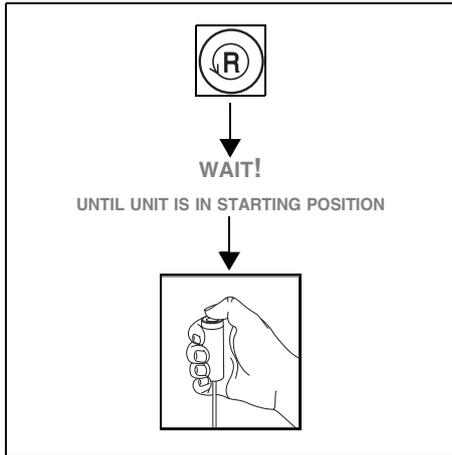
1. Go to the **SHADING** submenu.

#### Enabling exposure readiness

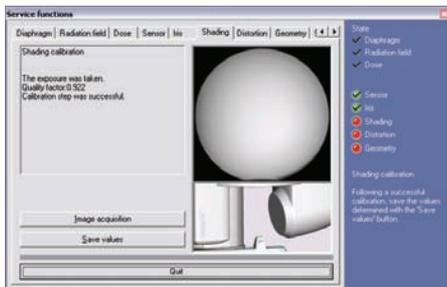


2. To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis.  
Service routine **S010.11** is displayed on the control panel touchscreen.

**Starting the exposure**



3. Take an exposure (85 kV/42 mAs):
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.



The shading exposure and the evaluation of the shading calibration is displayed.

**i NOTE**

*If the information in the message window indicates that calibration was not successful, keep repeating the procedure starting with step 2 until calibration is ok.*

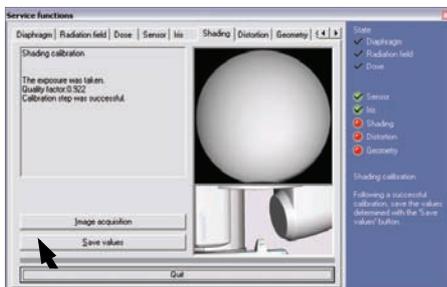
*If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center.*



**! CAUTION**

*No foreign bodies may be visible on the shading exposure. If this is the case, check the beam path for foreign bodies and remove them if applicable. Repeat the calibration.*

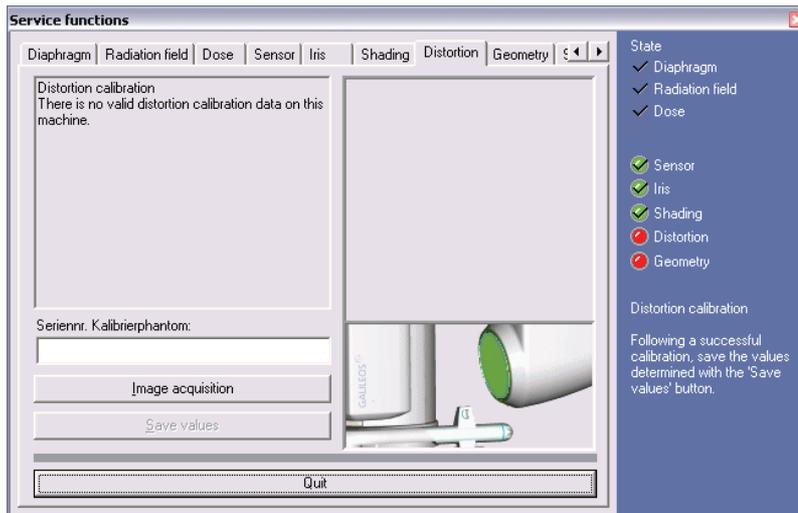
**Saving the values**



4. If calibration was successful, click **SAVE VALUES** to save the calibration.

- The shading calibration is now complete.
- Continue the calibration with distortion calibration (see page 4-36).

## 4.3.9 Distortion calibration

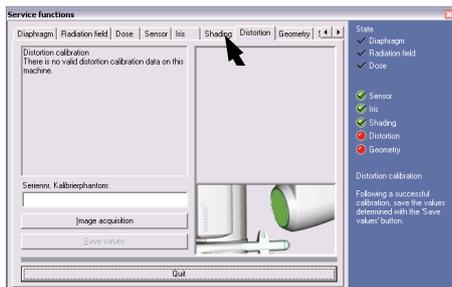


Menu: Distortion

### **i** NOTE

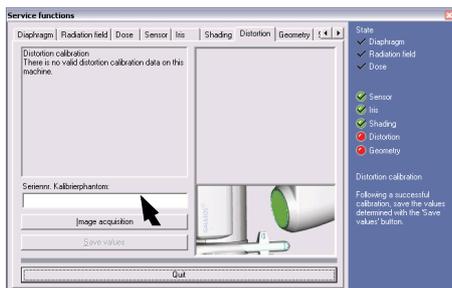
When a new distortion calibration is saved, the geometric calibration is set to "invalid" (red LED).

#### Selecting the DISTORTION menu



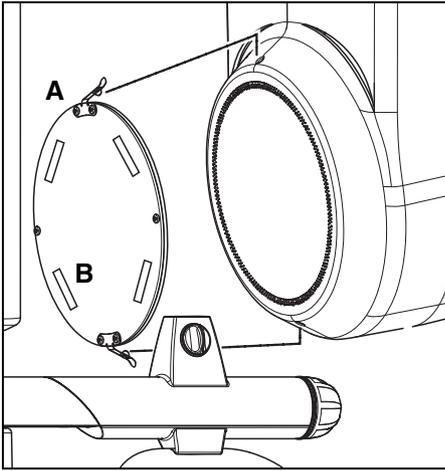
1. Go to the **DISTORTION** submenu.

#### Entering the serial number of the distortion phantom.



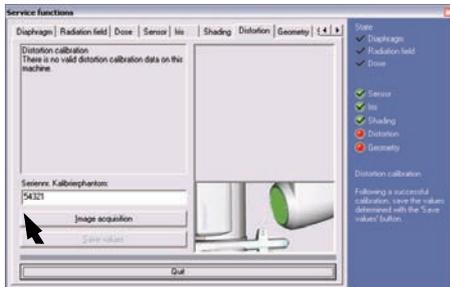
2. Read off the serial number of distortion phantom **A** (see page 4-26) from the ID label of the phantom and enter it in the text box located in the **DISTORTION** submenu.

## Clipping on the distortion phantom



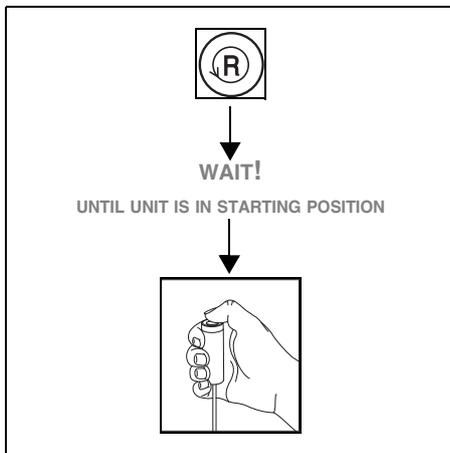
- Clip the distortion phantom **A** onto the X-ray detector cover.

## Enabling exposure readiness



- To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis.  
Service routine **S010.12** is displayed on the control panel touchscreen.

## Starting the exposure



- Take an exposure (85 kV/42 mAs):
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.

The unit transfers the acquired images to the Reconstruction and Control Unit (RCU). This process can take 2 – 3 minutes.

Once the transfer is complete, the evaluation of the distortion calibration is displayed in the message window.

**i** **NOTE**

*If the information in the message window indicates that calibration was not successful, check the calibration phantom to make sure that it is not damaged.*

*If the phantom checks out OK (all balls are present and correctly positioned), repeat the procedure starting with point 3 as often as required until the calibration is OK.*

*If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center.*

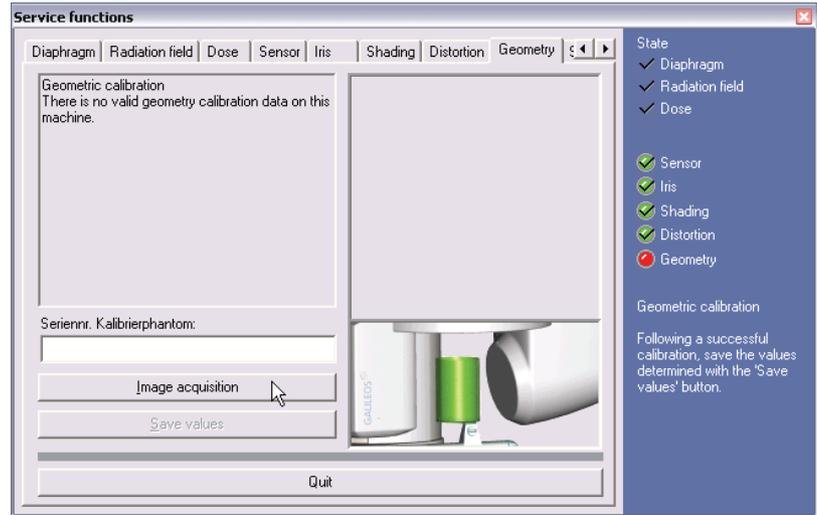
**Saving the values**

6. If calibration was successful, click **SAVE VALUES** to save the calibration.



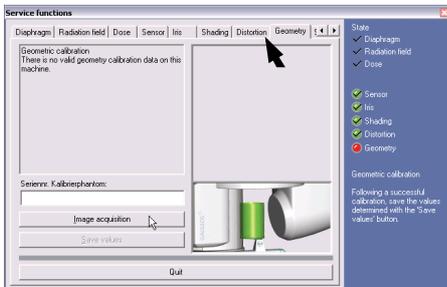
- Remove the distortion phantom.
- The distortion calibration is now complete.
- Continue the calibration with geometry calibration (see page 4-39).

### 4.3.10 Geometry calibration

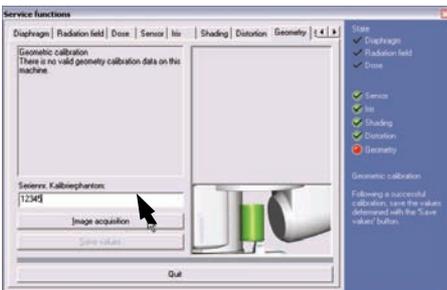


Menu: Geometry

#### Selecting the GEOMETRY menu



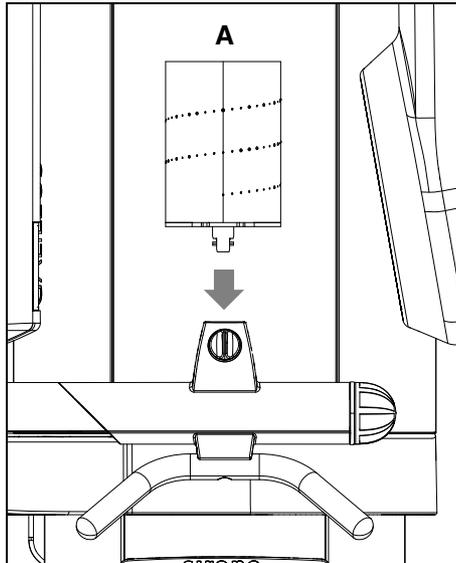
#### Entering the serial number of the geometric phantom.



1. Go to the **GEOMETRY** submenu.

2. Read off the serial number of geometric phantom **A** (see page 4-40) from the ID label of the phantom and enter it in the input field located in the **GEOMETRY** submenu.

### Inserting the geometric phantom

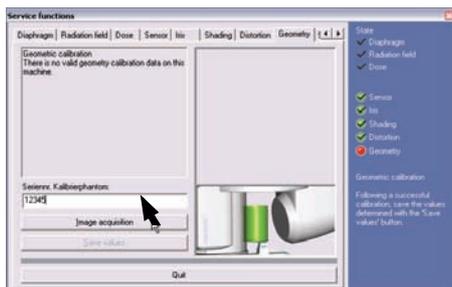


3. Insert the geometric phantom **A** into the bite block holder of the unit.

#### **i** NOTE

Make sure that the phantom is securely fastened and in an upright position in the bite block holder of the unit.

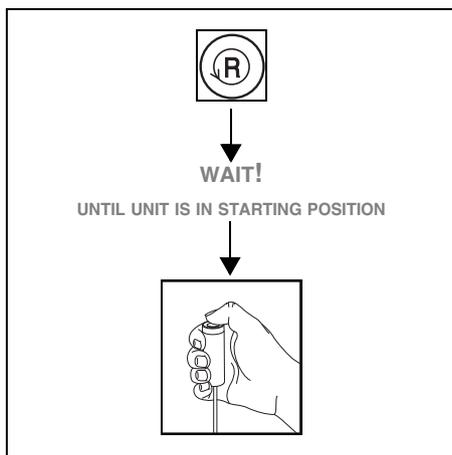
### Enabling exposure readiness



4. To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**

The exposure dialog box showing the exposure status appears in Sidexis. Service routine **S010.13** is displayed on the control panel touchscreen.

### Starting the exposure



5. Take an exposure (85 kV/42 mAs):
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until image acquisition is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.

The unit transfers the acquired images to the Reconstruction Control Unit (RCU). This process can take 2 – 3 minutes.

Once the transfer is complete, the evaluation of the calibration is displayed in the message window.

**i NOTE**

If the information in the message window indicates that calibration was not successful, check the calibration phantom to make sure that it is not damaged.

If the phantom checks out OK (all balls present are and correctly positioned), repeat the procedure starting with point 3 as often as required until the calibration is OK.

If you have repeated the procedure three times and still have not attained a positive result, please check the mechanical geometry of the unit (see Section 4-7). Adjust the unit if necessary and then repeat the calibration.

If this still does not lead to a positive result, please contact the SIRONA Customer Service Center.

**Saving the values**

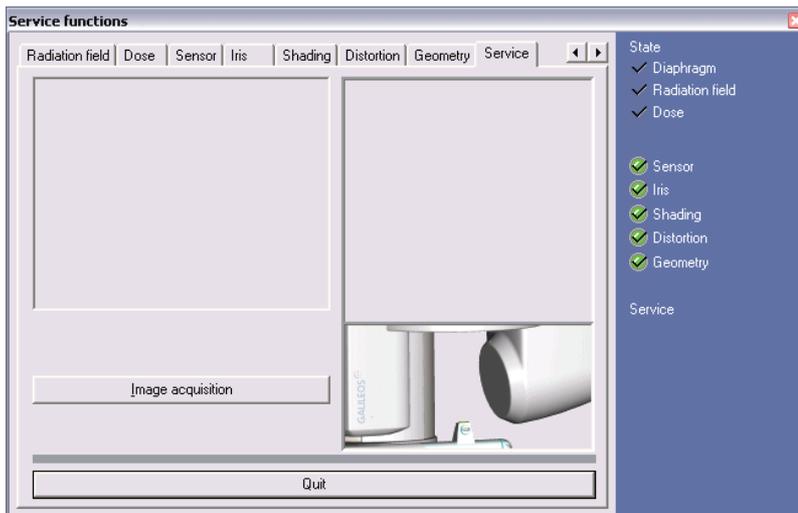
- If calibration was successful, save the calibration by clicking **SAVE VALUES**.

- Remove the geometric phantom.
- The calibration of GALILEOS is now complete.**

**! CAUTION**

After every calibration of the unit the reference values for the constancy measurement must be redetermined and entered in the "Test results" form, "Reference value" column (see section 4.5).

### 4.3.11 Service menu

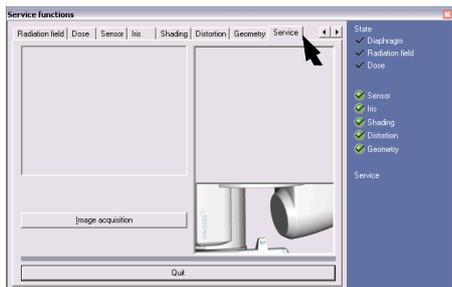


Menu: Service

#### **i** NOTE

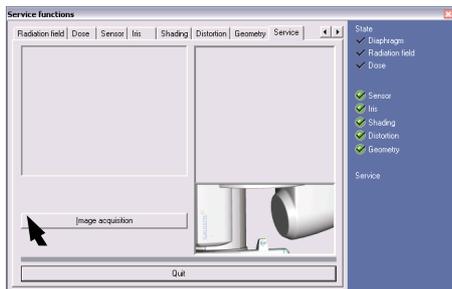
You can create a test image with the **SERVICE** sub-menu. It is not necessary to execute this menu **for the calibration of the unit!!!**

#### Selecting the SERVICE menu

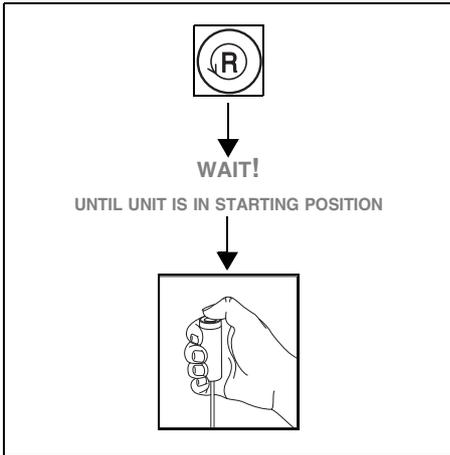


1. To create a test image, go to the **SERVICE** submenu.

#### Enabling exposure readiness



2. To make SIDEXIS XG ready for exposure:  
Click **IMAGE ACQUISITION**  
The exposure dialog box showing the exposure status appears in Sidexis.  
Service routine **S032.41** is displayed on the control panel touchscreen.

**Starting image transfer**

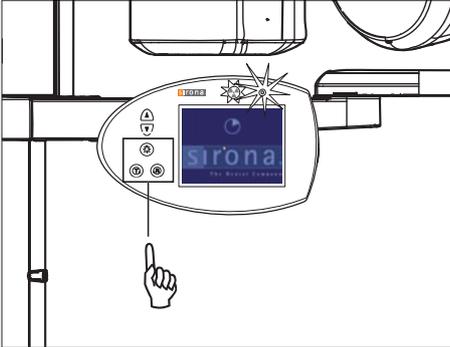
3. Start the image transfer:
  - Press the **R key** to move the unit back to the starting position.
  - Press the release button. Hold down the release button until the image transfer is completed and the acoustic signal that indicates the end of the exposure (double beep) can be heard.

**CCD test image**

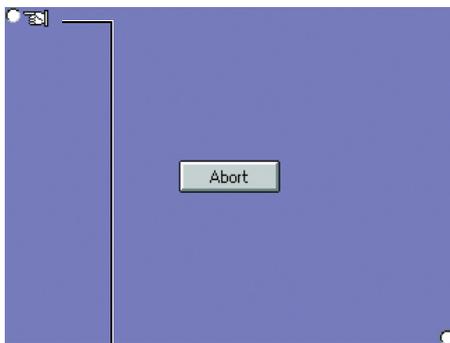
The CCD test image is displayed.

## 4.4 Checking/calibrating the touchscreen (for GALILEOS only)

### Switching the unit ON



### Performing a calibration



see next page

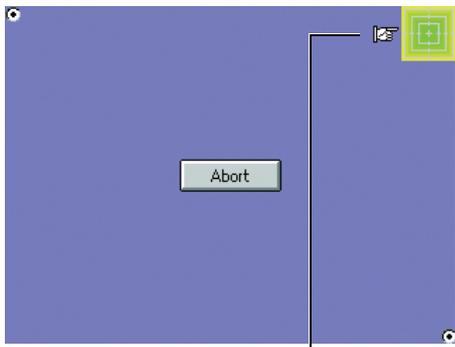
1. Switch the unit ON.
2. When the start screen appears (see above), press the **light localizer**, **T** and **R** keys immediately and simultaneously.

#### **i** NOTE

*These keys must be pressed while the unit is booting and the start screen is displayed.*

The **first** adjustment screen appears on the display.

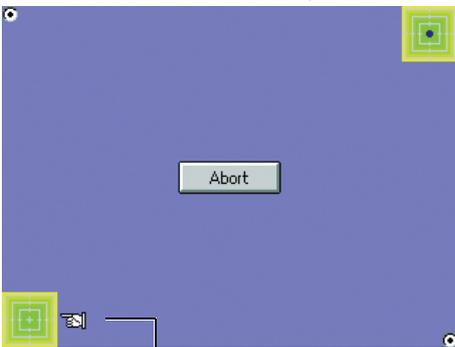
3. Calibrate the touchscreen:
  - Touch the **upper left** corner.  
The **second** adjustment screen appears on the display.
  - Touch the **lower right** corner.  
The **third** adjustment screen appears on the display.



- Touch the center of the green square in the **upper right** corner.  
The **fourth** adjustment screen appears on the display.

**i** **NOTE**

*Try to place the black dots which then appear as close to the centers of the squares as possible by touching the centers of the squares.*



- Touch the center of the green square in the **lower left** corner.  
The **fifth** adjustment screen appears on the display.



- Confirm the adjustment with **YES**.  
The touchscreen is now adjusted.

To repeat the adjustment, touch **NO**.

You can abort the adjustment at any time by pressing the **ABORT** button.

## 4.5 Reference images for the constancy test

The production of reference images is referred to as "Acceptance test" in the software and in the present document.

The reference image must be taken by a service engineer (password-protected area)!

The acceptance test should be performed by the service engineer immediately after the installation of the GALILEOS unit.

### 4.5.1 Note unit data

- Note down the unit data of the GALILEOS unit concerned as well as the results in the "Test results" form.



#### **NOTE**

*You will find the "Test results" form...*

*...in Germany in the "X-ray System Logbook"*

*...in all other countries in the folder "GALILEOS/GALAXIS" behind the "Quality test" document.*

---

### 4.5.2 Preparing the X-ray device



#### **NOTE**

*Observe the operating instructions.*

---

Make sure that no foreign particles are located in the beam path of the X-ray device and that the X-ray device is in its starting position.

- Remove the bite block from the bite block holder.

### 4.5.3 Starting the constancy test program

If more than 30 days (configuration under **UTILITIES/CONFIGURE SYSTEM.../CONSTANCY TEST**) have elapsed since the acceptance test or the last constancy test, a dialog box reminding you that the constancy test is overdue may appear after the start of SIDEXIS XG.

- Confirm with **OK**.



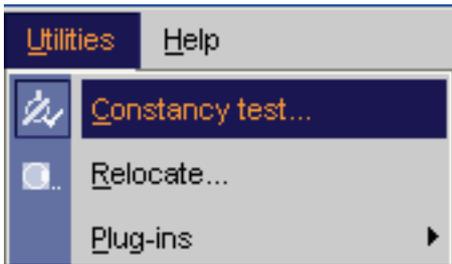
#### **NOTE**

*The time interval refers to the last constancy test that was performed on this PC.*

*The program makes no distinction between different X-ray devices.*

*The system owner is responsible for determining which X-ray device is due for a new constancy test.*

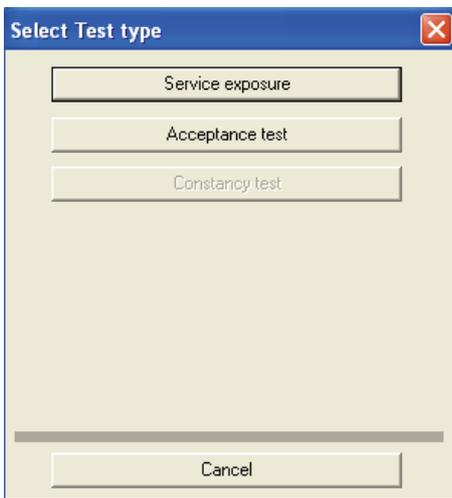
---

**Start**

1. Start SIDEXIS XG.
2. Select the **CONSTANCY TEST** menu option on the **UTILITIES** menu bar. The test program starts.

**4.5.4 Enabling exposure readiness on the PC**

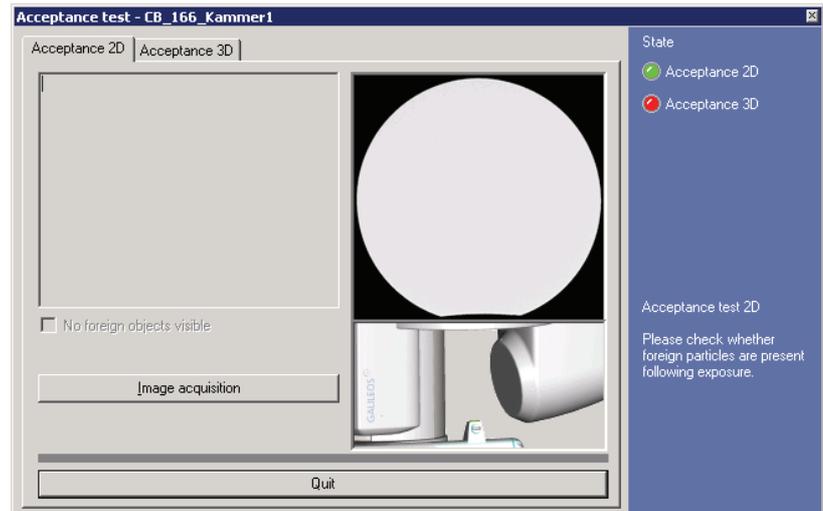
1. Click the **3D IMAGE** button on the left tool bar or click the menu option **3D X-RAY** on the **TEST** menu bar. The **SELECT TEST TYPE** dialog box appears.



2. Click the **ACCEPTANCE TEST** button. The acceptance test window appears.

**i NOTE**

*Due to the varying geometry of the GALILEOS and the GALILEOS GAX5 diaphragms, the preview images displayed in this menu differ slightly (see section 4.3.1).*



### 4.5.5 Taking and evaluating exposures

The acceptance test is performed via the "Acceptance test" dialog box.

Two different X-ray exposures are taken.

- 2D X-ray image (without test phantom)
- 3D X-ray image (with test phantom)

#### Prerequisite

The **ACCEPTANCE TEST** dialog box opens (see section 4.5.4).

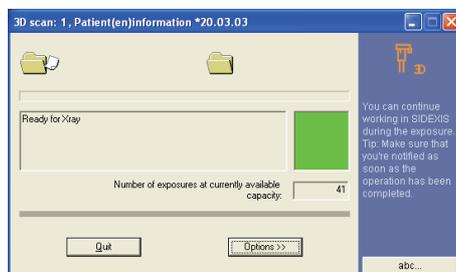
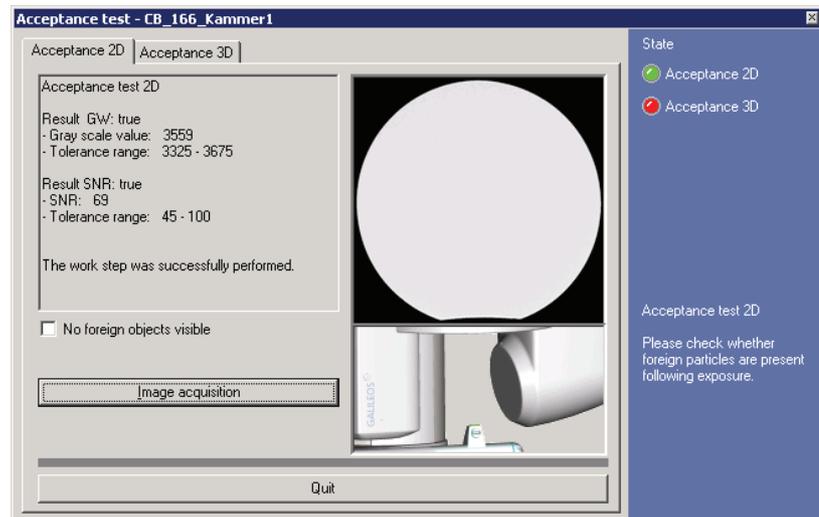
### 2D X-ray image (without test phantom)

#### **i** NOTE

*No bite block or test phantom may be located in the bite block holder during the X-ray exposure.*

#### Exposure

1. Select the **ACCEPTANCE2D** tab.



2. Click the **IMAGE ACQUISITION** button.  
The exposure readiness dialog box opens.



3. Move the GALILEOS unit to its starting position (Press Return key **R** on the control panel).

**4.** Release an exposure.

The X-ray exposure of the 2D acceptance test is displayed on the user interface.

On completion of the exposure, the program performs measurements.

If these measurements check out OK, the results are displayed in the test field.

**5.** Enter the result of the gray level measurement (GW) and the result of the pixel noise measurement (SNR) in the "Test results" form (Reference value column).

---

**i** **NOTE**

*Starting with unit software version V03.05, the values are based on uncorrected raw data. Therefore they differ from values measured earlier.*

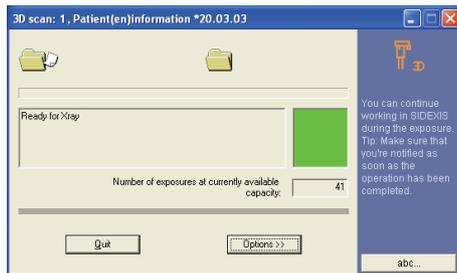
---

**Visual check**

1. Check the X-ray exposure from the 2D acceptance test for foreign particles (e.g. inserted bite block).
2. Activate the **NO FOREIGN PARTICLES VISIBLE** check box if no foreign particles are visible in the X-ray image of the 2D constancy test and enter the result in the "Test results" form.

The **ACCEPTANCE 2D** test is then marked by a green signal light with a checkmark in the status area.

## Exposure



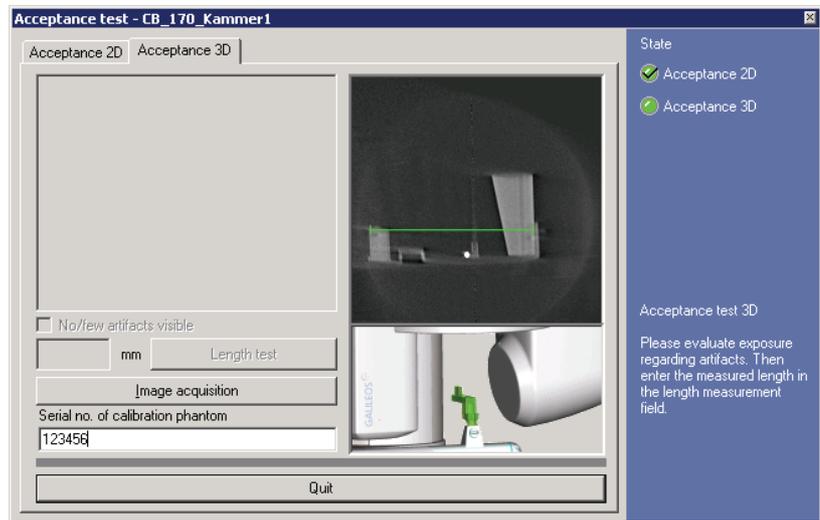
## 3D X-ray image (with test phantom)

1. Change to the **ACCEPTANCE3D** tab.
2. Read the serial number on the identification label of the used phantom and enter this in the input field of the **ACCEPTANCE 3D** tab.
3. Insert the test phantom in the bite block holder.
4. Click the **IMAGE ACQUISITION** button.  
The exposure readiness dialog box opens.

5. Move the GALILEOS unit to its starting position (Press Return key **R** on the control panel).
6. Release an exposure.

The X-ray image of the 3D acceptance test appears on the user interface. On completion of the exposure, the program performs measurements.

If these measurements are OK, the results are displayed in the test field and the **ACCEPTANCE3D** test is marked with a green signal light in the status area.



7. Enter the result of the low contrast measurement (LowContrast) in the "Test results" form.
8. Enter the result of the modulation transfer function measurement (MTF10) in the "Test results" form.

**Visual check****Artifacts**

1. Check the X-ray images of the 3D acceptance test. No strong artifacts should be evident.
2. If the result is positive, activate the **NO/FEW ARTIFACTS VISIBLE** check box and enter the result in the "Test results" form.

**Length measurement**

1. Select the **MEASURE LENGTH** menu option on the **ANALYSIS** menu bar.
2. Determine the starting point of the length measurement with the mouse pointer.
3. While holding the left mouse button down, drag the mouse pointer to the end point of the length measurement.  
The distance between the two points in millimeters is displayed in the status bar at the bottom edge of the program window.
4. Enter this value in the text box.
5. Press the **LENGTH TEST** button.  
If the value entered is within tolerance, the green signal light of the **ACCEPTANCE3D** test is marked with a check mark in the Status column.
6. Enter the value measured in millimeters in the "Test results" form.

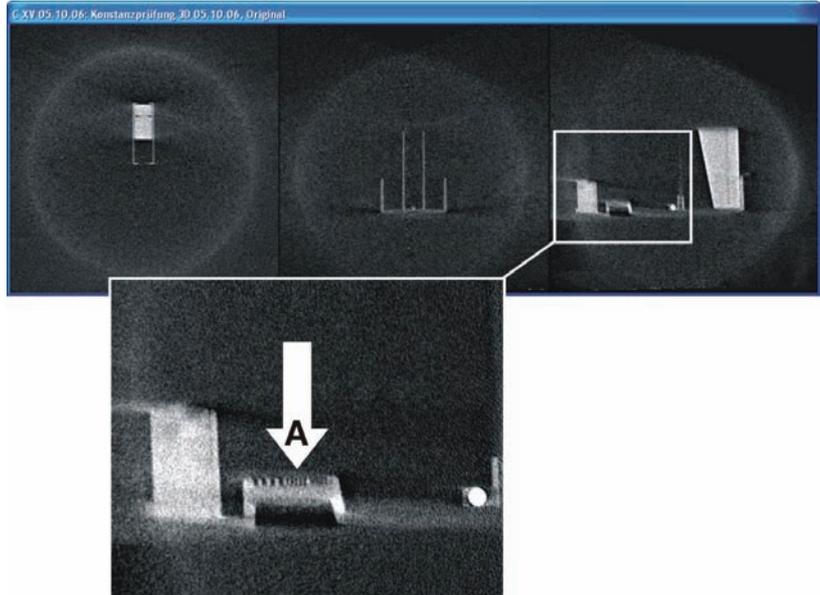
---

## Checking the high contrast resolution

In addition to the electronic measurement value logging of the acceptance test, the high contrast resolution of the generated X-ray image also must be checked visually.

A comb-shaped test element (**A**) inside the test phantom is used for this purpose.

### Exam workspace



### Check

---

#### **i** NOTE

For the examination, the part being examined (see illustration) must be sufficiently magnified in the software user interface.

The center lines of the comb-shaped test element (A) must be visible (1.4 Lp/mm).

1. Check the high contrast resolution of the comb-shaped test element (**A**).
2. Enter the result of the high contrast resolution in the "Test results" form.
3. Quit the acceptance test dialog box by clicking the **EXIT** button.
4. Remove the test phantom from the bite block holder.

### 4.5.6 Storing the exposure



- Close the image:
    - Click the **CLOSE IMAGE** button on the left toolbar.
  - or
  - Close the image by activating the **CLOSE** option on the **TEST** menu bar.
- The image is now stored.

---

 **CAUTION**

***If any test phantom images are not OK:***

*If the test phantom image does not comply with the requirements specified, you must remedy the problem. E.g. check the unit adjustment. Subsequently you must repeat the acceptance test.*

---

### 4.5.7 Exiting the constancy test program

---

 **NOTE**

*You must terminate all test programs before exiting the constancy test program.*

---

- To exit the constancy test program, click **UTILITIES** on the menu bar and then **CONSTANCY TEST** in the menu window.

4.5.8 Sample for the "Test results" form

**TEST RESULTS**  
 on the Constancy Test of Dental X-ray Equipment  
**GALILEOS X-ray unit in connection with SIDEXIS XG**

**X-ray system:**

Name/designation and location in the dental practice \_\_\_\_\_  
 Serial number of complete system \_\_\_\_\_  
 Serial number of X-ray tube assembly \_\_\_\_\_  
 Serial number of X-ray tube \_\_\_\_\_  
 Serial number of X-ray detector \_\_\_\_\_  
 Serial number of test phantom \_\_\_\_\_

**Test results:**

Year: .....	Month:	Reference value	1	2	3	4	5	6	7	8	9	10	11	12
<b>2D X-ray image (without test phantom)</b>														
- Grayscale value (GW)	.....	<input type="checkbox"/>												
- Image element noise (SNR)	.....	<input type="checkbox"/>												
- No impurity visible		<input type="checkbox"/>												
<b>3D X-ray image (with test phantom)</b>														
- Low contrast		<input type="checkbox"/>												
- Low contrast resolution		<input type="checkbox"/>												
- MTF 10	.....	<input type="checkbox"/>												
- No new artifacts in comparison to acceptance test (visual)		<input type="checkbox"/>												
- Length measurement in millimeters	.....	<input type="checkbox"/>												
<b>High contrast resolution (visual)</b>														
- Lines visible in center range (1.4 Lp/mm)		<input type="checkbox"/>												
Test date:														
Initials:														

- Check the passed test results.
- Enter the measured values.
- Enter the date of the constancy test and acknowledge with your initials.

If you need more copies, please copy an empty form

# 5 Service routines

GALILEOS

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## 5

## Service routines

The service routines enable you to check the function of specific system components and modules.

This section describes all service routines that can be selected and started via the Easypad Service Menu.

---

**i NOTE**

*Service routines S010.X, S011.8 and S030.5 are not manually selectable and therefore are not described here. They are used only for system adjustment via Sidexis (see chapter 4).*

---

### 5.1 Selecting the Service menu

#### 5.1.1 Selection on the Easypad (for GALILEOS)

##### Design of the user interface

The touchscreen user interface of the Easypad is subdivided into 4 levels:

**Level 1:** Main menu

**Level 2:** Program Settings

**Level 3:** Basic Settings

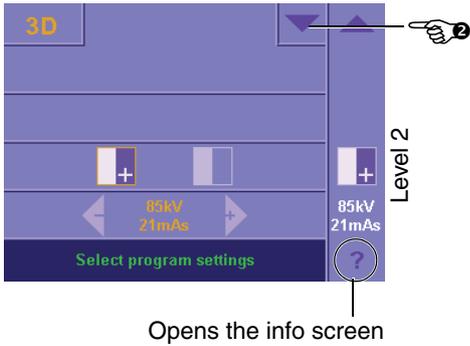
**Level 4:** Service menu

##### Main menu



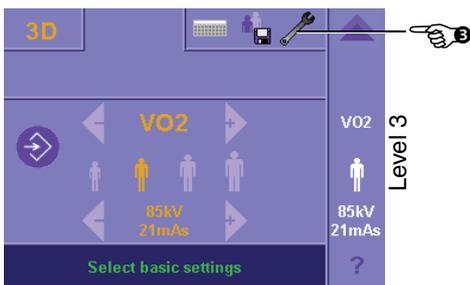
1. To select **level 2** (Program Settings menu), touch the blue arrow in the upper right corner of the touchscreen.

**Program Settings menu**



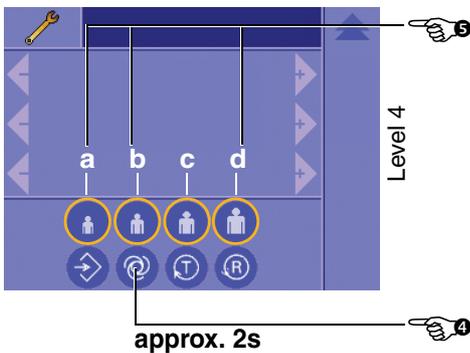
- To select **level 3** (Basic Settings menu), touch the left blue arrow in the upper right corner of the touchscreen.

**Basic Settings menu**



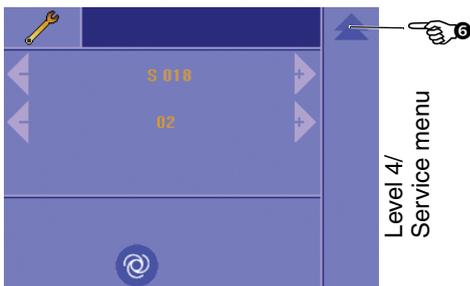
- To select **level 4** (Service menu/access), touch the wrench symbol.

**Service menu/access**



- Access the **Service menu**:
  - Press and hold down the Service key until the patient symbol keys light up (approx. 2 s).
- Then press the patient symbol keys in the following order within 4 s: **b – d – a**.  
After you have entered the key combination correctly, the Service menu appears. You can return to the next higher level with the double arrow key at any time.

**Service menu**

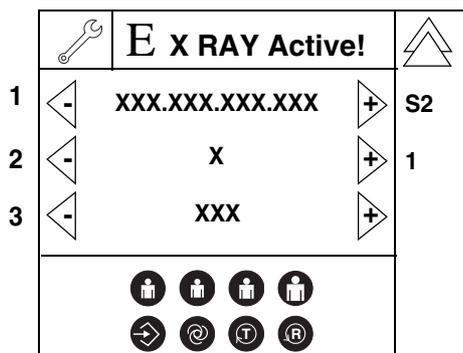


To quit the Service menu and return to the main menu, press the **double arrow key** .

**Displays and symbols in the Service menu**

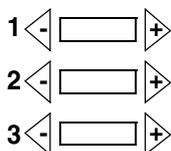
From the Service menu, you can run all available service routines and perform important system settings, tests and compensations.

Depending on the procedure step, different control symbols and display fields are activated in a context-sensitive way on the touchscreen:



*Display*

Title bar: X RAY Radiation can be released  
X RAY Active! Caution, radiation is active!

Selection fields 1 - 3:  Display fields for service routines, test steps, values, IDs, etc.

*Buttons*

Patient symbol keys a - d:  different functions, depending on service routine

Memory key:  For saving an input

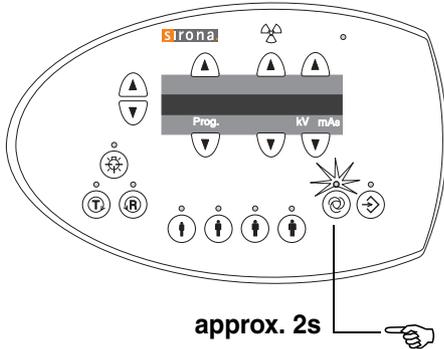
Service key:  different functions depending on service routine, but in most cases for confirming a selection or jumping to the next test step

Test key:  For starting a test

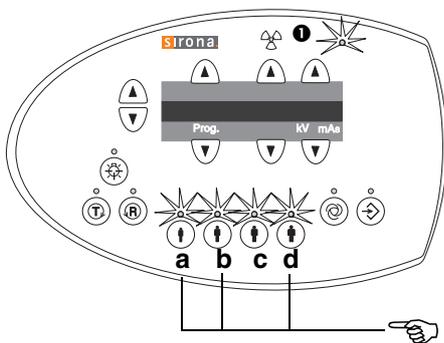
Return key:  For moving the unit to the starting position or confirming a save operation

Double arrow key:  Return to the Main menu

### 5.1.2 Selection on the Multipad (for GALILEOS GAX5)



1. Press the Service key until the LED above the Service key lights up. After the Service key is released, the LEDs above the patient symbol keys light up.

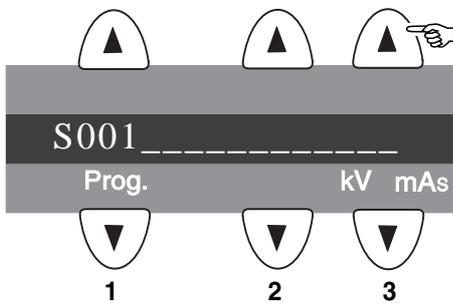


2. Then press the patient symbol keys in the following order within 4 s: **b – d – a**. After you have entered the key combination correctly, the Service menu appears.

**i NOTE**

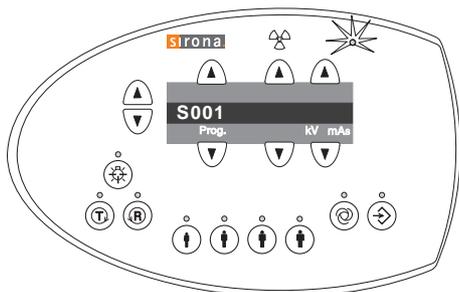
The service mode is signaled by a slow flashing of the Power LED å

**Service menu**



To quit the Service menu and return to the Main menu, press the **up arrow key** (▲) above selection field 3 (see section 5.1.2).

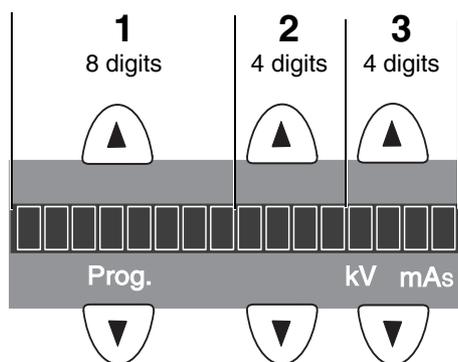
**Displays and keys on the Multipad (for service)**



From the Service menu, you can run all available service routines and perform important system settings, tests and compensations.

Depending on the procedure step, different hints, error messages and parameters are displayed in a context-sensitive way on the Multipad:

*Display*

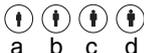


Selection fields 1 - 3: Display fields for service routines, test steps, values, IDs, etc.

**i NOTE**

The empty digits in the single-line display of the Multipad are marked with underscores in this Manual (see page 5-9). They have been added to enhance clarity and are not present on the real Multipad.

*Keys*

- Patient symbol keys a - d:  different functions, depending on service routine
- Memory key:  For saving an input
- Service key:  different functions depending on service routine, but in most cases for confirming a selection or jumping to the next test step
- Test key:  For starting a test
- Return key:  For moving the unit to the starting position or confirming a save operation
- Double arrow key:  Return to the Main menu

## 5.2 Selecting a service routine

- Select the Service menu (see section 5.1).

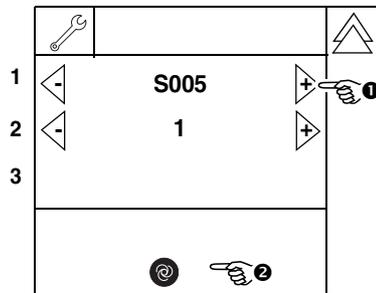
### Selecting a service routine

1. Select the desired service routine using the **arrow keys** of selection field 1 and confirm your selection by pressing the **Service key**  .

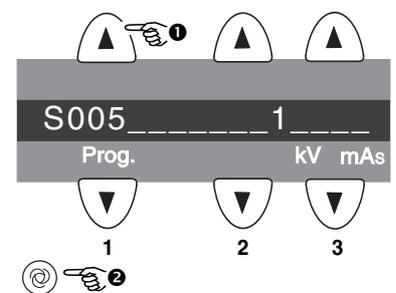
**i** **NOTE**

*If the selected service routine comprises several test steps, the first selectable test step is displayed in selection field 2.*

**GALILEOS: Easypad touchscreen**



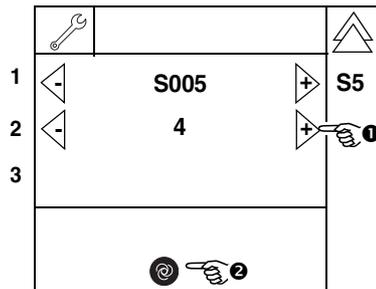
**GALILEOS GAX5: Multipad**



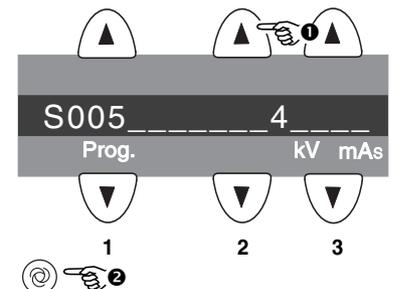
### Selecting a test step

2. Select the desired test step using the **arrow keys** of selection field 2 and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



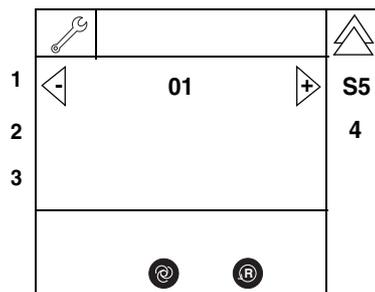
For *GALILEOS*:

The selected service routine as well as the selected test step are displayed in the right column (in our example S005, test step 4).

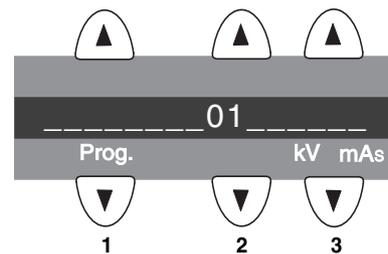
For *GALILEOS GAX5*:

The parameters or IDs of the selected service routine are displayed on the Multipad. The Multipad does not show which service routine or test step is currently active.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



### Quitting the service routine

**For GALILEOS:**

To return to the service routine selection menu, press the **Service key** or the **double arrow key** .

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key** above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key** above selection field 3.

### 5.2.1 Service routines with security access

**i NOTE**

A security code is required for accessing service routines involving functions such as radiation release or editing of configuration data or stored values. This procedure prevents the inadvertent selection or activation of these service routines.

To select a service routine or test step with security access, proceed as follows:

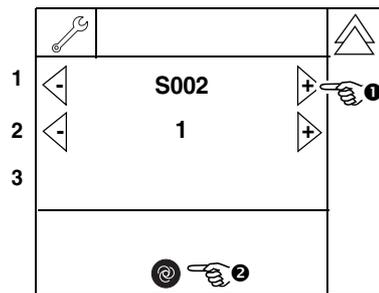
**! WARNING**

Be sure to observe the radiation protection regulations applicable in your country.

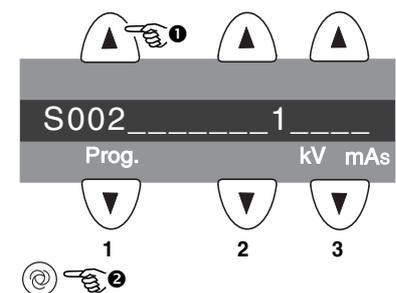
#### Selecting the service routine/test step

1. Select the service routine or the test step and confirm your selection with the **Service key**  .

**GALILEOS: Easytad touchscreen**



**GALILEOS GAX5: Multipad**

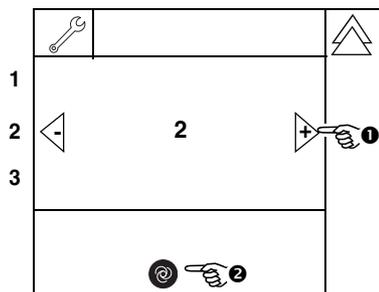


After you have confirmed your selection, a 0 appears in selection field 2.

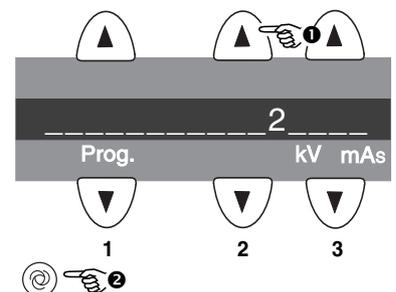
#### Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (2) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easytad touchscreen**



**GALILEOS GAX5: Multipad**



Following this double selection and confirmation, the service routine is activated.

### 5.3 Service routines with SIDEXIS

#### **WARNING**

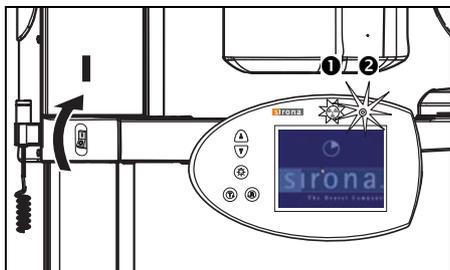
*Be sure to observe the radiation protection regulations applicable in your country.*

1. Switch the unit **ON**.  
To do this, set the main switch to position I, and wait approx. 1 minute.

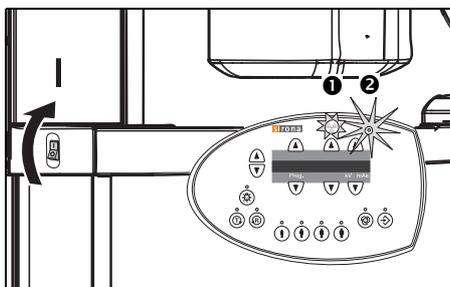
#### **NOTE**

*Due to the warm-up phase of the screen backlight, screen readability is poor for a few minutes after switching on the system.*

#### For GALILEOS



#### For GALILEOS GAX5



The X-Ray radiation indicator  $\text{\AA}$  lights up briefly.

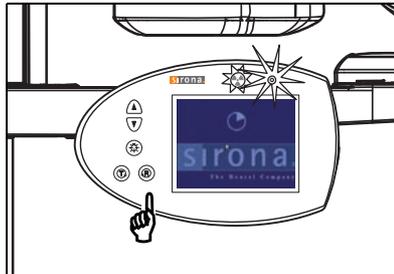
After approx. 2 sec., the green LED  $\text{\AA}$  in the upper part of the Easypad lights up. This LED remains permanently lit as long as the unit is ON.

All LEDs and the LED display on the Multipad light up briefly.

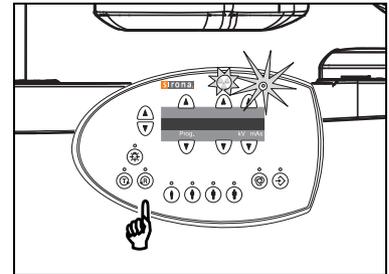
After approx. 2 sec., the green LED in the upper part of the Multipad  $\text{\AA}$  lights up. This LED remains permanently lit as long as the unit is ON.

- Press the **R** key   to move the unit back to the starting position.

**GALILEOS: Easypad touchscreen**



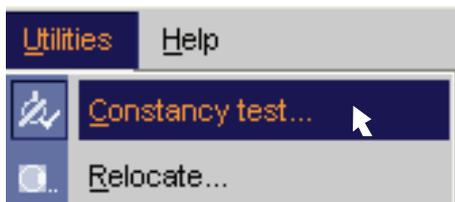
**GALILEOS GAX5: Multipad**



- Switch the PCs **ON** (RCU (Reconstruction and Control Unit) and clinic PC), and start up the SIDEXIS XG.

**i NOTE**

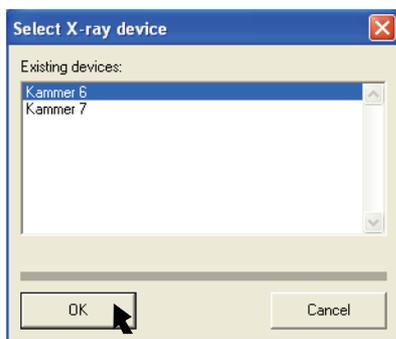
As long as no connection has been made to SIDEXIS XG, the message “Switch SIDEXIS to ready for exposure state” is displayed in the comment line of the Easypad touchscreen or help message **H401** is displayed on the Multipad (GALILEOS GAX5).



- Select the constancy test in SIDEXIS XG:  
**EXTRAS ± CONSTANCY TEST**  
The typical Sidexis user interface is started.  
Constancy test is already preset.



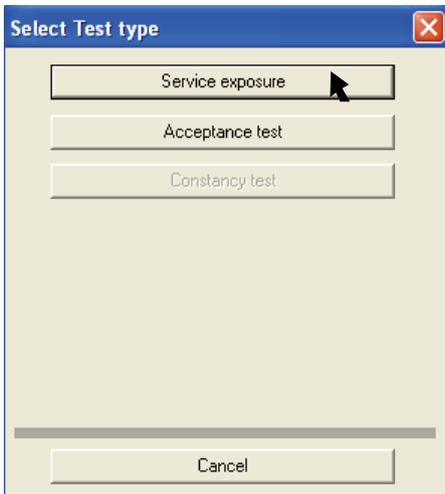
- Start the exposure mode:  
Click **3D**  
The dialog box for selecting the X-ray device appears on the screen.



- Select/confirm the X-ray unit:  
Select the desired **X-RAY DEVICE** and click **OK**.  
The dialog box for selecting the test type appears on the screen.

**i NOTE**

If only a single device is logged into SIDEXIS, the software skips the dialog box for selecting the X-ray device and the dialog box for selecting the test type appears immediately.



6. Select/confirm the test type:  
Click **SERVICE EXPOSURE**

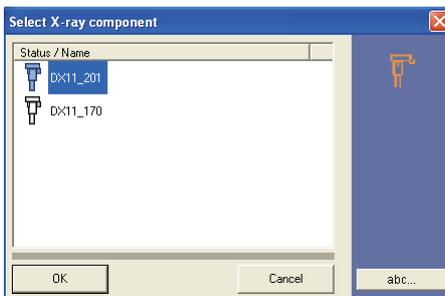
The dialog box for selecting the service exposure appears on the screen.



**i** **NOTE**

The **SERVICE FUNCTIONS** menu is password-protected. As password, enter the first four digits of the current system date (PC) in reverse order.

Example: On 05/30/2004, the service password is **5003**

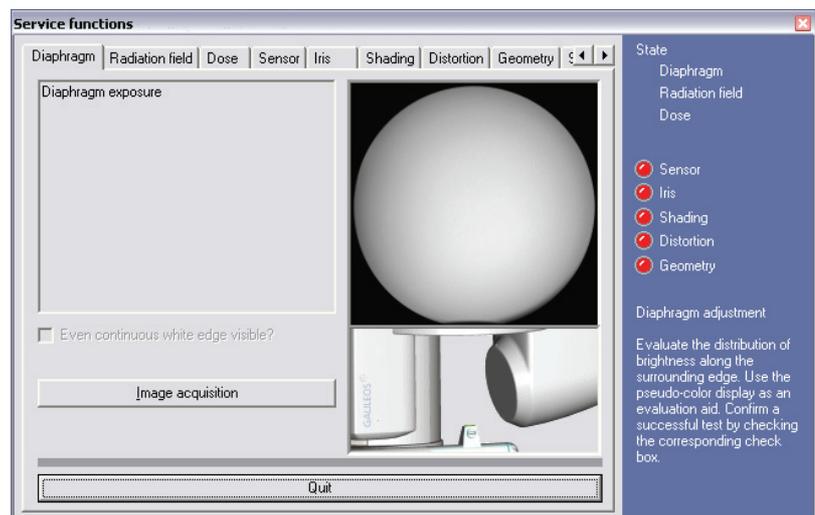


7. Select/confirm the X-ray component:  
Select the desired **X-RAY COMPONENT** and click **OK**.

The SIDEXIS dialog window **SERVICE FUNCTIONS** is displayed on the screen, showing the exposure status.

**i** **NOTE**

If only a single device is logged into SIDEXIS, the software skips the dialog box for selecting the X-ray device and the dialog box for selecting the test type appears immediately.



**i** **NOTE**

During operation in the service mode, the unit switches from the user mode to the PC service mode logged by the PC (see section 4.3.1).

## 5.4 Service routine S002

Radiation without rotary movement, maximum radiation time can be selected



### WARNING

Be sure to observe the radiation protection regulations applicable in your country.

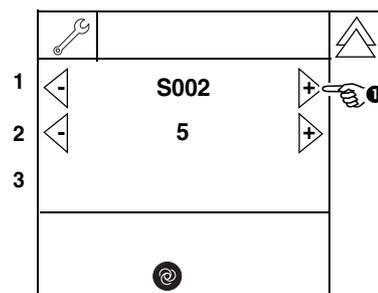
Function S002	X-ray beam test	
Test step 5	Long-term exposure with fixed radiation intervals from any position	Security access

- Select the Service menu (see page 5-6).

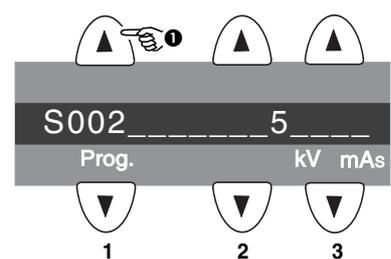
### Selecting service routine S002

1. Select service routine **S002** using the **arrow keys** of selection field 1.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

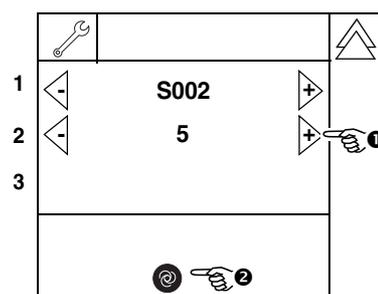


### 5.4.1 S002: Test step 5

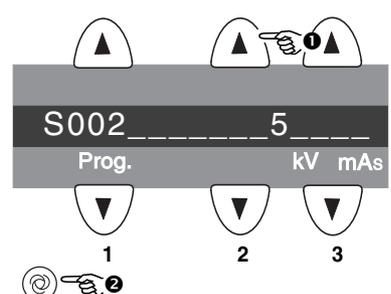
### Selecting test step 5

1. Select test step 5 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key** .

**GALILEOS: Easypad touchscreen**

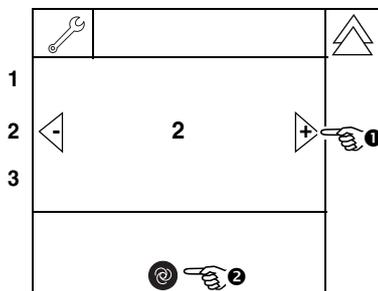
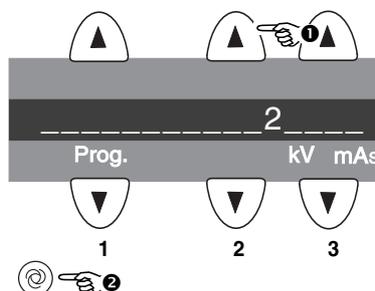


**GALILEOS GAX5: Multipad**

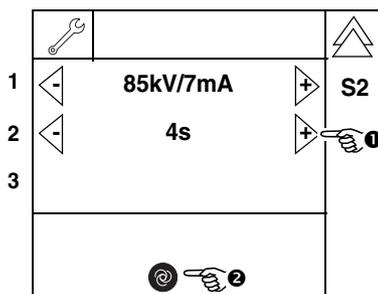
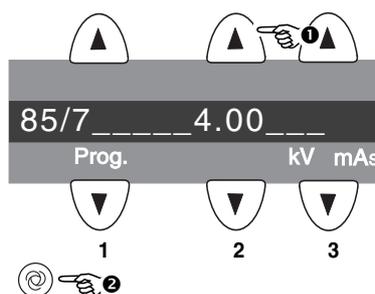


**Confirming the security access**

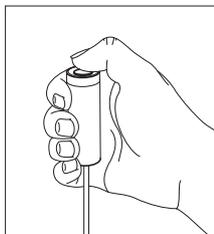
2. Confirm security access by once again selecting the number of the main routine (2) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****Selecting radiation time**

3. Select the desired radiation time (0.1 s to 4 s) using the **arrow keys** of selection field 2 and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****i NOTE**

You can select the kVmA levels 85 kV/5 mA or 85 kV/7 mA in selection field 1, using the arrow keys. The default setting is 85 kV/7 mA.

**Releasing radiation**

4. Release radiation by pressing the release button.

**i NOTE**

The release button releases radiation for the configured radiation time, at the longest. If you let go of the release button before the selected radiation time has elapsed, radiation is terminated prematurely and the exposure is interrupted. The actual radiation time is **not** displayed.

When you release radiation during the cool-down interval, a countdown of the remaining waiting time is displayed in the Easypad title bar (automatic exposure blocking).

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.5 Service routine S005

### General X-ray tube assembly service



**WARNING**

*Be sure to observe the radiation protection regulations applicable in your country.*

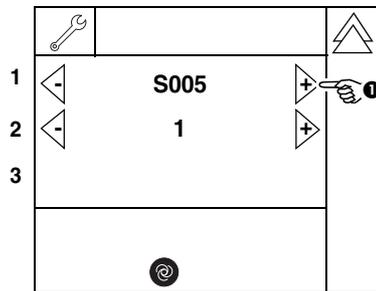
Function S005	General X-ray tube assembly service	
Test step 1	Read/select the X-ray tube assembly type (if invalid)	(Security access)
Test step 4	Fan test in the single tank	
Test step 5	Temperature sensor test in the single tank	
Test step 8	Automatic adjustment of preheating	Security access

- Select the Service menu (see page 5-6).

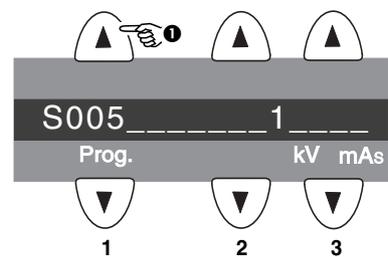
#### Selecting service routine S005

1. Use the **arrow keys** to select service routine **S005**.

**GALILEOS: Easypad touchscreen**



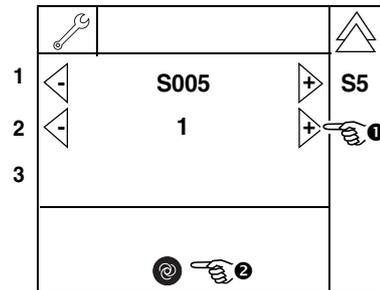
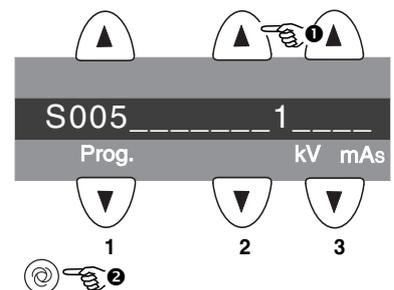
**GALILEOS GAX5: Multipad**



## 5.5.1 S005: Test step 1

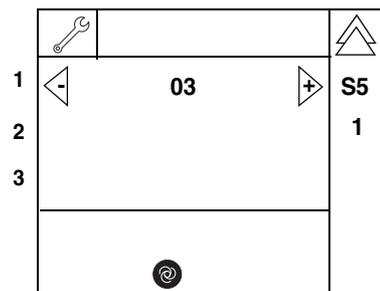
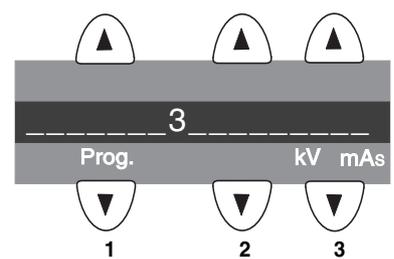
## Selecting test step 1

1. Select test step 1 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

Selection field 1 shows the indicator number of the installed tube type.

**03 = CB tube D 151 R**

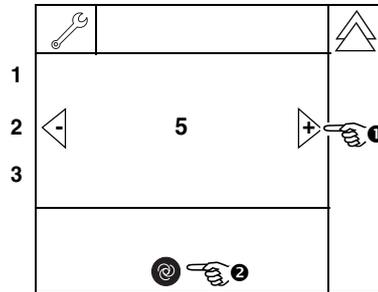
**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****i NOTE**

The X-ray tube assembly automatically queries the tube type information. If no defined value is saved, the security access will be shown instead of the tube type.

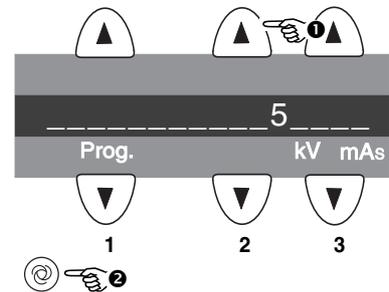
Confirm security access (only if no defined value is saved in the tube)

2. Confirm security access by once again selecting the number of the main routine (5) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



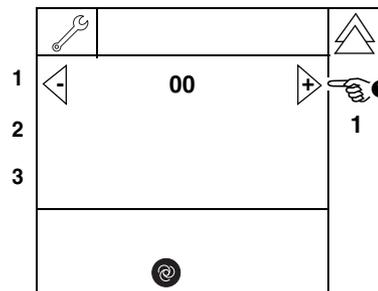
**GALILEOS GAX5: Multipad**



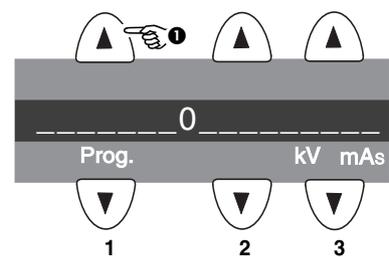
Selection field 1 shows the indicator number of the (invalid) tube type detected by the X-ray tube assembly.

- 00 = Siemens tube 90/15
- 01 = CEI OPX100
- 02 = Toshiba tube DO 56
- 03 = CB tube D 151 R

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



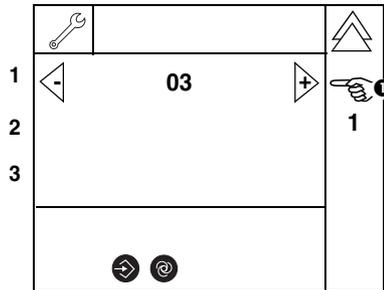
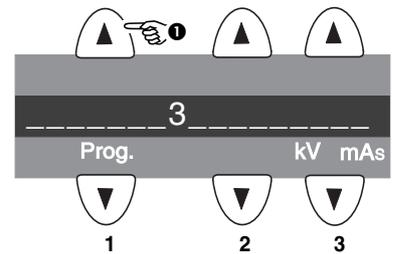
 **CAUTION**

For the operation with the GALILEOS volume tomography unit, only CB tube D151 R (indicator number 03) is permissible.

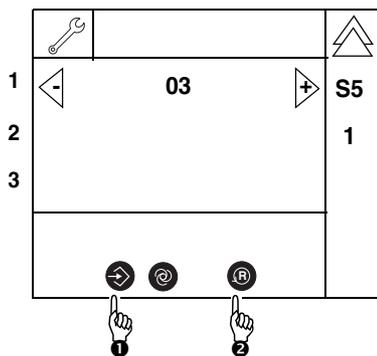
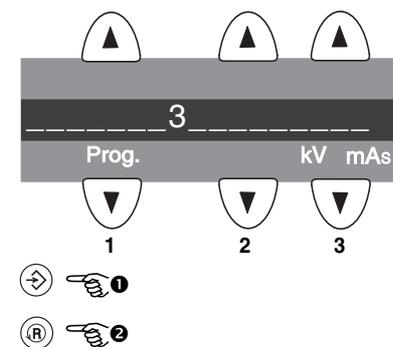
## Selecting the tube type

- Select the indicator number 03 (CB tube D 151 R) in selection field 1, using the arrow keys.

The Memory key  (GALILEOS) or the LED above the Memory key  (GALILEOS GAX5) lights up.

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

- To save the selection, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****i NOTE**

When S005.1 is repeated, no security access prompt will appear and the saved tube type is displayed (as described on page 5-21).

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

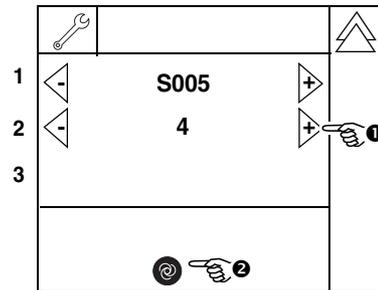
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.5.2 S005: Test step 4

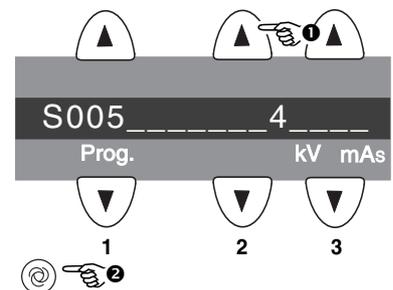
## Selecting test step 4

1. Select test step 4 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

GALILEOS: Easypad touchscreen



GALILEOS GAX5: Multipad

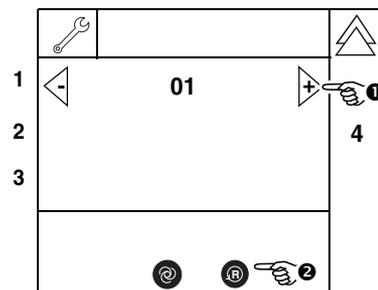


## Testing the fan

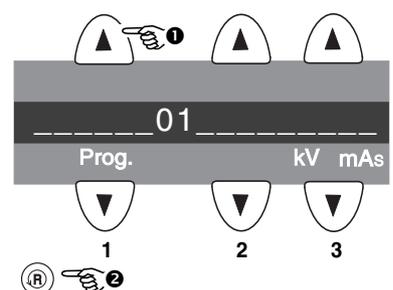
2. Switch the fan **ON** by selecting code **01** with the **arrow keys** and confirming with the **R key**  .

**Code:**    **00 = Fan OFF**  
               **01 = Fan ON**

GALILEOS: Easypad touchscreen



GALILEOS GAX5: Multipad



- Check the fan for running noise.

**i** **NOTE**

*When you quit the service routine the fan is automatically switched off again.*

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

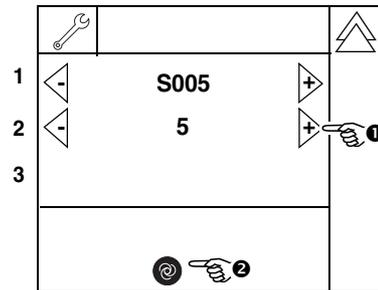
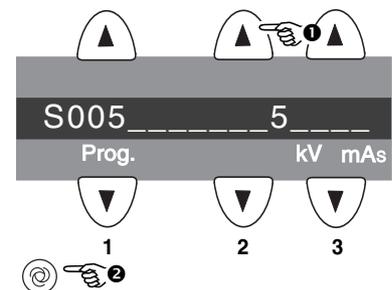
Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

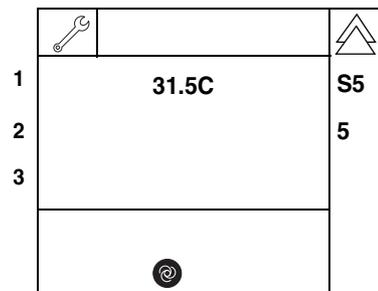
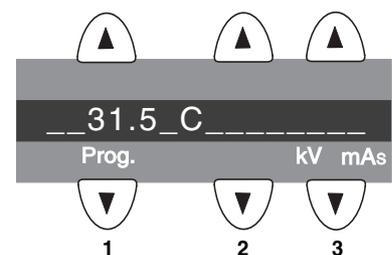
## 5.5.3 S005: Test step 5

## Selecting test step 5

1. Select test step 5 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

*GALILEOS: Easypad touchscreen**GALILEOS GAX5: Multipad*

After test step 5 is selected, selection field 1 displays the single tank temperature in °C. The display is updated once per second.

*GALILEOS: Easypad touchscreen**GALILEOS GAX5: Multipad*

## Quitting the service routine

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

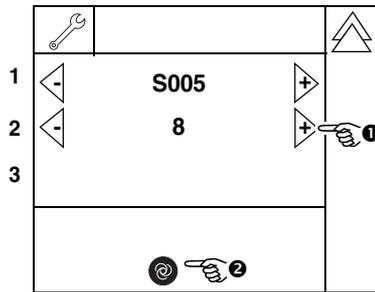
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

5.5.4 S005: Test step 8

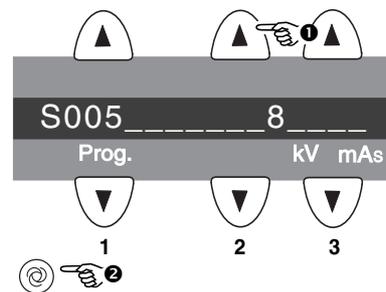
Selecting test step 8

1. Select test step 8 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



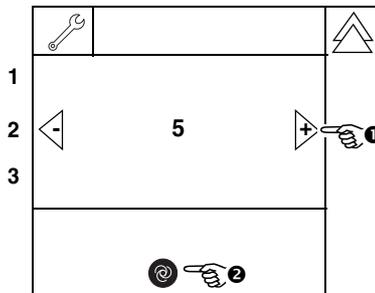
**GALILEOS GAX5: Multipad**



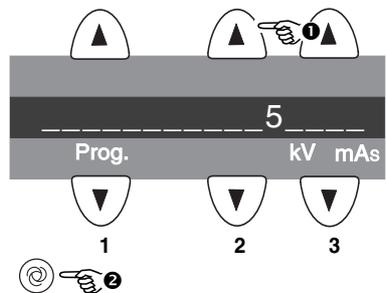
Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (5) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

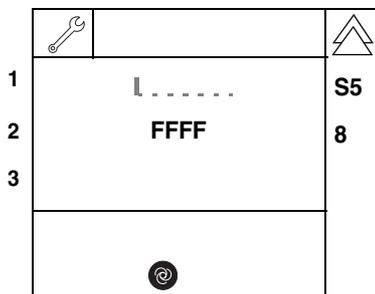


**GALILEOS GAX5: Multipad**

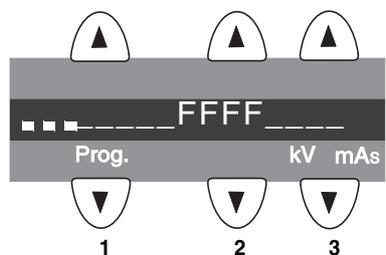


An inactive progress indicator in selection field 1 and the message FFFF in selection field 2 signal that the system is ready for adjustment.

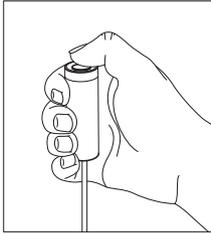
**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



### Performing the compensation



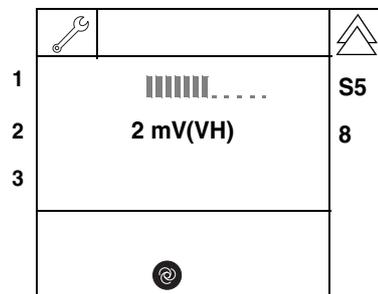
3. Start the automatic adjustment by pressing the release button.

#### **i** NOTE

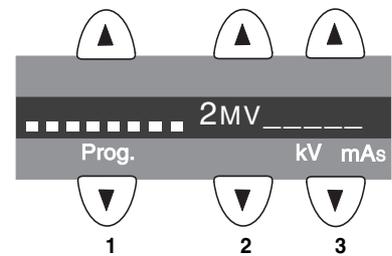
When pressing the release button, radiation is released for 2 s to warm up the tube assembly to operating temperature. This is followed by the automatic tuning routine.

Keep pressing the release button until adjustment is completed and the new offset value for preheating is displayed. A progress indicator is displayed during the service function.

#### **GALILEOS: Easypad touchscreen**



#### **GALILEOS GAX5: Multipad**



#### **i** NOTE

If you interrupt the adjustment procedure prematurely by letting go of the release button, the message EEEE appears in selection field 2. This message must be acknowledged with the **R** key.

### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key** or the **double arrow key** returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key** above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key** above selection field 3.

## 5.6 Service routine S007

## Error logging memory

Function S007	Error logging memory	
Test step 1	Display the error list from the logging memory of board DX11	
Test step 2	Clear the error logging memory on board DX11	Security access

**i** NOTE

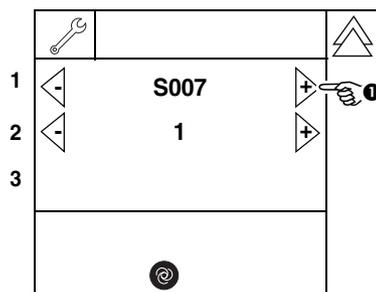
In addition to Service routine S007.1, you can also use the extended detail query in SIXABCON to check the error logging memory.

- Select the Service menu (see page 5-6).

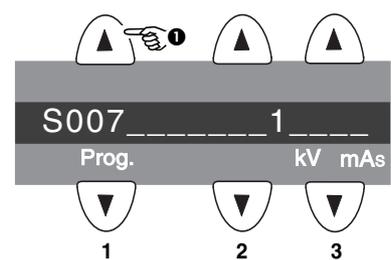
## Selecting service routine S007

1. Use the **arrow keys** to select service routine **S007**.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

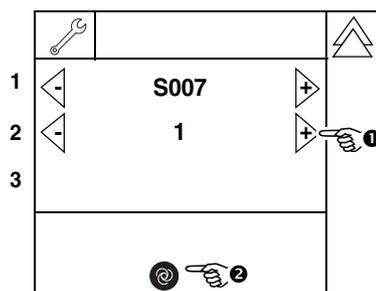


## 5.6.1 S007: Test step 1

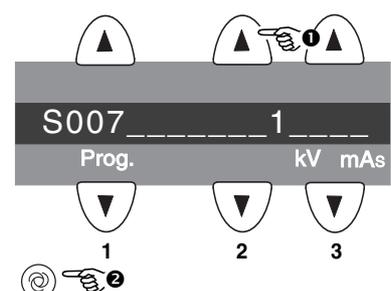
## Selecting test step 1

1. Select test step 1 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

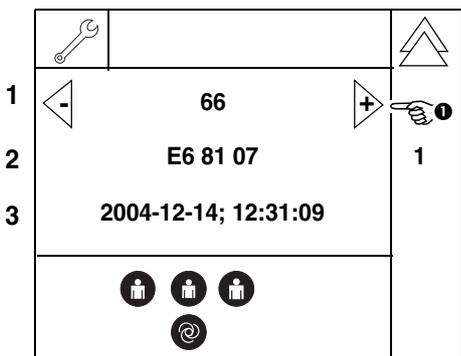
**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**GALILEOS: Easypad touchscreen**

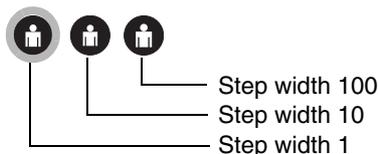


2. Select the desired error event (in example 66).

You can browse between the different occurred error numbers with the arrow keys in selection field 1.

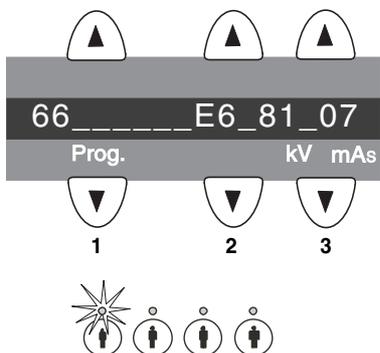
The corresponding error message is displayed in selection field 2 (see section 2.5). Selection field 3 displays the date and time of the error event.

You can set the step width for browsing between the error numbers with the patient symbol keys.

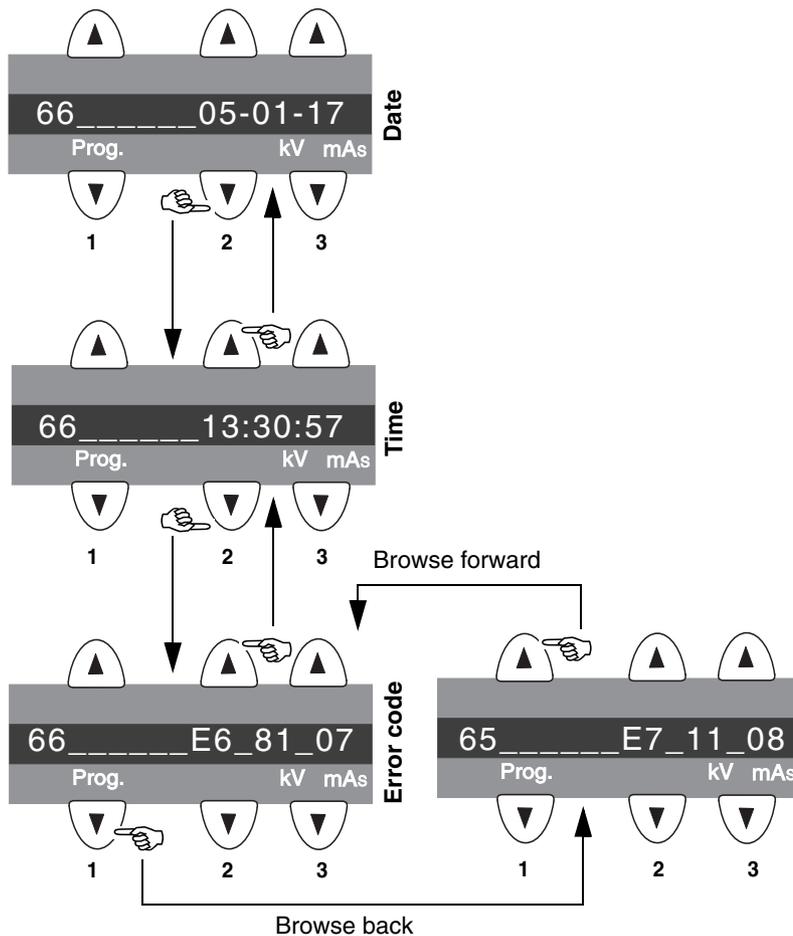


The currently selected patient symbol key is lit. A step width of 1 is preset (left patient symbol key is lit).

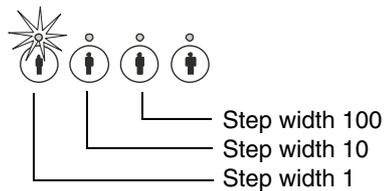
**GALILEOS GAX5: Multipad**



You can browse between the different occurred error numbers with the arrow keys in selection field 1. You can display the error code, time or date of the error event with the arrow keys in selection field 2.



You can set the step width for browsing between the error numbers with the first three patient symbol keys (starting from the left).



The LED above the selected patient symbol key is lit. A step width of 1 is pre-set (the LED above the left patient symbol key is lit).

### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

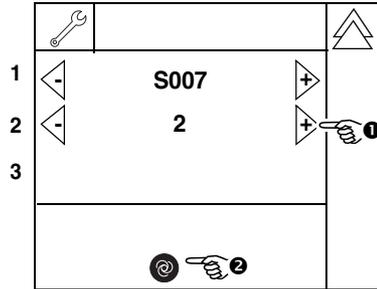
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

### 5.6.2 S007: Test step 2

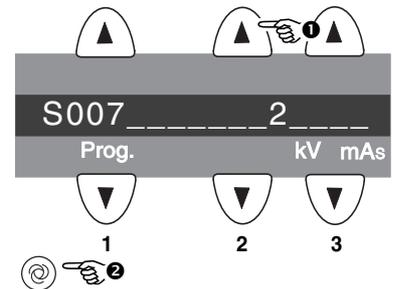
#### Selecting test step 2

1. Select test step 2 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



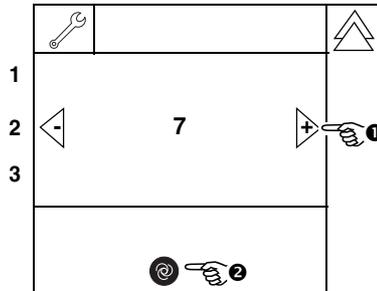
**GALILEOS GAX5: Multipad**



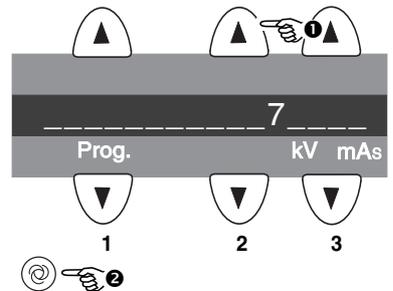
#### Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (7) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

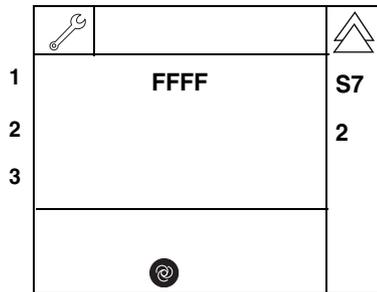


**GALILEOS GAX5: Multipad**

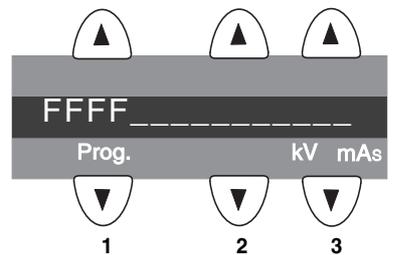


The system's readiness to clear the memory is indicated by the display message FFFF in selection field 1. If the error logging memory does not contain any data, 0000 is displayed.

**GALILEOS: Easypad touchscreen**



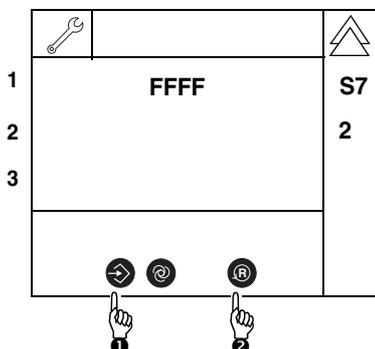
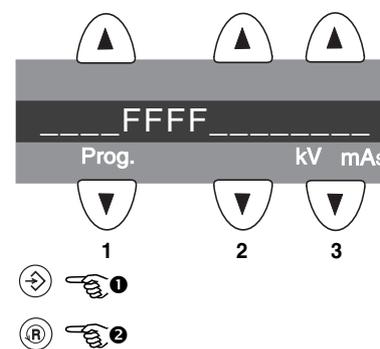
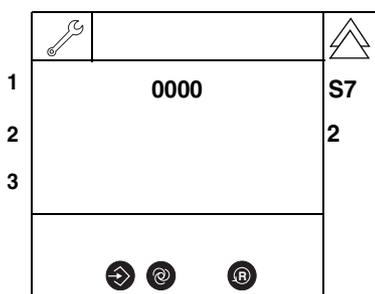
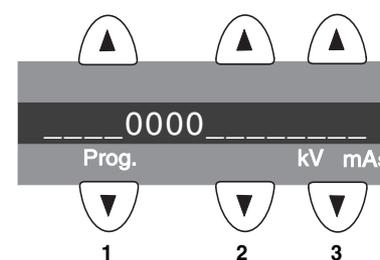
**GALILEOS GAX5: Multipad**



The system's readiness to clear the memory is indicated by the display message FFFF in selection field 1. If the error logging memory does not contain any data, 0000 is displayed.

## Clearing error logging memory

3. To clear the memory, first press the **Memory key**  (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

## Quitting the service routine

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.7 Service routine S008

### Update service

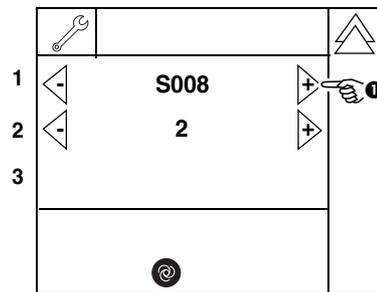
Function S008	Checking the software versions
Test step 2	Query the software versions of the modules
Test step 3	Input/confirmation/query of unit serial number

- Select the Service menu (see page 5-6).

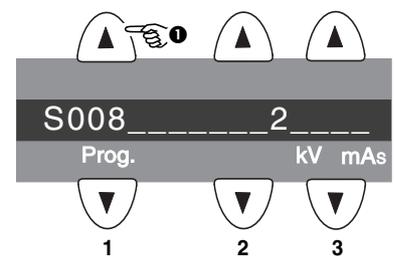
#### Selecting service routine S008

1. Use the **arrow keys** to select service routine **S008**.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

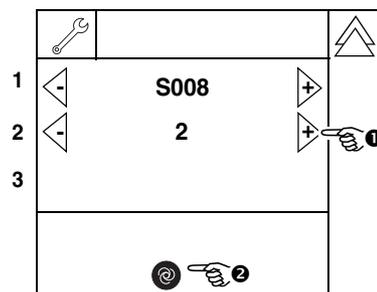


### 5.7.1 S008: Test step 2

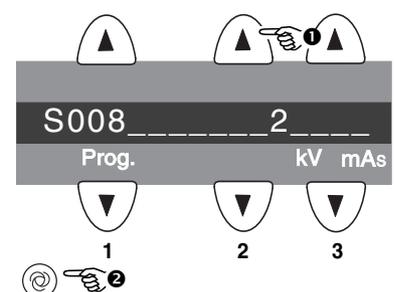
#### Selecting test step 2

1. Select test step 2 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key** .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

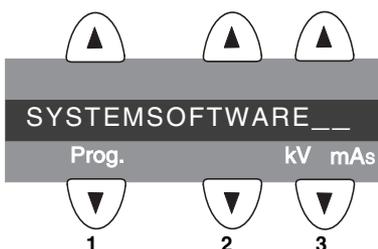


**GALILEOS: Easypad touchscreen**

System software	: V03.03.01
DX11	: V02.61.01
DX41	: V02.30.00
DX42	: V02.45.06
DX6	: V02.88.00
DX89	: V01.10.06
DX89_F1	: V01.13.01
DX7	: V02.57.00
DX7 lang_0	: V02.18.00

The software versions currently installed in the modules are displayed on the info screen of the touchscreen display.

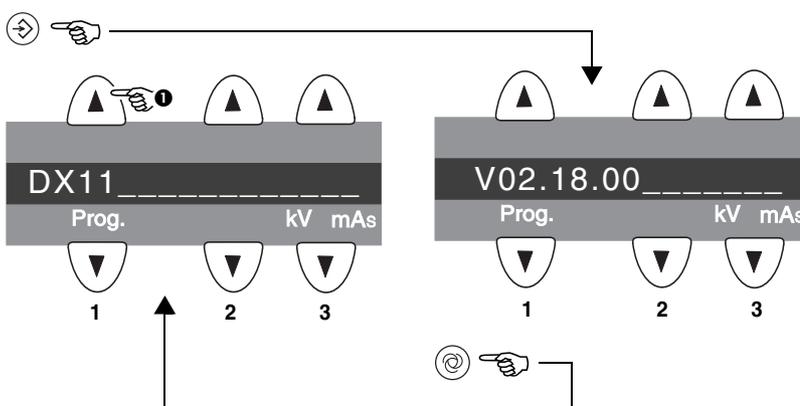
**GALILEOS GAX5: Multipad**



The single-line display of the Multipad shows the message **SYSTEMSOFTWARE**.

Select the desired module using the **arrow keys** of selection field 1 and confirm your selection by pressing the **Memory key** .

The software version of the selected module is displayed in selection field 1.



To return to the module selection menu, press the Service key .

**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key** or the **double arrow key** returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

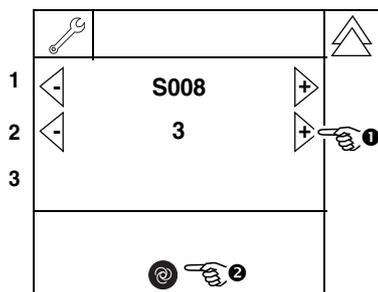
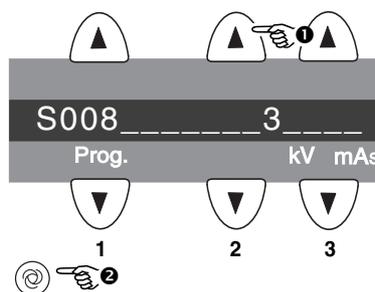
Pressing the **up arrow key** above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key** above selection field 3.

## 5.7.2 S008: Test step 3

## Selecting test step 3

1. Select test step 3 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

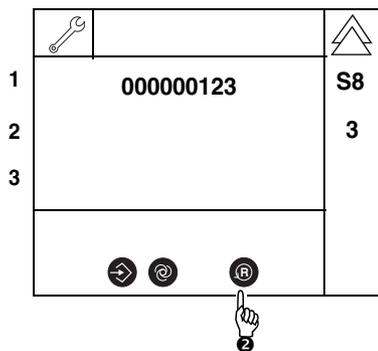
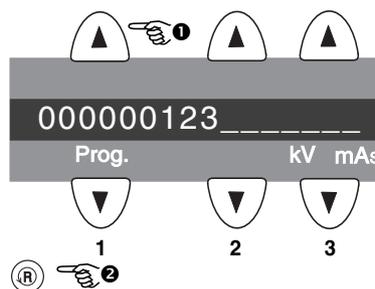
*GALILEOS: Easypad touchscreen**GALILEOS GAX5: Multipad*

This test step is required when modules are replaced. In this case, the backup copy of the unit serial number still stored in the unit must be reconfirmed.

If this service routine is called up with a valid unit serial number, the possibility of entering or confirming the serial number will be deactivated. The valid serial number is displayed in selection field 1.

## Confirm serial number

1. To confirm the displayed serial number, press the **R key**  .

*GALILEOS: Easypad touchscreen**GALILEOS GAX5: Multipad*

You can interrupt this procedure with the Service key  . The unit serial number will then not be confirmed.

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.8 Service routine S009

### Flash file system

Function S009	Flash file system	
Test step 4	Formating flash file system	Security access
Test step 5	Test flash file system	
Test step 7	Trigger save/restore function of DX89 data	Security access

#### CAUTION

The unit has to be completely recalibrated after formating the flash file system (see section 4).

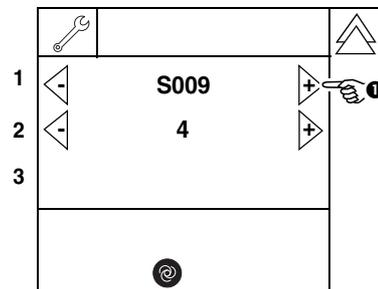
Formating the flash file system also deletes the content of the error log.

- Select the Service menu (see page 5-6).

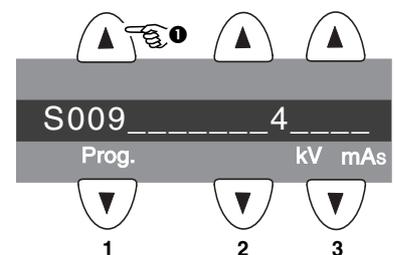
#### Selecting service routine S009

1. Use the **arrow keys** to select service routine **S009**.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

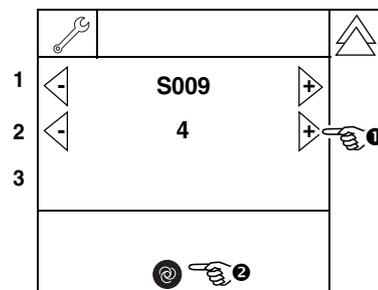


### 5.8.1 S009: Test step 4

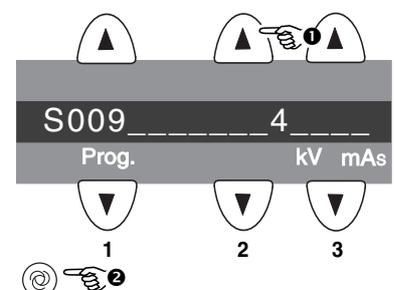
#### Selecting test step 4

1. Select test step 4 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

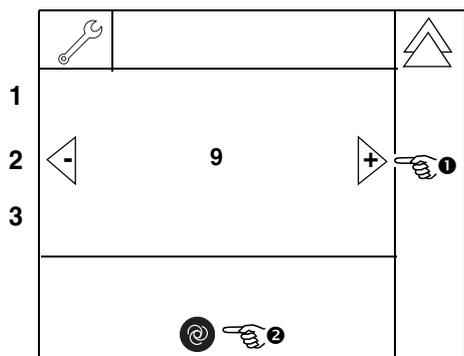
**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

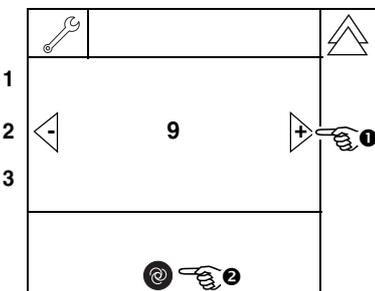


**Confirming the security access**

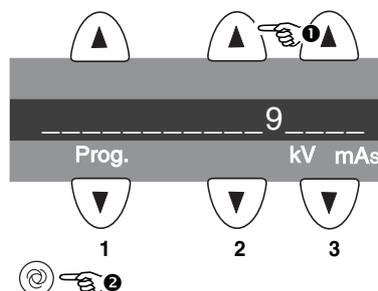


2. Confirm security access by once again selecting the number of the main routine (9) with the **arrow keys** of selection field 2 and then pressing the **Service key** .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

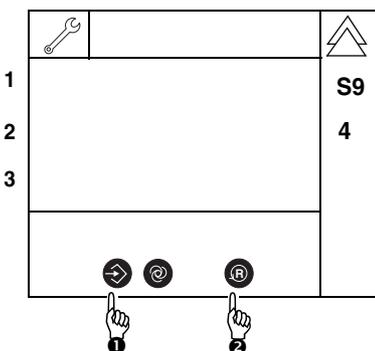


After the selection of the test step the **Memory key** lights up.

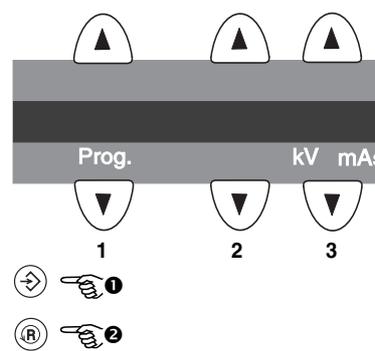
**Formating flash file system**

3. To format the flash file system, first press the **Memory key** (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** .

**GALILEOS: Easypad touchscreen**

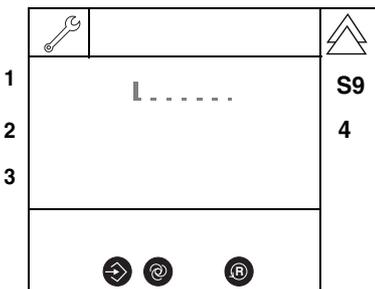


**GALILEOS GAX5: Multipad**

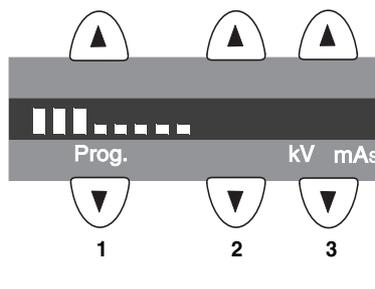


Flash file system formatting in progress. This process takes approx. 5 - 6 min. and is visualized by a progress indicator. The end of this process is indicated by the message 0000 in selection field 2. The **Memory key** (GALILEOS) or the LED above the **Memory key** (GALILEOS GAX5) lights up.

**GALILEOS: Easypad touchscreen**

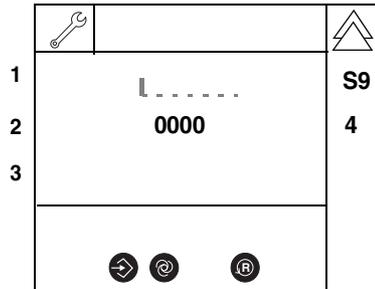


**GALILEOS GAX5: Multipad**

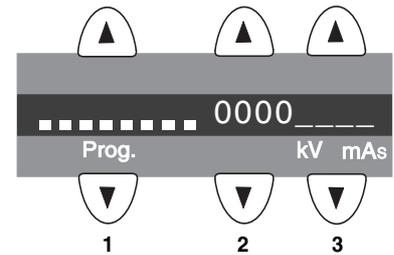


When formatting has been completed, 0000 is displayed in the selection field.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

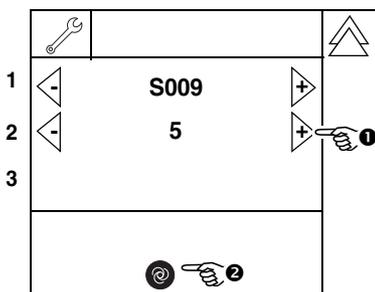
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

5.8.2 S009: Test step 5

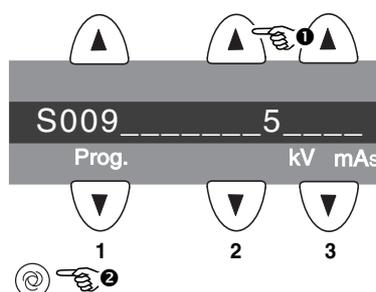
Selecting test step 5

1. Select test step 5 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key** (R) (R) .

**GALILEOS: Easypad touchscreen**



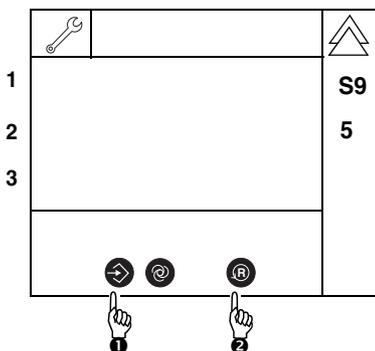
**GALILEOS GAX5: Multipad**



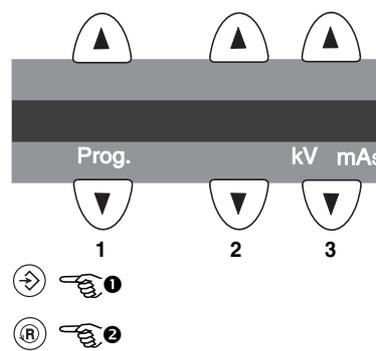
Test flash file system

2. To test the flash file system, first press the **Memory key** (R) (R) (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** (R) (R) .

**GALILEOS: Easypad touchscreen**

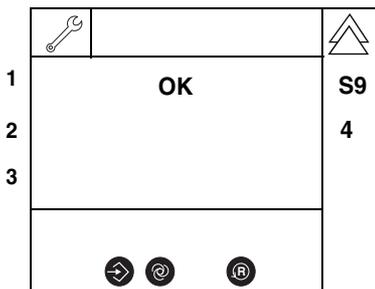


**GALILEOS GAX5: Multipad**

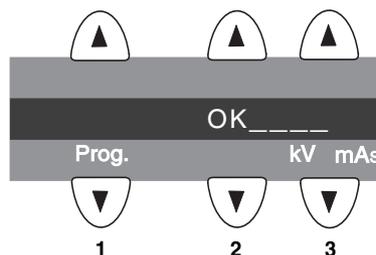


Once the system has passed the test without errors, **OK** appears in selection field 1.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



If the test fails, **ERROR** will appear. In this case, the flash file system has to be formatted via service routine S009.4 (see page 5-39).

---

 **CAUTION**

*The unit has to be completely recalibrated after formatting the flash file system (see section 4).*

---

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

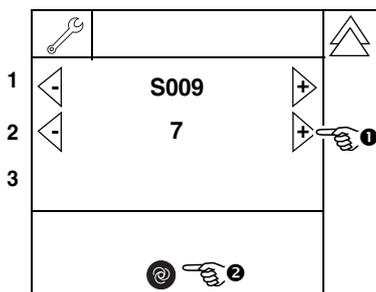
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

### 5.8.3 S009: Test step 7

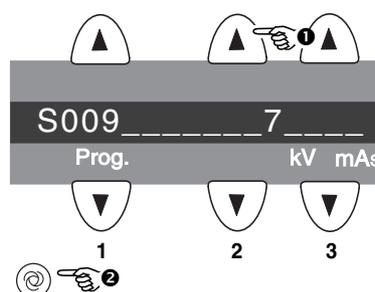
#### Selecting test step 7

1. Select test step 7 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



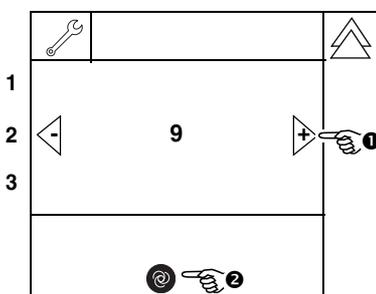
**GALILEOS GAX5: Multipad**



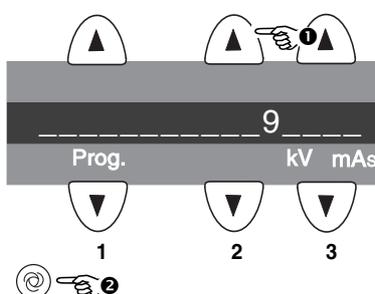
#### Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (9) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

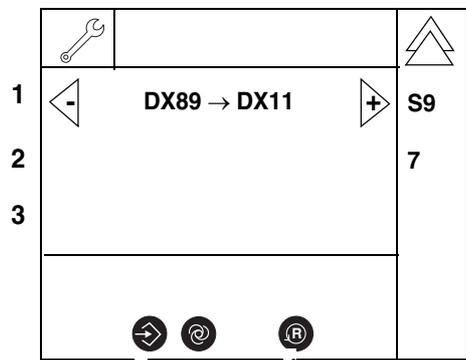


**GALILEOS GAX5: Multipad**



After the selection of the test step the **Memory key**   lights up.

**GALILEOS: Easypad touchscreen**



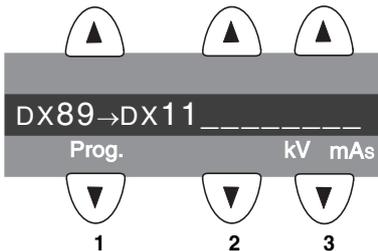
Selection field 1 may show the following after selecting this service routine:

- DX89 → DX11:** Data are imported from DX89 to DX11; Memory key  lights up
- DX11 → DX89:** Data are imported from DX11 to DX89; Memory key  lights up
- "---":** Data on both boards (DX11 and DX89) are valid or data transfer is impossible; all keys remain dark

**i NOTE**

Only one useful transfer direction is offered. If both locations contain valid data, "---" is displayed.

**GALILEOS GAX5: Multipad**



Selection field 1 may show the following after selecting this service routine:

**DX89→DX11:** Data are imported from DX89 to DX11;  
LED above Memory key lights up

**DX11→DX89:** Data are imported from DX11 to D89;  
LED above Memory key lights up

"---": Data on both boards (DX11 and DX89) are valid or data transfer is impossible;  
the LEDs above the keys remain dark

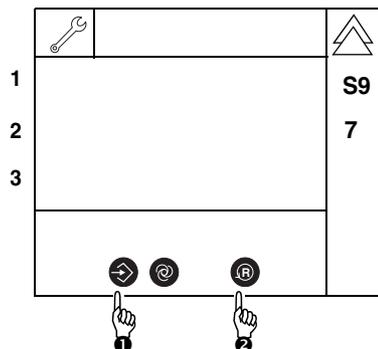
**i NOTE**

Only one useful transfer direction is offered. If both locations contain valid data, "---" is displayed.

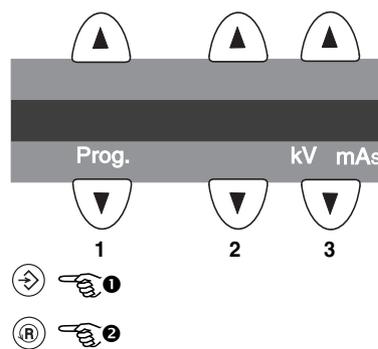
**Saving or triggering a restore**

- To trigger the storage process, first press the **Memory key** (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** .

**GALILEOS: Easypad touchscreen**

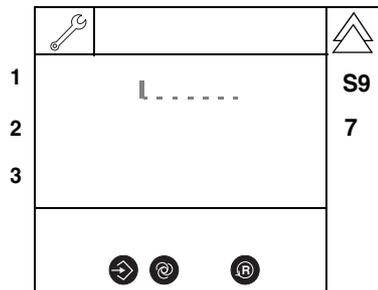


**GALILEOS GAX5: Multipad**

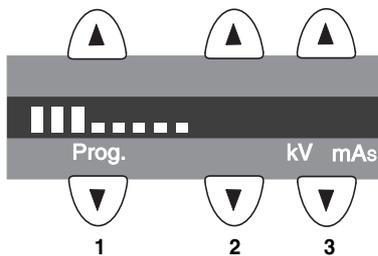


The data are transferred. During the data transfer, a progress indicator is displayed in selection field 1.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key** or the **double arrow key** returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.9 Service routine S011

### Dosimetry (without ring movement)



#### WARNING

Be sure to observe the radiation protection regulations applicable in your country.

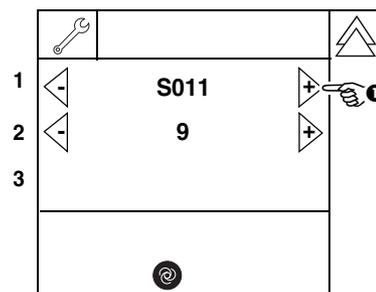
Function S011	Dosimetry (without ring movement)	
Test step 9	4 s long-term radiation with 85 kV/7 mA (for current measurement)	Security access
Test step 12	Dosimetry with pulses	Security access

- Select the Service menu (see page 5-6).

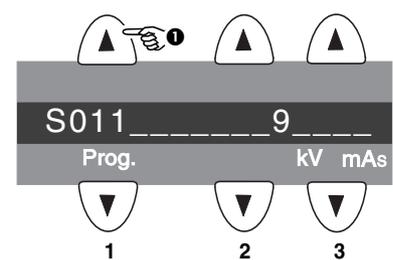
#### Selecting service routine S005

1. Use the **arrow keys** to select service routine **S011**.

#### GALILEOS: Easypad touchscreen



#### GALILEOS GAX5: Multipad

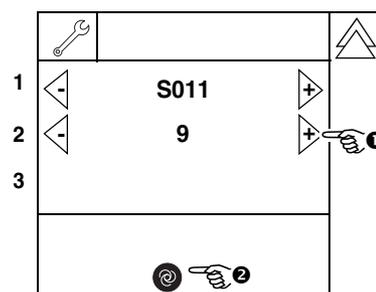


### 5.9.1 S011: Test step 9

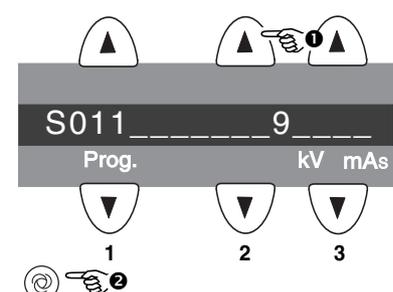
#### Selecting test step 9

1. Select test step 9 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key** .

#### GALILEOS: Easypad touchscreen

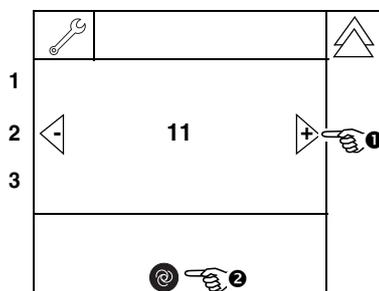
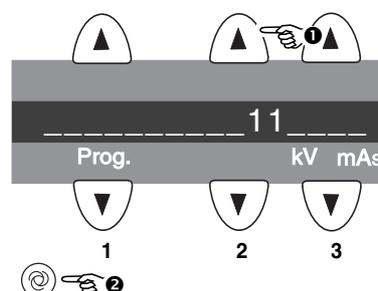


#### GALILEOS GAX5: Multipad



## Confirming the security access

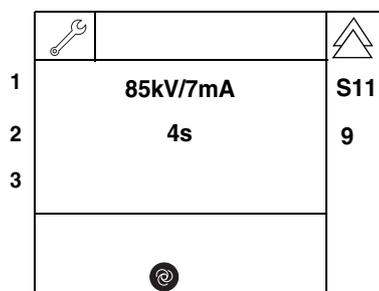
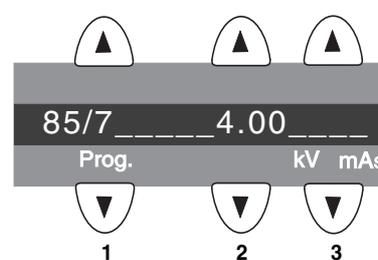
- Confirm security access by once again selecting the number of the main routine (11) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

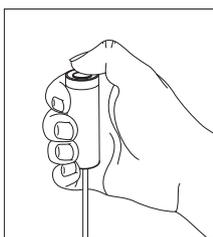
Selection field 1 shows the kVmA level, while selection field 2 displays the maximum radiation time.

**i NOTE**

The kVmA level and the maximum radiation time are fixed settings.

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

## Releasing radiation



- Release radiation by pressing the release button.

**i NOTE**

The release button releases radiation for the maximum radiation time of 4 s. If you let go of the release button before the radiation time expires, radiation will be terminated prematurely. The actual radiation time is **not** displayed.

When you release radiation during the cool-down interval, a countdown of the remaining waiting time is displayed in the Easypad title bar (automatic exposure blocking).

### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

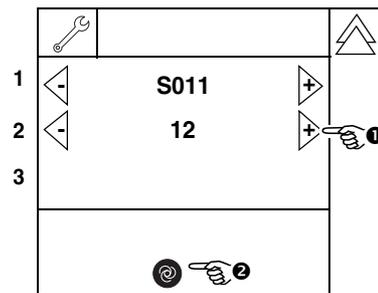
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.9.2 S011: Test step 12

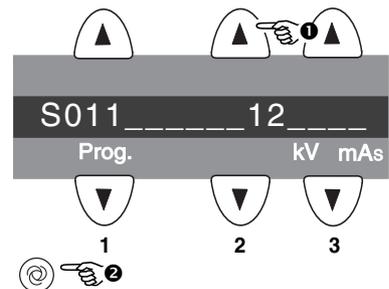
### Selecting test step 12

1. Select test step 12 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

#### GALILEOS: Easypad touchscreen



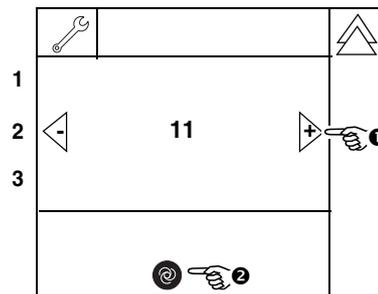
#### GALILEOS GAX5: Multipad



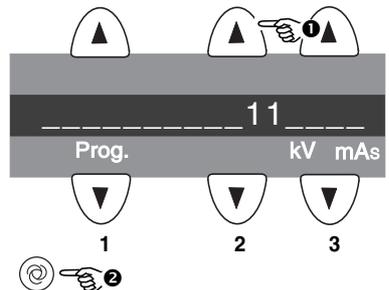
### Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (11) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

#### GALILEOS: Easypad touchscreen

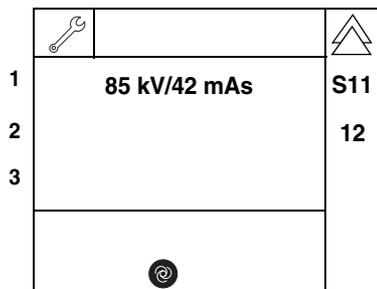


#### GALILEOS GAX5: Multipad

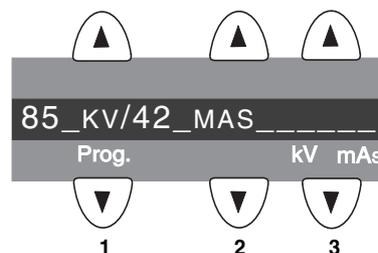


85 kV/42 mAs is displayed in the selection field 1.

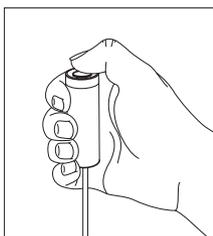
**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



### Releasing radiation



3. Release radiation by pressing the release button.

#### **i** NOTE

The release button releases radiation with 200 pulses and 85 kV/42 mAs. If you let go of the release button before the radiation time expires, radiation will be terminated prematurely.

When you release radiation during the cool-down interval, a countdown of the remaining waiting time is displayed in the Easypad title bar (automatic exposure blocking).

### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.10 Service routine S012

### CAN bus service

Function S012	CAN bus service
Test step 1	Presence display of modules

#### **i** NOTE

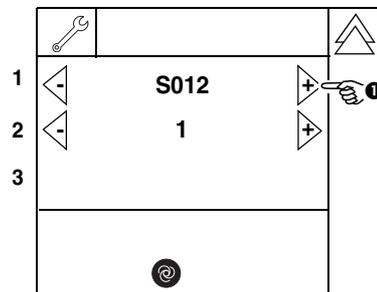
The CAN bus service is not yet implemented for the module DX11!

- Select the Service menu (see page 5-6).

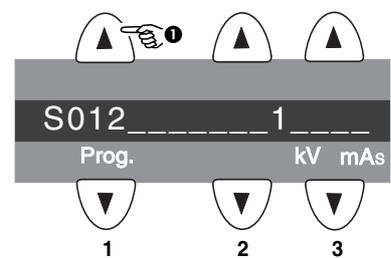
#### Selecting service routine S012

1. Use the **arrow keys** to select service routine **S012**.

##### *GALILEOS: Easypad touchscreen*



##### *GALILEOS GAX5: Multipad*

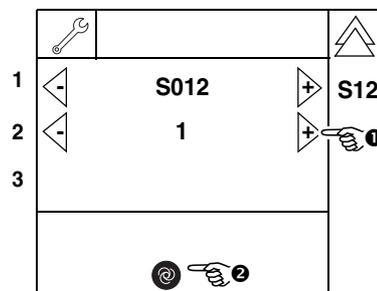


### 5.10.1 S012: Test step 1

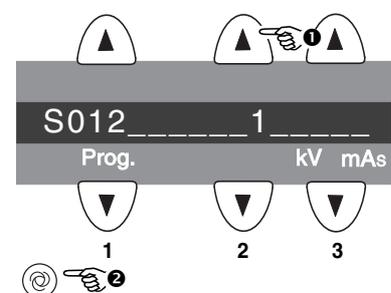
#### Selecting test step 1

1. Select test step 1 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key** (Ⓜ) (Ⓜ).

##### *GALILEOS: Easypad touchscreen*



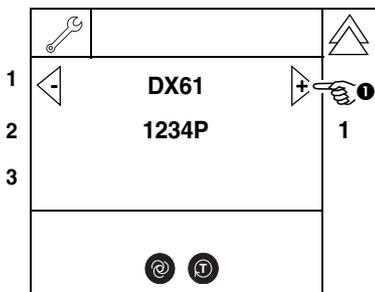
##### *GALILEOS GAX5: Multipad*



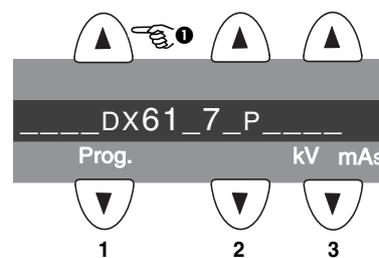
**Checking the module**

2. Select the desired module using the **arrow keys** of selection field 1.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



Selection field 2 displays the counter value of past CAN bus events (since the last startup of the system) for the selected module.

A **P** after the counter value (e.g. 1234P) means: Module is "present"

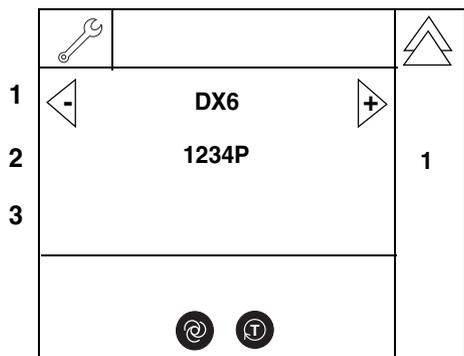
An **L** after the counter value (e.g. 1234L) means: Module is "lost"

**Clearing the counter for the module**

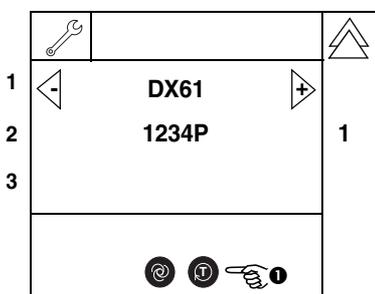
3. To delete the counter of the respective module, press the **Test key**



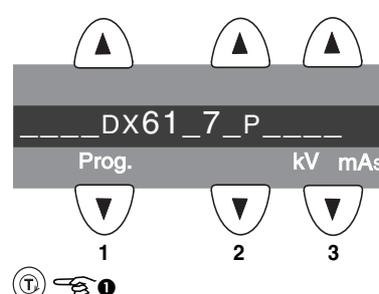
The counter is then reset to "0".



**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.11 Service routine S017

### Configuration service

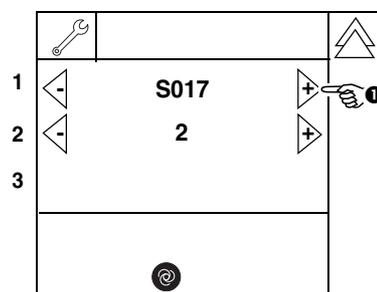
Function S017	System configuration	
Test step 2	Configuring the hardware version	Security access
Test step 3	Enter country group code	Security access
Test step 4 (not for GALILEOS GAX5)	Select a language index within the language set	Security access
Test step 5 (not for GALILEOS GAX5)	Select a language set index within the language set	Security access
Test step 6	Activate the remote control display	Security access
Test step 7	Configuring the switching plate for the swivel arm	Security access
Test step 9	Activate/deactivate system operation with board DX41	Security access
Test step 13 (not for GALILEOS GAX5)	Enabling/disabling the welcome screen	Security access
Test step 14 (not for GALILEOS GAX5)	Enabling/disabling certain lines of the welcome screen	Security access
Test step 15	Activating/deactivating the acoustic signal for end of exposure	Security access

- Select the Service menu (see page 5-6).

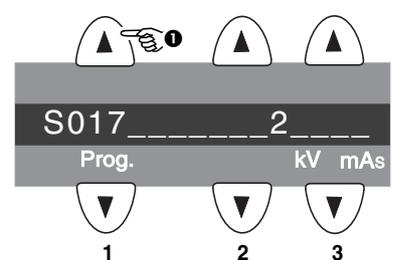
#### Selecting service routine S017

1. Use the **arrow keys** to select service routine **S017**.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

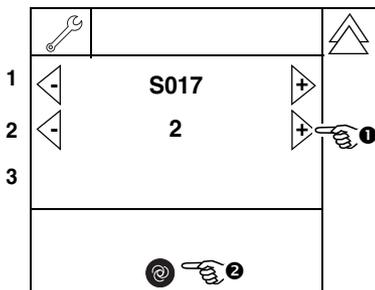


### 5.11.1 S017: Test step 2

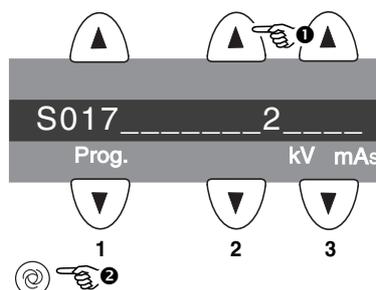
#### Selecting test step 2

1. Select test step 2 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



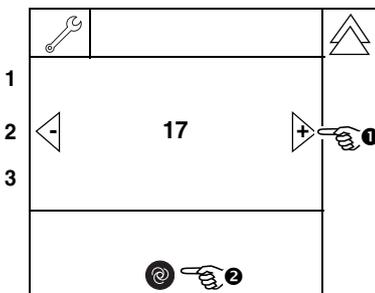
**GALILEOS GAX5: Multipad**



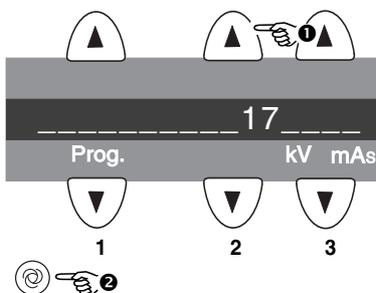
#### Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (17) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

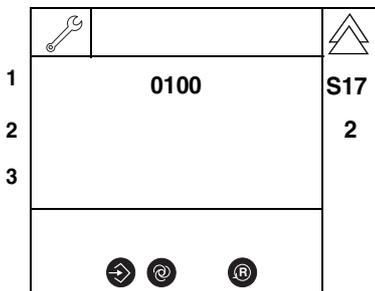


**GALILEOS GAX5: Multipad**

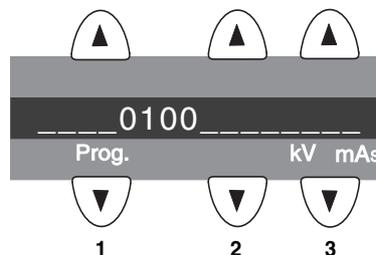


When you open the service routine, you will see system version 0100 (CB) in the selection field. Since no other version is available, you can only confirm.

**GALILEOS: Easypad touchscreen**

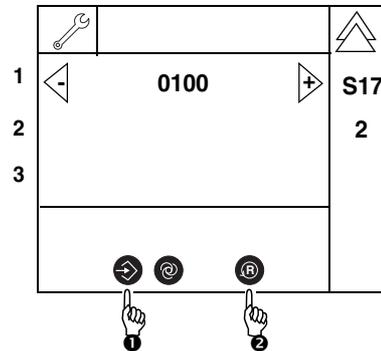
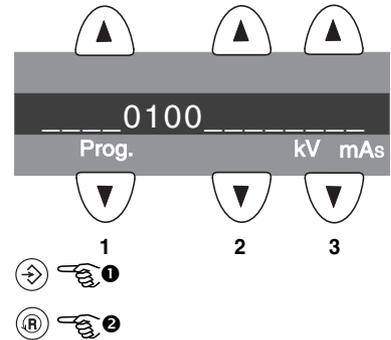


**GALILEOS GAX5: Multipad**



**Confirming/saving system version**

3. To save the system version, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.11.2 S017: Test step 3

- Start test step 3 in the same way as described on page 5-54 or by pressing the **Service key**   in test step 2.

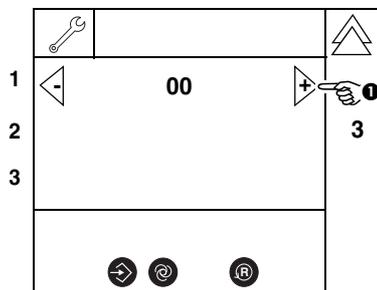
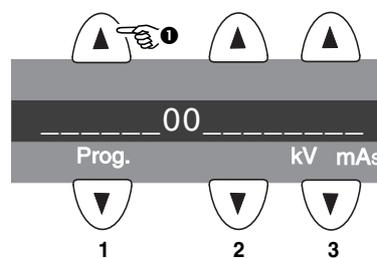
**i** **NOTE**

If you go to test step 3 from test step 2 by pressing the Service key, the security access confirmation will be skipped.

## Selecting the country group code

- Select the desired country group code using the **arrow keys** of selection field 1.

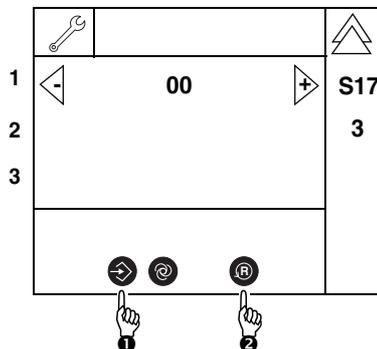
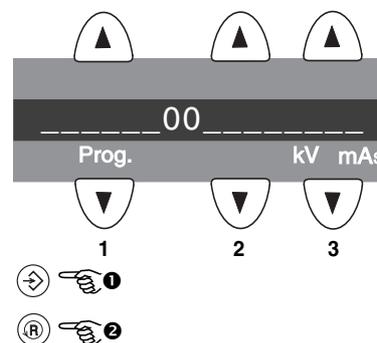
**00 = worldwide**  
**01 = Asia**  
**02 = USA**

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

After the country group code is selected the

**Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

- To save the selected country group code, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****i** **NOTE**

The setting is permanently saved.

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

### 5.11.3 S017: Test step 4 (not for GALILEOS GAX5)

- Start test step 4 in the same way as described on page 5-54 or by pressing the **Service key**  in test step 3.

#### **NOTE**

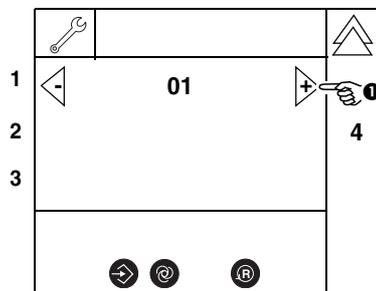
*If you go to test step 4 from test step 3 by pressing the Service key, the security access confirmation will be skipped.*

#### Selecting a language index

1. Select the desired language index using the **arrow keys** of selection field 1.

00 = English  
 01 = German  
 02 = French  
 03 = Italian  
 04 = Dutch  
 05 = Spanish  
 06 = Russian  
 07 = Norwegian  
 08 = Portuguese  
 09 = Swedish  
 10 = Chinese  
 11 = Korean  
 12 = Japanese

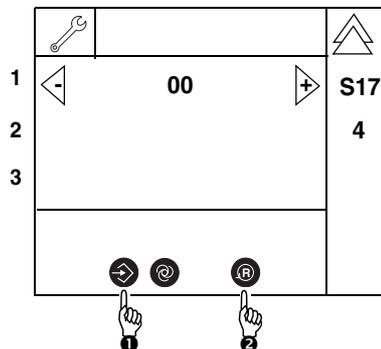
#### **GALILEOS:** Easypad touchscreen



After the language index is selected, the **Memory key**  lights up.

- To save the selected language index, first press the **Memory key**  (the R key lights up) and then the **R key** .

**GALILEOS: Easypad touchscreen**



**i NOTE**

The setting is permanently saved.

**i NOTE**

If the selected language is not contained in the installed language set, English is set as the default language.

**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.11.4 S017: Test step 5

- Start test step 5 in the same way as described on page 5-54 or by pressing the **Service key**  in test step 4.

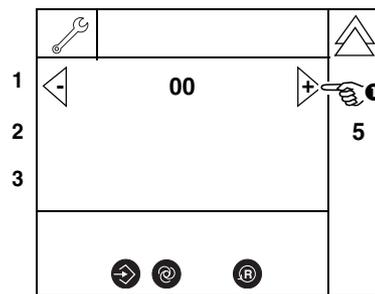
**i** **NOTE**

*If you go to test step 5 from test step 4 by pressing the Service key, the security access confirmation will be skipped.*

**Selecting a language set index**

- Select the desired language set index using the **arrow keys** of selection field 1.

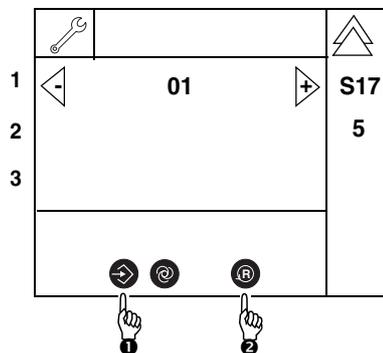
- 00 = German, English, French, Italian**
- 01 = German, English, French, Dutch**
- 02 = German, English, Spanish, Russian**
- 03 = German, English, Korean, Japanese**

**GALILEOS: Easypad touchscreen**

After the language set index is selected, the **Memory key**  **lights up.**

- To save the selected language set index, first press the **Memory key**  (R key lights up) and then the **R key** .

**GALILEOS: Easypad touchscreen**



### **i** NOTE

*The setting is permanently saved.*

- Perform a software update to install the corresponding languages in the system (see section 1.6).

### Quitting the service routine

To go on to the next test step, press the **Service key** .

To return to the Service menu, press the **double arrow key** .

To quit the Service menu and return to the Main menu, press the **double arrow key** .

## 5.11.5 S017: Test step 6

- Start test step 6 in the same way as described on page 5-54 or by pressing the **Service key** in test step 5 (or 3).

**i** **NOTE**

If you go to test step 6 from test step 5 (or 3) by pressing the Service key, the security access confirmation will be skipped.

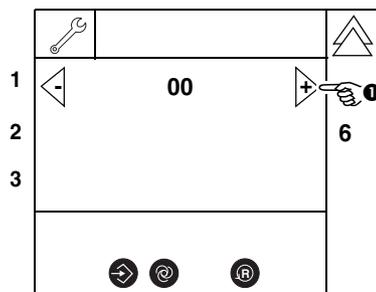
## Selecting the device status

- Select the desired device status using the **arrow keys** of selection field 1.

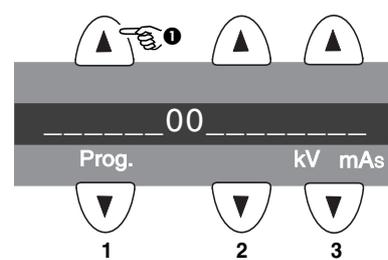
**00 = Remote control disabled**

**01 = Remote control enabled**

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

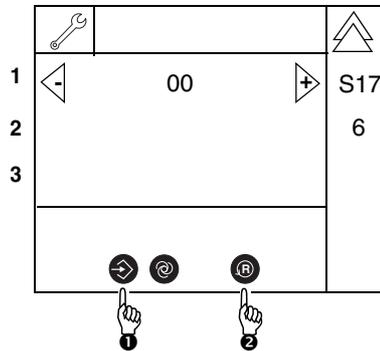


After the device status has been selected the

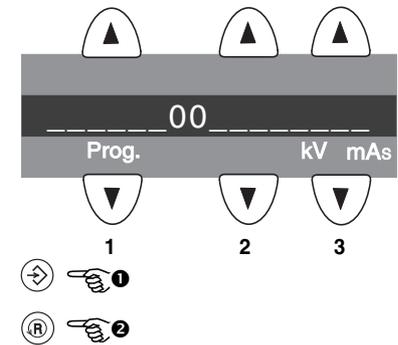
**Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

2. To save the selected device status, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**i NOTE**

The setting is permanently saved.

**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.11.6 S017: Test step 7

- Call up test step 7 in the same way as described on page 5-53 or by pressing the **Service key** in test step 6.

**i** **NOTE**

If you go to test step 7 from test step 6 by pressing the Service key, the security access confirmation will be skipped.

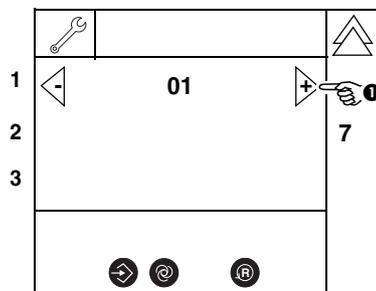
## Selecting a switching plate

1. Select the desired setting for the switching plate using the **arrow keys** of selection field 1.

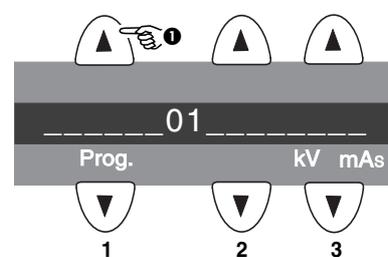
**01 = up to unit serial number 1079**

**02 = from unit serial number 1080**

**GALILEOS: Easypad touchscreen**



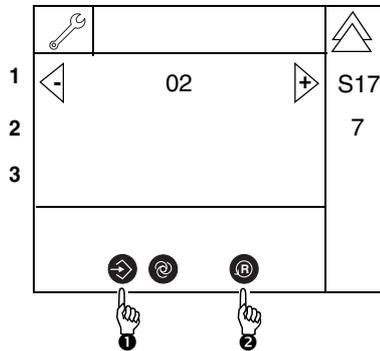
**GALILEOS GAX5: Multipad**



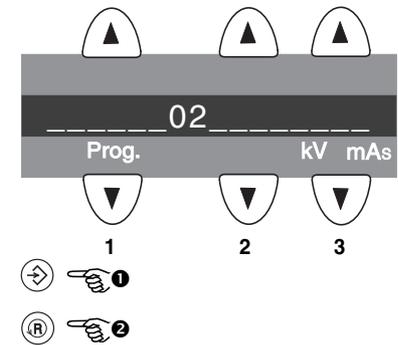
After the switching plate is selected the **Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

2. To save the selected switching plate, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**i NOTE**

The setting is permanently saved.

### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.11 Service routine S017

## 5.11.7 S017: Test step 9

This service routine is used to configure operation of the system with or without the module DX41. This configuration is necessary for software updates and module replacement or board DX11 if systems with or without board DX41 should be supported.

- Start test step 9 in the same way as described on page 5-54 or by pressing the **Service key** in test step 6.

**i** **NOTE**

If you go to test step 9 from test step 6 by pressing the Service key, the security access confirmation will be skipped.

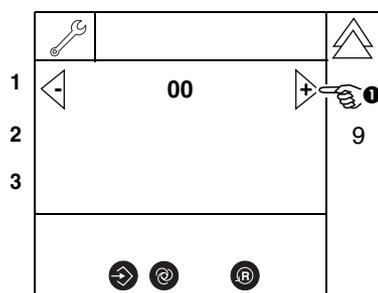
### Setting the configuration for board DX41

1. Select the desired device status using the **arrow keys** of selection field 1.

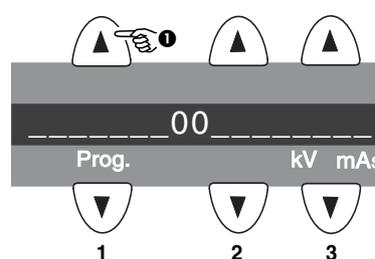
**00 = Board DX41 disabled**

**01 = Board DX41 enabled**

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**!** **CAUTION**

If the code is "00", i.e. the system is configured for operation without board DX41, DX41 may not be installed in the system!

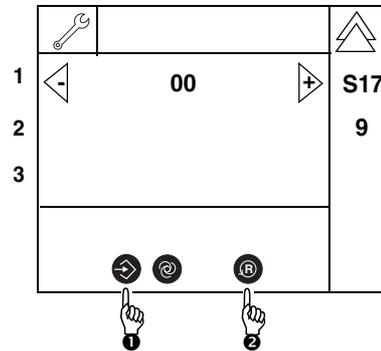
If the code is "01", i.e. the system is configured for operation with board DX41, the system will expect to detect an installed DX41.

After the device status has been selected the

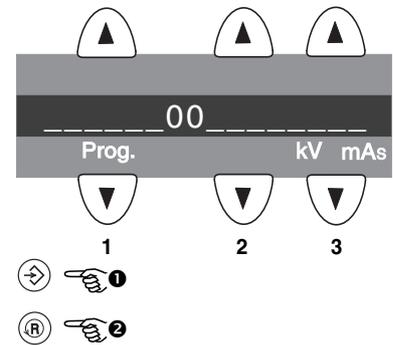
**Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

2. To save the selected device status, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**i NOTE**

The setting is permanently saved.

**Quitting the service routine**

**For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

### 5.11.8 S017: Test step 13 (not for GALILEOS GAX5)

- Start test step 13 in the same way as described on page 5-54 or by pressing the **Service key**  in test step 12.

#### **i** NOTE

If you go to test step 13 from test step 6 by pressing the Service key, the security access confirmation will be skipped.

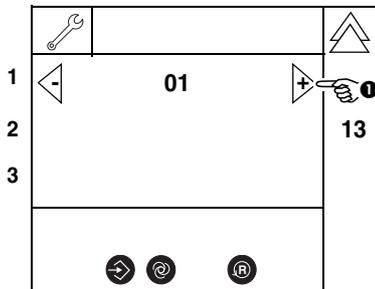
#### Enabling/disabling the welcome screen

- Select the code for enabling or disabling the welcome screen using the **arrow keys** of selection field 1.

**00 = Welcome screen disabled**

**01 = Welcome screen enabled**

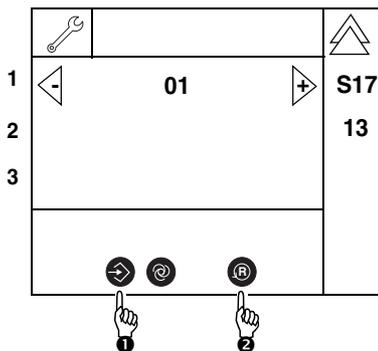
**GALILEOS: Easypad touchscreen**



After the code is selected, the **Memory button**  lights up.

- To save your selection, first press the **Memory key**  (the R key lights up) and then press the **R key** .

**GALILEOS: Easypad touchscreen**



The welcome screen is enabled or disabled.

#### **i** NOTE

After the welcome screen is disabled all parameters of the service routine S017.14 are reset back to the factory setting.

**Quitting the service routine**

To go on to the next test step, press the **Service key** .

To return to the Service menu, press the **double arrow key** .

To quit the Service menu and return to the main menu, press the **double arrow key** .

### 5.11.9 S017: Test step 14 (not for GALILEOS GAX5)

- Start test step 14 in the same way as described on page 5-54 or by pressing the **Service key**  in test step 13 (or 9).

#### **NOTE**

*If you go to test step 14 from test step 13 (or 9) by pressing the Service key, the security access confirmation will be skipped.*

**Enabling/disabling certain lines of the welcome screen**

- Select the code of the desired line using the **arrow keys** of selection field 1.

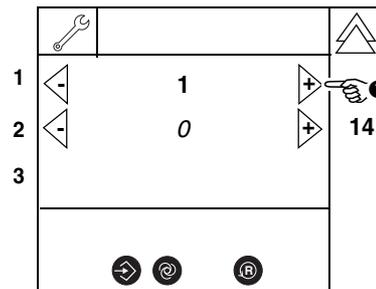
**1 = First name**

**2 = Surname**

**3 = Date of birth**

**4 = Patient number**

#### **GALILEOS: Easypad touchscreen**



The activation status code is displayed in selection field 2.

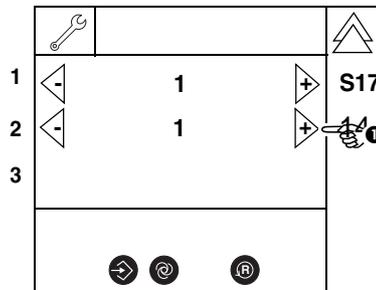
**0 = disabled**

**1 = enabled**

## 5.11 Service routine S017

2. Select the desired status using the **arrow keys** of selection field 2.

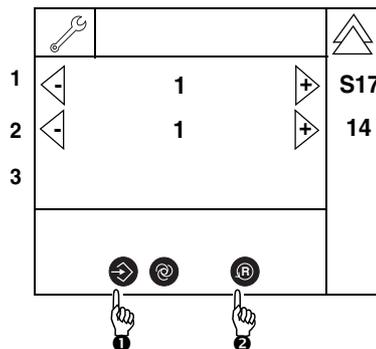
**GALILEOS: Easypad touchscreen**



After the code is selected, the **Memory button**  lights up.

3. To save your selection, first press the **Memory key**  (the R key lights up) and then press the **R key** .

**GALILEOS: Easypad touchscreen**



### Quitting the service routine

To go on to the next test step, press the **Service key** .

To return to the Service menu, press the **double arrow key** .

To quit the Service menu and return to the main menu, press the **double arrow key** .

## 5.11.10 S017: Test step 15

- Start test step 15 in the same way as described on page 5-54 or by pressing the **Service key**   in test step 14.

**i** **NOTE**

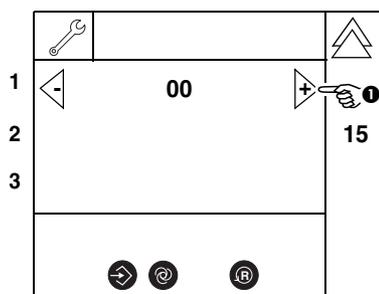
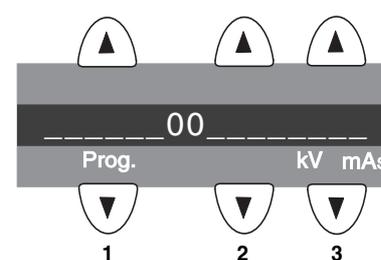
If you go to test step 15 from test step 14 by pressing the Service key, the security access confirmation will be skipped.

**Activating/deactivating the acoustic signal for end of exposure**

- Select the code for activating or deactivating the acoustic signal using the **arrow keys** of selection field 1.

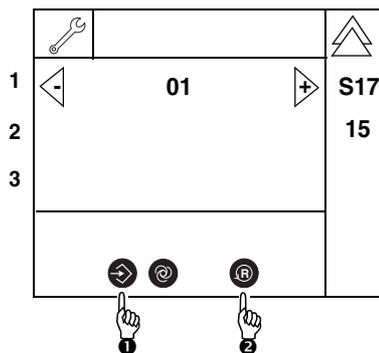
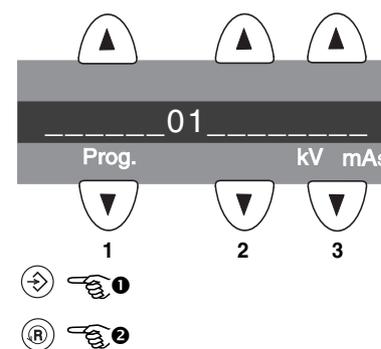
**00 = acoustic signal for end of exposure = OFF**

**01 = acoustic signal for end of exposure = ON**

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

After the code is selected the **Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

- To save the selection, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.12 Service routine S018

### Service for height adjustment

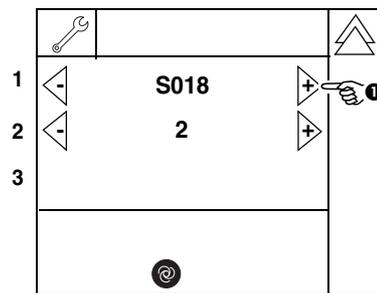
Function S018	Service for height adjustment
Test step 2	Limitation of the maximum travel height
Test step 3	Undoing the maximum travel height setting
Test step 4	Check of the height adjustment sensor system

- Select the Service menu (see page 5-6).

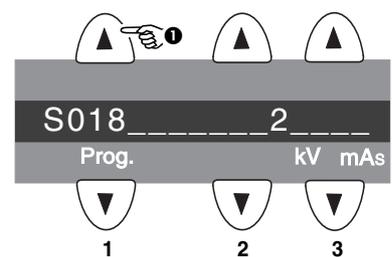
#### Selecting service routine S018

1. Use the **arrow keys** to select service routine **S018**.

##### GALILEOS: Easypad touchscreen



##### GALILEOS GAX5: Multipad



### 5.12.1 S018: Test step 2

#### Moving the unit



1. Move the unit to the required maximum travel height by pressing the **Up/Down keys** on the control panel.

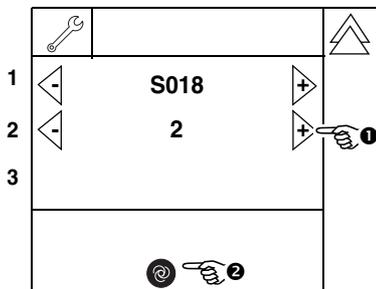
#### **i** NOTE

Programming the maximum travel height is possible only for a system height above the upper correction switch level (> position value of 1500)!

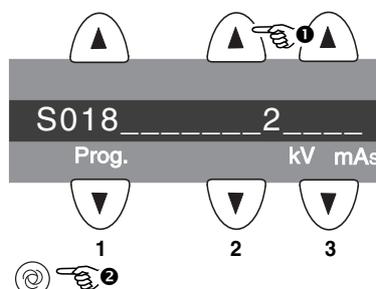
Selecting test step 2

2. Select test step 2 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key** (R) (R) .

**GALILEOS: Easypad touchscreen**

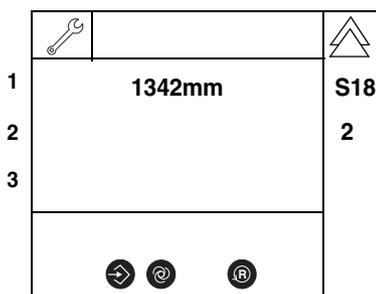


**GALILEOS GAX5: Multipad**

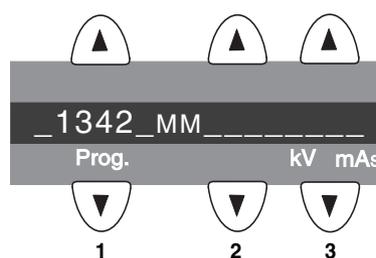


The current height position is displayed in selection field 1. The **Memory key** (M) (M) (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up.

**GALILEOS: Easypad touchscreen**



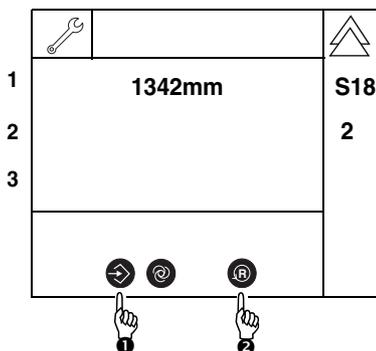
**GALILEOS GAX5: Multipad**



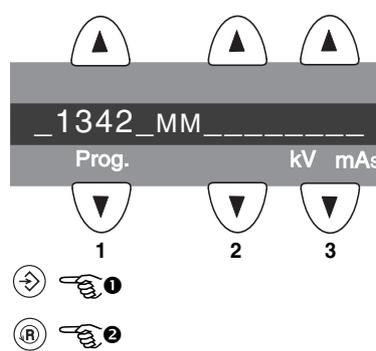
Saving the maximum travel height

3. To save the maximum travel height, first press the **Memory key** (M) (M) (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** (R) (R) .

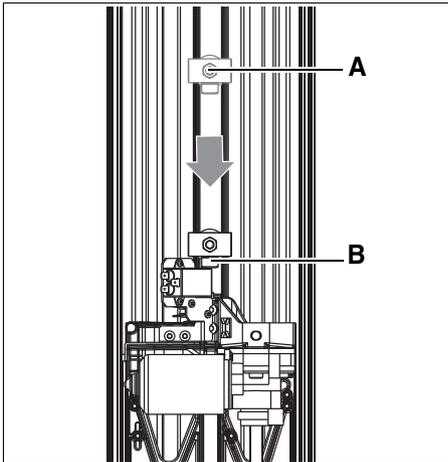
**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



### Setting the mechanical limit stop on the unit



- Loosen nut **A** and slide mechanical limit stop **B** for the limit switch toward the limit switch until it switches. Retighten nut **A**.

#### **i** NOTE

*The next time the Up key is pressed, the unit will stop 10 mm below the limit switch.*

### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

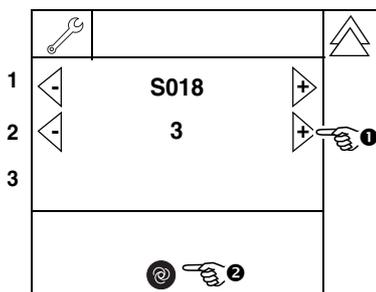
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

5.12.2 S018: Test step 3

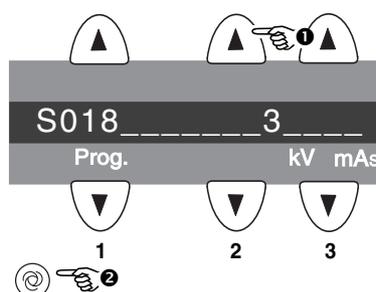
Selecting test step 3

1. Select test step 3 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

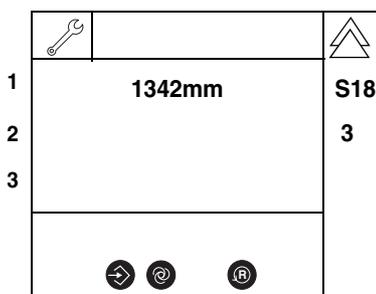


**GALILEOS GAX5: Multipad**

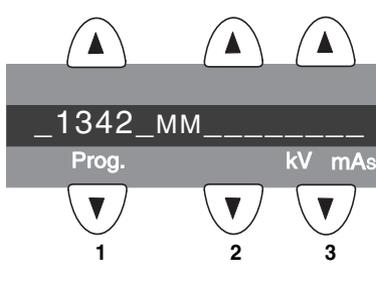


The current height position is displayed in selection field 1. The **Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

**GALILEOS: Easypad touchscreen**



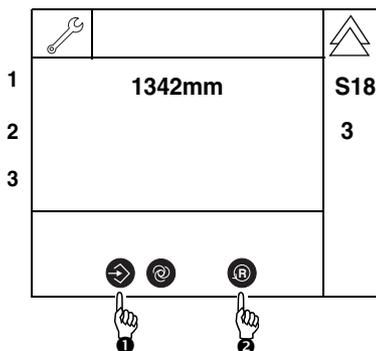
**GALILEOS GAX5: Multipad**



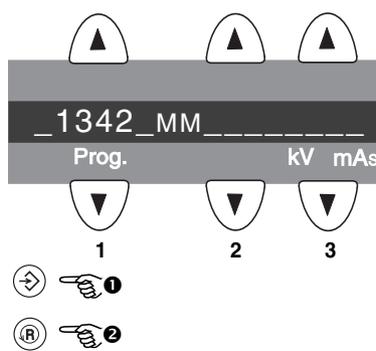
Undo the maximum travel height setting

2. To cancel the limit for the maximum travel height, first press the **Memory key**   (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key**  .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

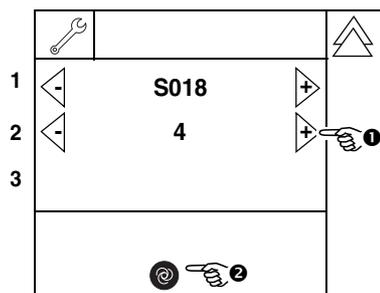
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

### 5.12.3 S018: Test step 4

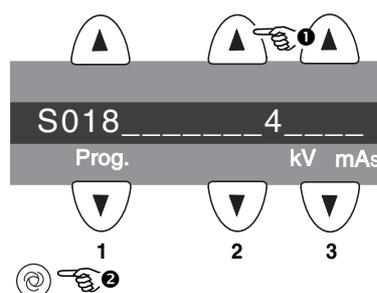
#### Selecting test step 4

1. Select test step 4 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

#### GALILEOS: Easypad touchscreen

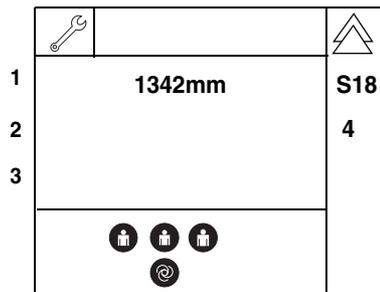


#### GALILEOS GAX5: Multipad

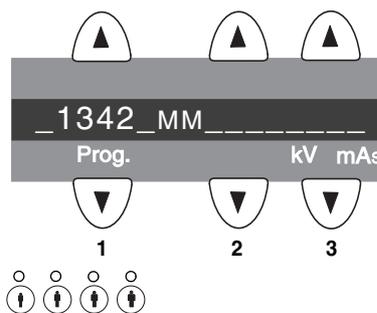


The current height position is displayed in selection field 1.

#### GALILEOS: Easypad touchscreen



#### GALILEOS GAX5: Multipad



#### NOTE

After this service routine is selected, the stand can be moved upward or downward up to the limit switches using the **UP/DOWN** keys on the control panel. The "soft limit positions" set by the software are ignored in this case.



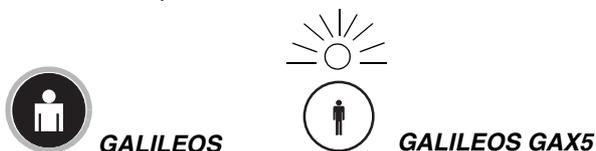
The first three patient symbol keys (from the left) indicate the switching state of the limit switches:

**First patient symbol key = State of correction switch**

**Second patient symbol key = State of bottom limit switch**

**Third patient symbol key = State of top limit switch**

If the **patient symbol key** (GALILEOS) or the LED above the **patient symbol key** (GALILEOS GAX5) lights up, the switch is actuated, i.e. the system is located above the position value 1500.



### Quitting the service routine

#### For GALILEOS:

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

#### For GALILEOS GAX5:

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

## 5.13 Service routine S037

### Network service

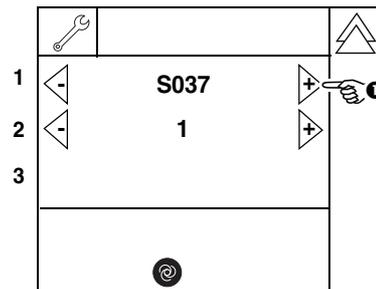
Function S037	Network service	
Test step 1	Displaying the network data	
Test step 2	Delete network addresses or set them to factory defaults	Security access
Test step 3	Configure boot mode	Security access
Test step 4	Configure network data	Security access

- Select the Service menu (see page 5-6).

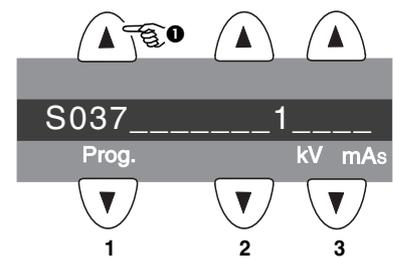
#### Selecting service routine S037

1. Use the **arrow keys** to select service routine **S037**.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

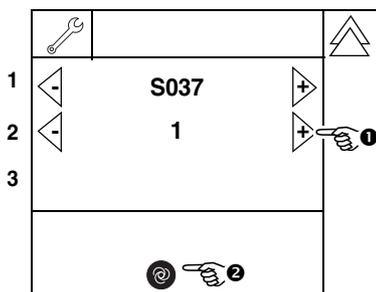


### 5.13.1 S037: Test step 1

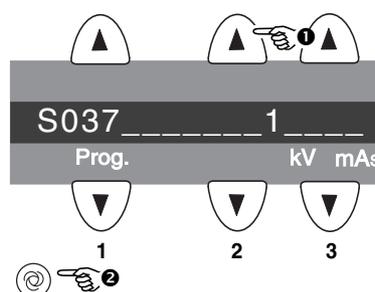
#### Selecting test step 1

1. Select test step 1 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

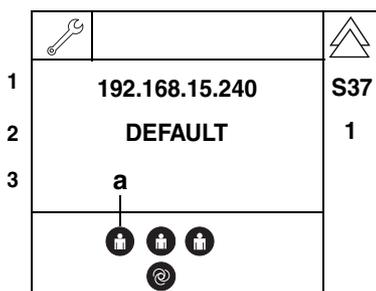


**GALILEOS GAX5: Multipad**

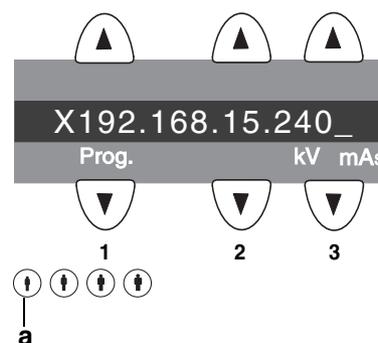


The IP address of the unit is displayed.

**GALILEOS: Easypad touchscreen**



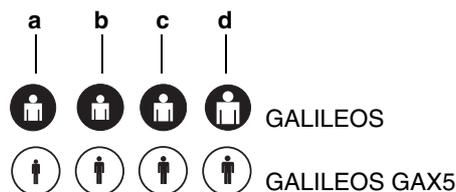
**GALILEOS GAX5: Multipad**



**DEFAULT** or **STATIC** or **IS DHCP** is displayed in selection field 2.

- DEFAULT** = fixed address, factory setting
- STATIC** = fixed address, changed setting
- DHCP** = automatic address allocation

#### Displaying the network data



2. You can display different network data in selection field 1 by pressing **patient symbol keys a, b and c**.

- a** : Display of IP address
- b** : Display of standard gateway
- c** : Display of subnet mask

The currently selected **patient symbol key** is lit.

**DEFAULT** or **STATIC** or **IS DHCP** is displayed in selection field 2.

 **NOTE**

If all network data is set to **DEFAULT**, the system is in the UDP boot mode.

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

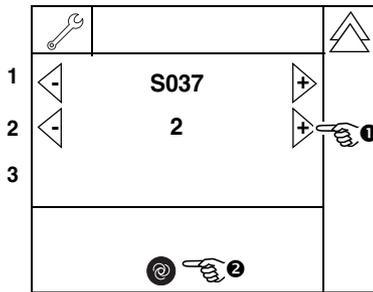
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

5.13.2 S037: Test step 2

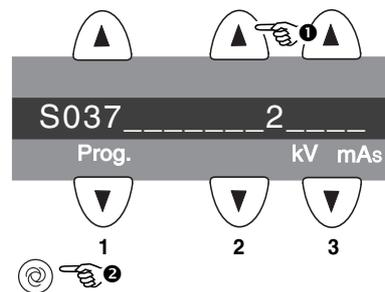
Selecting test step 2

1. Select test step 2 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



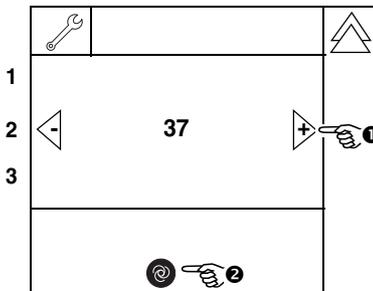
**GALILEOS GAX5: Multipad**



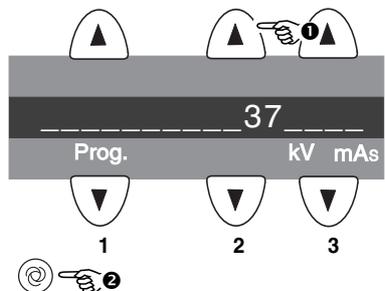
Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (37) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

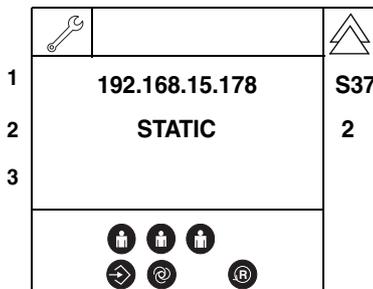


After test step 2 is selected, the network data will be displayed as in test step 1.

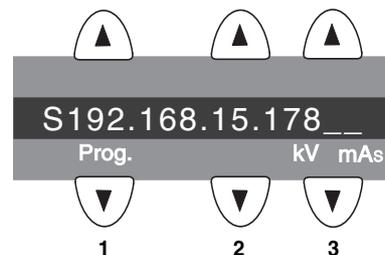
For GALILEOS: In addition, the **Memory key**  and the **R key**  are also displayed.

The **Memory key**  (GALILEOS) or the LED above the **Memory key**  (GALILEOS GAX5) lights up.

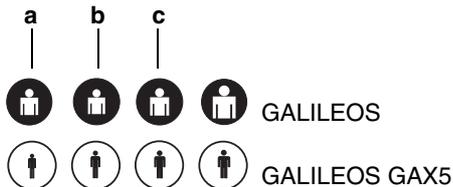
**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**Checking the network data**



3. Check the network data still in the system before resetting.

- a : Display of IP address
- b : Display of standard gateway
- c : Display of subnet mask

The currently selected **patient symbol key** (GALILEOS) or the LED above the selected **patient symbol key** (GALILEOS GAX5) lights up.

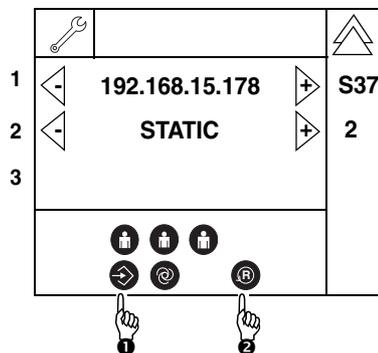
**Resetting the network data**

4. To reset the network data, first press the **Memory key** (↔) (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** (Ⓜ).

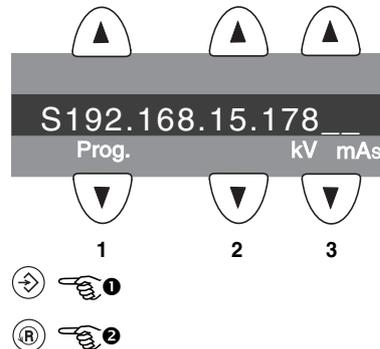
**CAUTION**

The network data cannot be reset selectively. All network data are reset.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**

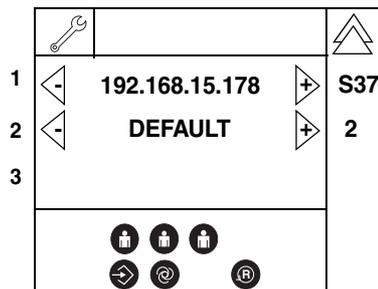


The default network data (factory default setting) is displayed. To switch between the display of the different network data, proceed as in test step 1.

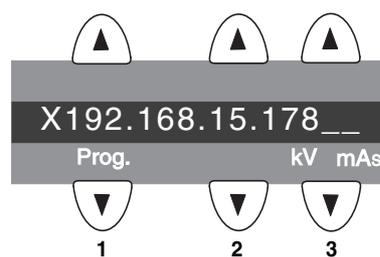
**NOTE**

The network address can only be reset to the default value only in the fixed address boot mode (no DHCP).

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



5. Switch the unit off and then on again.

**Quitting the service routine****For GALILEOS:**

Pressing the **Service key**  or the **double arrow key**  returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key**  above selection field 3 returns you to the service routine selection menu.

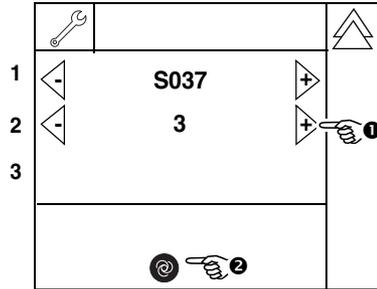
To quit the Service menu and return to the Main menu, press the **up arrow key**  above selection field 3.

### 5.13.3 S037: Test step 3

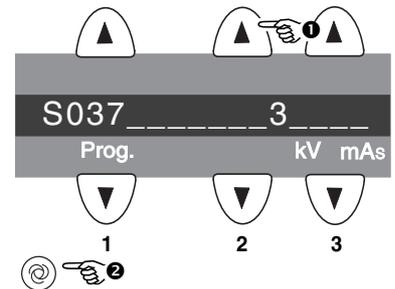
#### Selecting test step 3

1. Select test step 3 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**



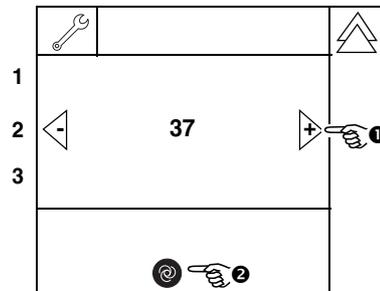
**GALILEOS GAX5: Multipad**



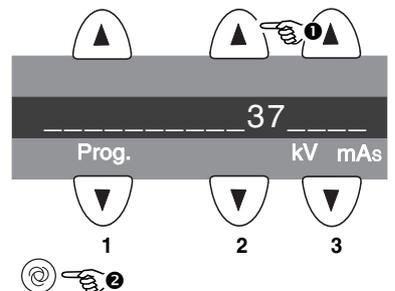
#### Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (37) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

**GALILEOS: Easypad touchscreen**

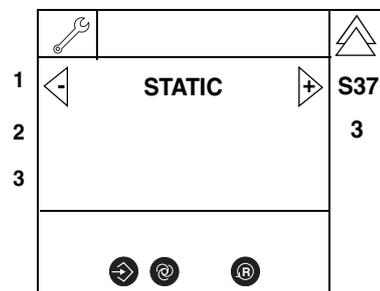


**GALILEOS GAX5: Multipad**

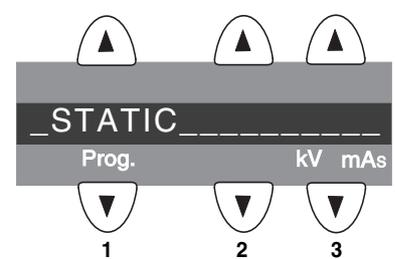


After selecting test step 3, the current boot mode of the unit is displayed in selection field 1.

**GALILEOS: Easypad touchscreen**

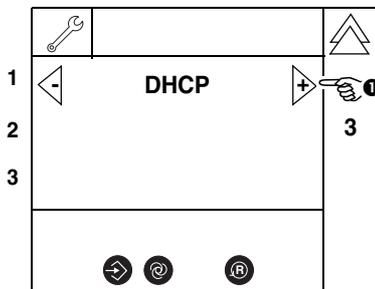
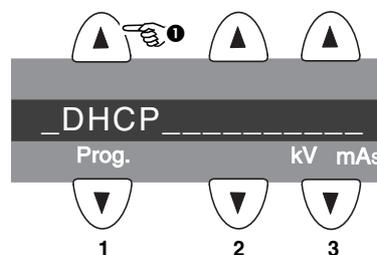


**GALILEOS GAX5: Multipad**



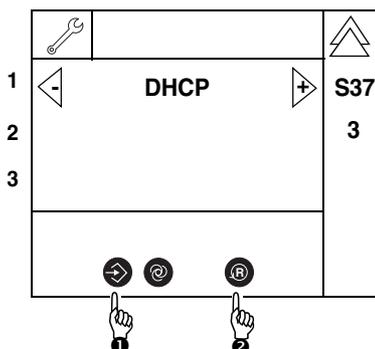
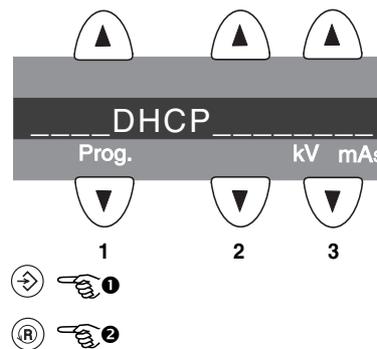
## Selecting the boot mode

- Use the **arrow keys** of selection field 1 to select the desired boot mode, i.e. **DHCP** or **fixed address** (STATIC).

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

## Saving the boot mode

- To save the boot mode, first press the **Memory key** (↔) (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** (R) .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad****i NOTE**

If the system is reset to the **STATIC** mode, the network addresses will be reset to the factory setting.

- Switch the unit off and then on again.

## Quitting the service routine

**For GALILEOS:**

Pressing the **Service key** (Ⓜ) or the **double arrow key** (↔) returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** (↔) .

**For GALILEOS GAX5:**

Pressing the **up arrow key** (▲) above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key** (▲) above selection field 3.

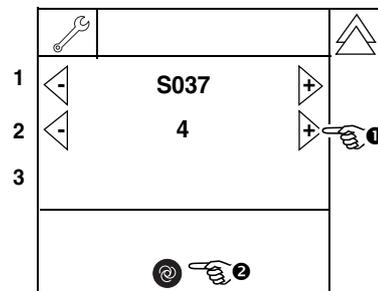
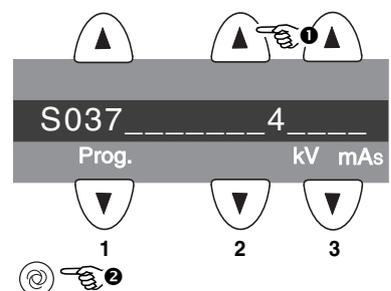
## 5.13.4 S037: Test step 4

**i** NOTE

Performance of this service routine is not possible in the **DHCP mode** (T key is blocked).

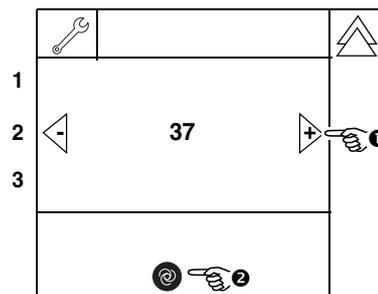
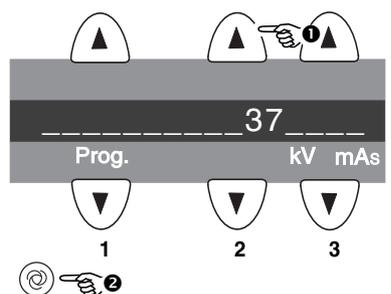
## Selecting test step 4

1. Select test step 4 in selection field 2 with the **arrow keys** and confirm your selection by pressing the **Service key**  .

**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

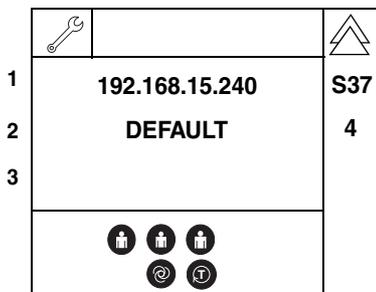
## Confirming the security access

2. Confirm security access by once again selecting the number of the main routine (37) with the **arrow keys** of selection field 2 and then pressing the **Service key**  .

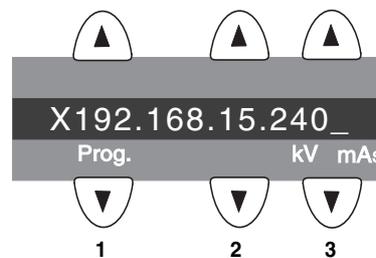
**GALILEOS: Easypad touchscreen****GALILEOS GAX5: Multipad**

The IP address of the unit is displayed in selection field 1.

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



**For GALILEOS only (Easypad touchscreen):**

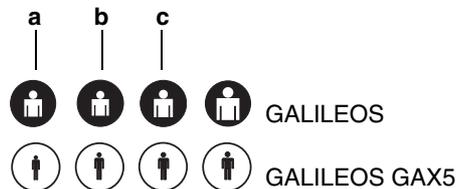
DEFAULT or STATIC or IS DHCP is displayed in selection field 2.

DEFAULT = fixed address, factory setting

STATIC = fixed address, changed setting

DHCP = automatic address allocation

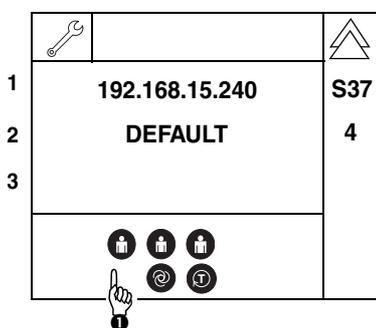
**Selecting/displaying the network data**



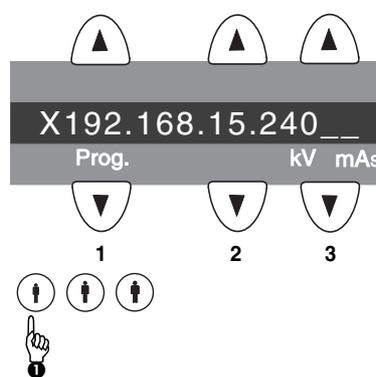
- To select the network data you would like to edit, press patient symbol key a, b or c:

- a : Display of IP address
- b : Display of standard gateway
- c : Display of subnet mask

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



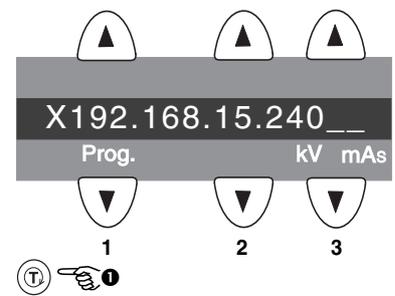
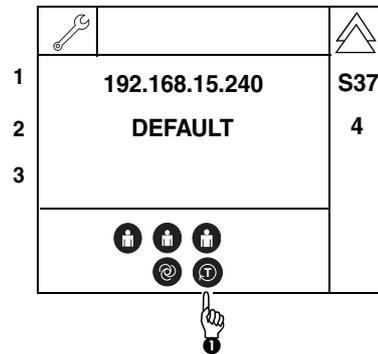
The currently selected patient symbol key (GALILEOS) or the LED above the selected patient symbol key (GALILEOS GAX5) lights up.

Selecting the network data

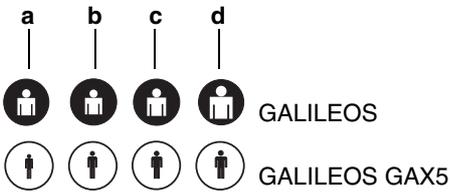
- To change the selected parameter, first press the **T** key  .

**GALILEOS: Easypad touchscreen**

**GALILEOS GAX5: Multipad**



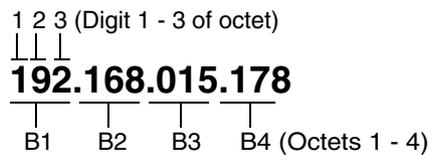
Selecting the octet



- Select the desired octet 1 - 4 using the **patient symbol key a - d**:

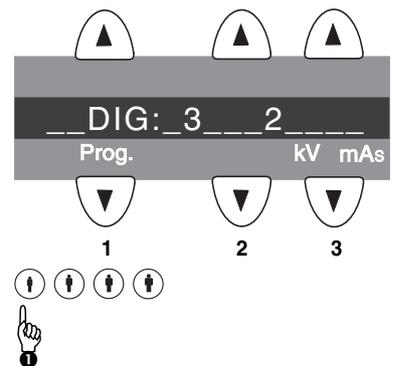
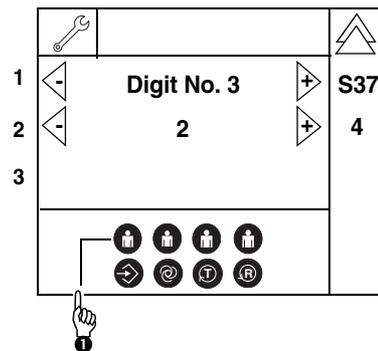
- a: Octet B1**
- b: Octet B2**
- c: Octet B3**
- d: Octet B4**

Example:



**GALILEOS: Easypad touchscreen**

**GALILEOS GAX5: Multipad**



The currently selected **patient symbol key** (GALILEOS) or the LED above the selected **patient symbol key** (GALILEOS GAX5) lights up.

**Selecting the digit**

- Select the desired digit within the octet using the arrow keys of selection field 1 (see 5.).

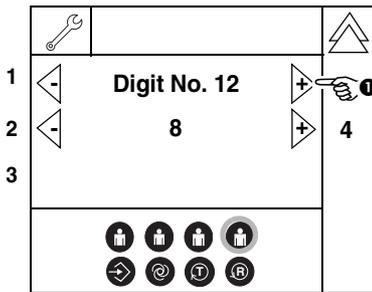
**i NOTE**

The digits always refer to the selected octet only. Reprogramming the last digit is shown here as an example.

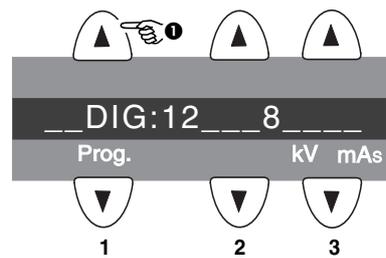
192.168.015.178

Octet 3, digit 12, with the value 8

**GALILEOS: Easypad touchscreen**



**GALILEOS GAX5: Multipad**



Selection field 2 shows the value of the selected digit.

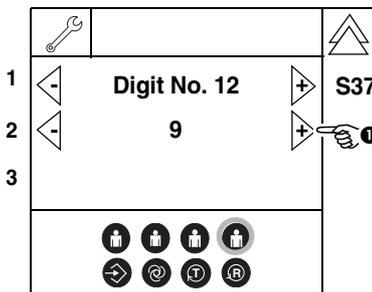
**Changing the value under the digit**

- To change the value under the digit, use the arrow keys of selection field 2.

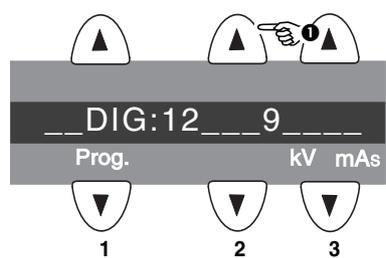
192.168.015.179

Octet 3, digit 12, with the value 9

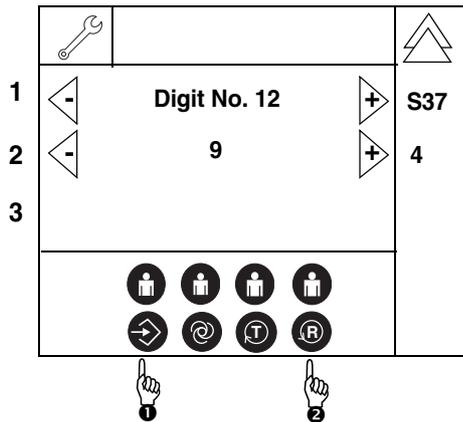
**GALILEOS: Easypad touchscreen**



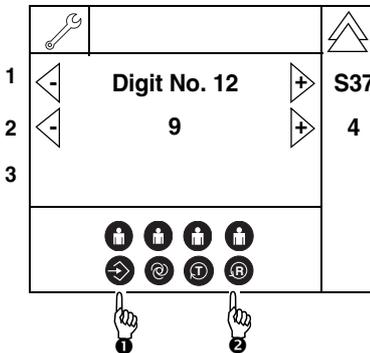
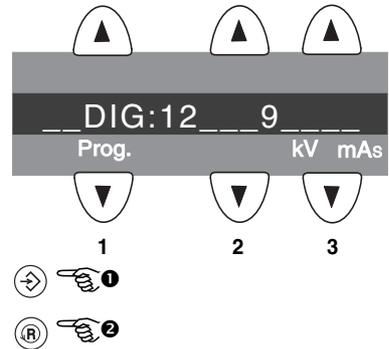
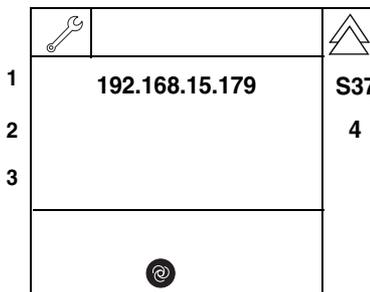
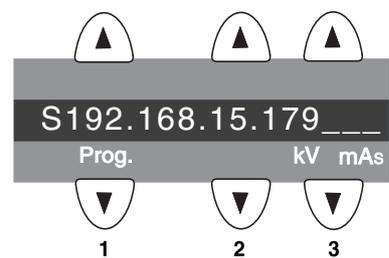
**GALILEOS GAX5: Multipad**



## Saving the changes



8. To save the change, first press the **Memory key** (R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up) and then the **R key** .

*GALILEOS: Easypad touchscreen**GALILEOS GAX5: Multipad**GALILEOS: Easypad touchscreen**GALILEOS GAX5: Multipad*

9. Switch the unit off and then on again.

## Quitting the service routine

**For GALILEOS:**

Pressing the **Service key** or the **double arrow key** returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the **double arrow key** .

**For GALILEOS GAX5:**

Pressing the **up arrow key** above selection field 3 returns you to the service routine selection menu.

To quit the Service menu and return to the Main menu, press the **up arrow key** above selection field 3.



# 6 Repair

GALILEOS

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# Repair

---

**⚠ DANGER**

**PERILOUS SHOCK HAZARD.** It is essential to switch the unit off and to wait at least 1 minute, or 4 minutes if disconnecting the tube assembly (cable L3), before starting the repair or taking off a cover panel!



Please observe the usual precautionary measures for handling printed circuit boards (ESD).

Touch a ground point to discharge static electricity before touching any boards.

---

**⚠ CAUTION**

Modifications to this system which might affect the safety of the system owner, patients or other persons are prohibited by law! For reasons of product safety, this product may be operated only with original Sirona accessories or third-party accessories expressly approved by Sirona. The user assumes the risk of using non-approved accessories.

---

**⚠ CAUTION**

After replacing boards or modules containing boards, check to make sure that the software version of the module corresponds to the current software status of the system. The software versions of the modules can be queried via service routine S008.2 or the extended detail query in SIXABCON. You can also check the info screen in advance to determine whether the current software constellation is permissible. If this is not the case, the version number of the entire software is marked by an asterisk (e.g. V03.03.01\*).

Perform a software update for the relevant module in case of software incompatibilities (see section 1.6).

---

**⚠ CAUTION**

When replacing modules, be sure to note which ones contain boards and follow the instructions in section "Measures following replacement of boards" starting on page 6-45. Also check whether the current GALILEOS XG CD or the SIRONA dealer page contains any additional, up-to-date information on module replacement.

Be sure to observe the information concerning actions following module replacement. You will find this information at the end of each set of repair instructions.

---

**⚠ CAUTION**

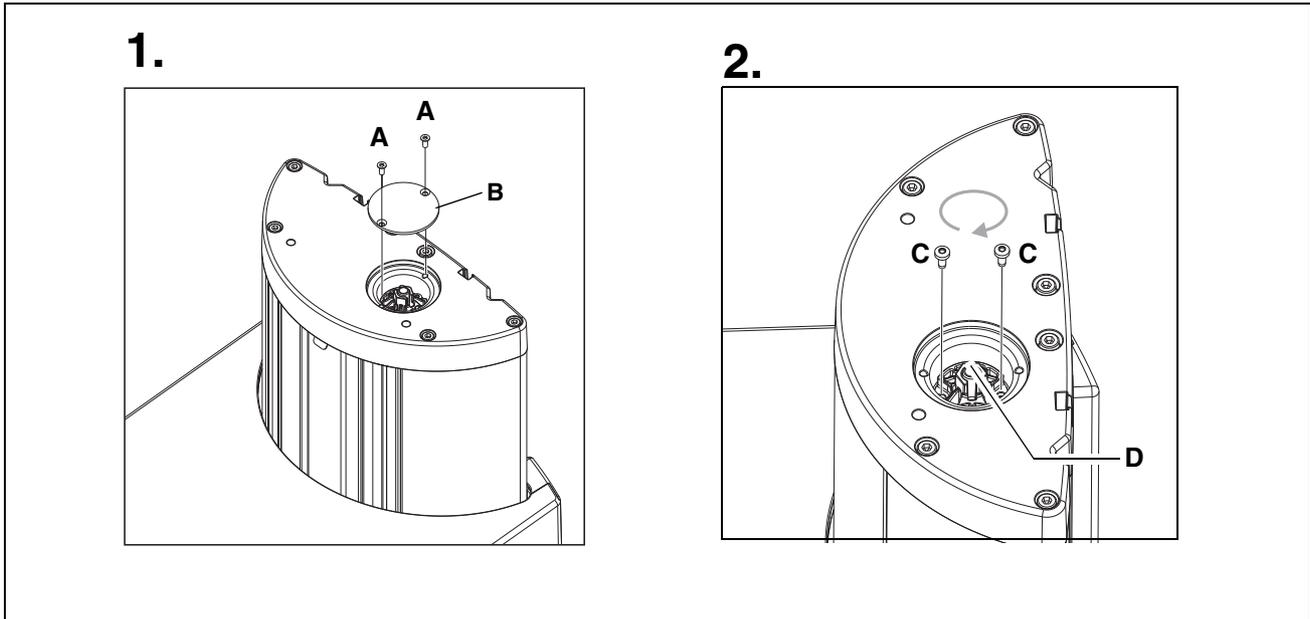
Make sure to reattach all ground cables to ensure correct grounding of all modules.

---

**CAUTION**

*Be careful not to kink the cables when removing or installing them. Handle fiber optic cables L5, L6, L7 and L15 with special care.  
Tighten the cable ties only up to the contact and without exerting force.*

## 6.1 Replacing the height adjustment motor (M1\_4)/spindle



### 6.1.1 Preparing for motor replacement

#### Moving the unit up and removing the profile covers

- Switch the unit ON.
- Use the UP/DOWN keys on the Easypad to move the slide upwards and remove the housing covers (see Section 1.11):
  - Intermediate piece
  - Profile covers (top and bottom)

#### **i** NOTE

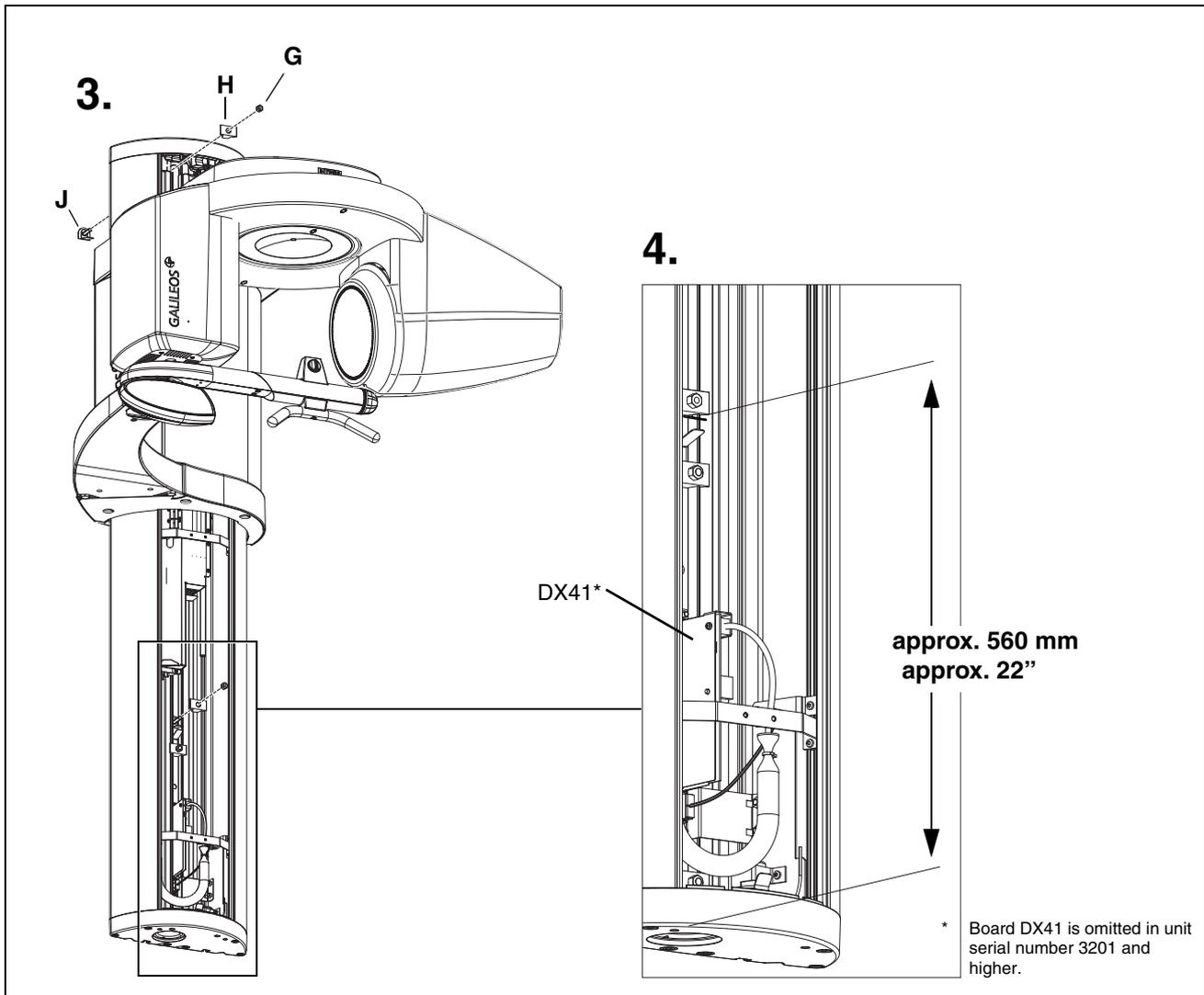
*Tip:* When unscrewing the upper profile cover, press it toward the top of the unit and let it slide down after detaching it.

#### **i** NOTE

*If the height adjustment motor is inoperative, you can also move the slide manually.*

#### Moving the slide manually

1. Loosen the two screws **A** and remove cover **B**.
2. Loosen screws **C** on spindle holder **D** and turn the spindle holder with a socket wrench (18 mm A/F):
  - **CW rotation of spindle = slide moves upward**
  - **CCW rotation of spindle = slide moves downward**
 The spindle and slide can thus be manually moved in the vertical axis.



### Securing the slide position

- Make a mark at the position of the upper limit stop.
- 3. Loosen nut **G** on upper profile clamp **H** and remove upper limit stop **J** from the stand.
- 4. Install limit stop **J** above the lower limit stop so that there is a distance of 31 cm between the upper edge of the upper screw on board DX41 and the lower edge of the limit stop.
- Move the slide downward using the UP/DOWN keys on the Easypad.

### **i** NOTE

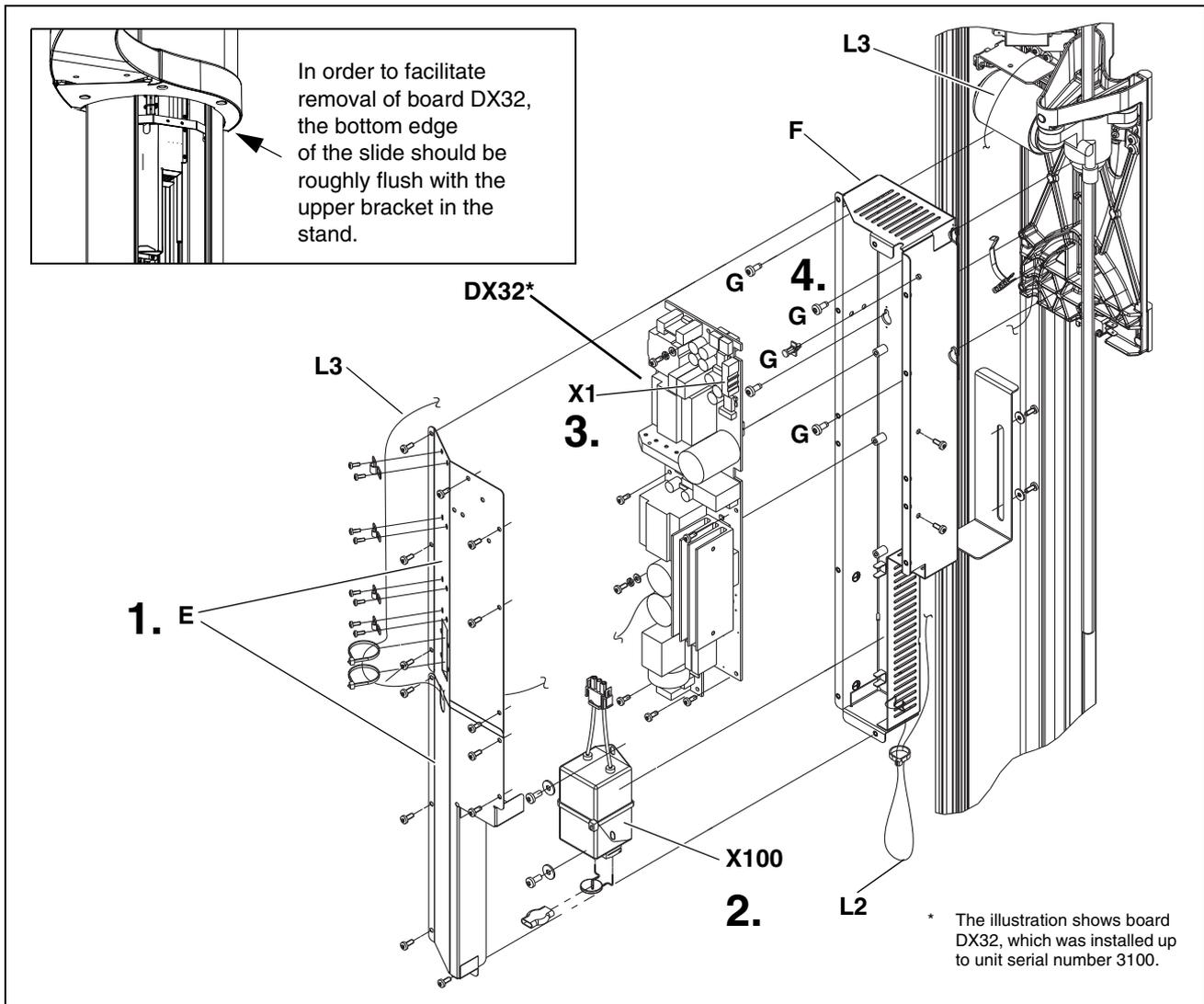
If the height adjustment motor is inoperative, you can also move the slide manually (see page 6-5).

- Switch the unit **OFF** and **de-energize** it.

**Removing the remaining covers**

- Remove the top cover and pull connector X607 off of board DX1.
- Now remove the following cover parts:
  - Arm cover
  - Slide cover, center rear
  - Slide cover, top rear
  - Slide cover, bottom rear
  - Slide cover, front

## 6.1.2 Removing board DX32



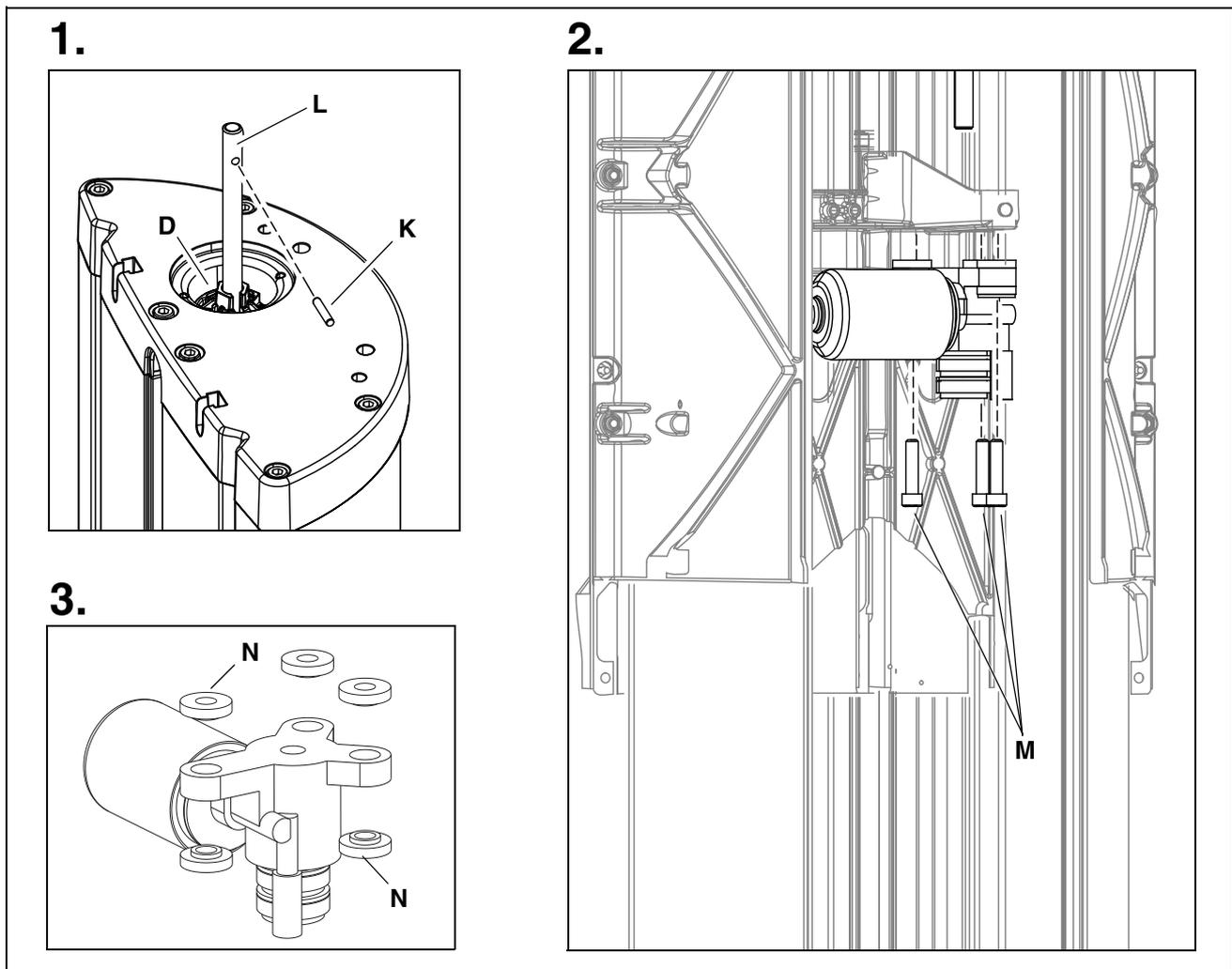
1. Unscrew cover plates **E** (bottom and top) from connection box **F** of board **DX32**.

**i** **NOTE**

*Cable **L3** can remain on the top cover plate (remove the shield terminal if necessary). The cover plate can simply be folded to the side and stored laterally in the stand.*

- Pull connector **X2** off of board **DX32** and detach the protective ground wire.
2. Detach cable **L2** from the cable tie and from terminal **X100** and pull it out of connection box **F** toward the bottom.
  3. Pull connector **X1** off of board **DX32**.
  4. Loosen the four screws **G** and remove the connection box including board **DX32**.

### 6.1.3 Replacing the height adjustment motor/spindle



#### Removing the spindle

1. Turn spindle holder **D** (with an 18 mm A/F socket wrench) CCW until the motor comes to rest on the limit stop and spindle **L** has been turned all the way out of the motor. Remove straight pin **K**. Remove spindle **L**.

#### **i** NOTE

**Tip:** First pull spindle **L** downward along the motor, and then diagonally upward and out of the unit.

#### Removing the defective motor

- Unplug connector **X402** of the pulse generator cable from board DX1, detach the motor cable from the cable harness and carefully pull it out of the stand.
  - Pull the motor connecting cable off of the filter.
2. Loosen the three screws **M**. Remove the motor while carefully pulling the motor cable out of the stand.

#### Inserting the dampers

3. Attach the new rubber pads **N** to the new motor. They are included in the scope of supply of a new HA motor.

**Installing the new motor**

- Install the height adjustment motor in the reverse order of removal. Please observe the following:

---

**i NOTE****For nuts:**

*When fastening the motor, make sure that all three screws are tightened uniformly and protrude approx. 3 mm out of the nut.*

**For cap nuts:**

*If the unit is equipped with cap nuts, then screw the cap nuts tight as far as they will go.*

---

---

**i NOTE**

*Don't forget to plug all connectors and cables back in again in their original positions and to reattach all cable ties and clamps.*

*Make sure that no cables are pinched by the cover plates of connection box DX32.*

---

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**i NOTE**

*Don't forget to install the upper limit stop in the marked position after replacing the height adjustment motor.*

---

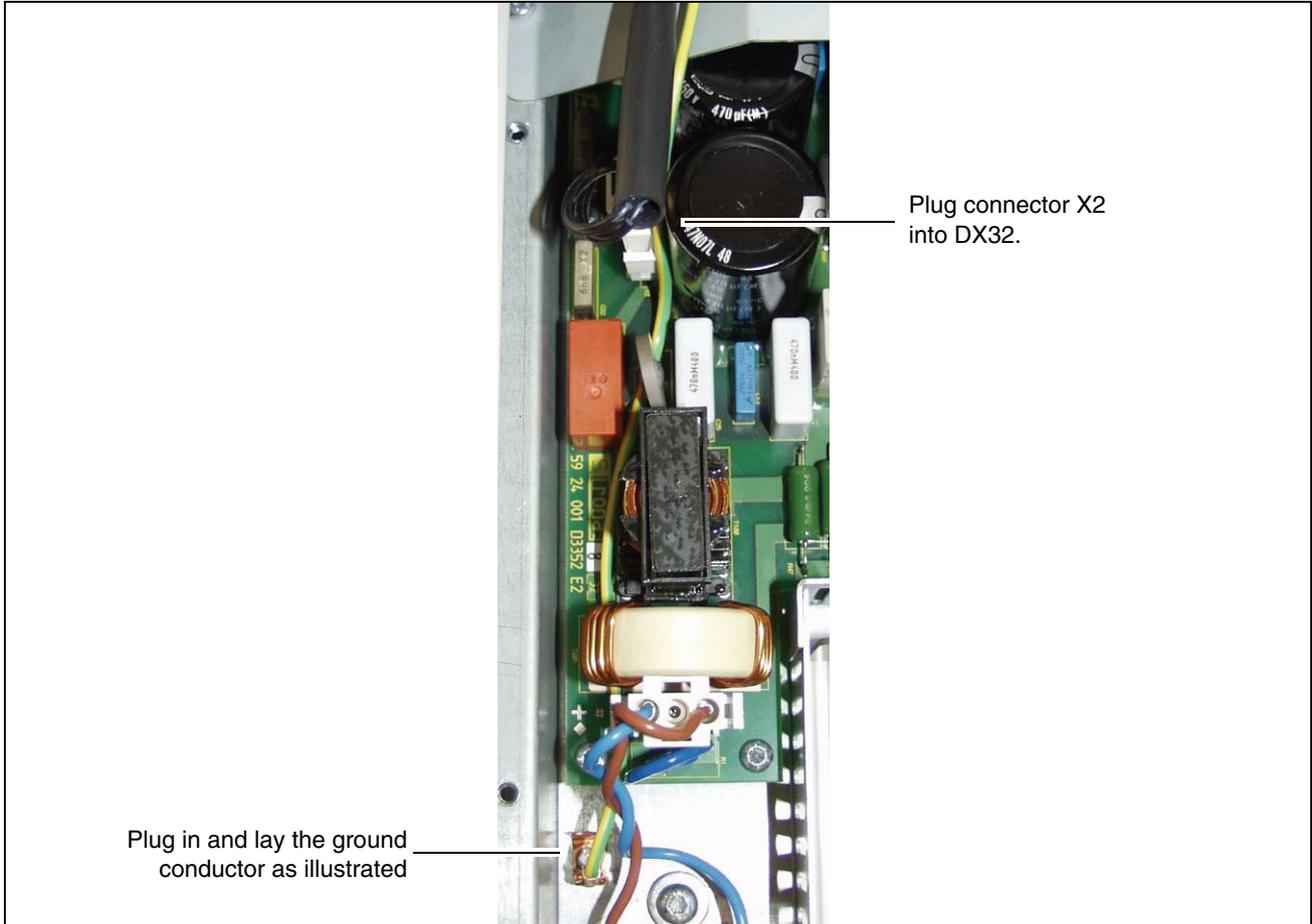
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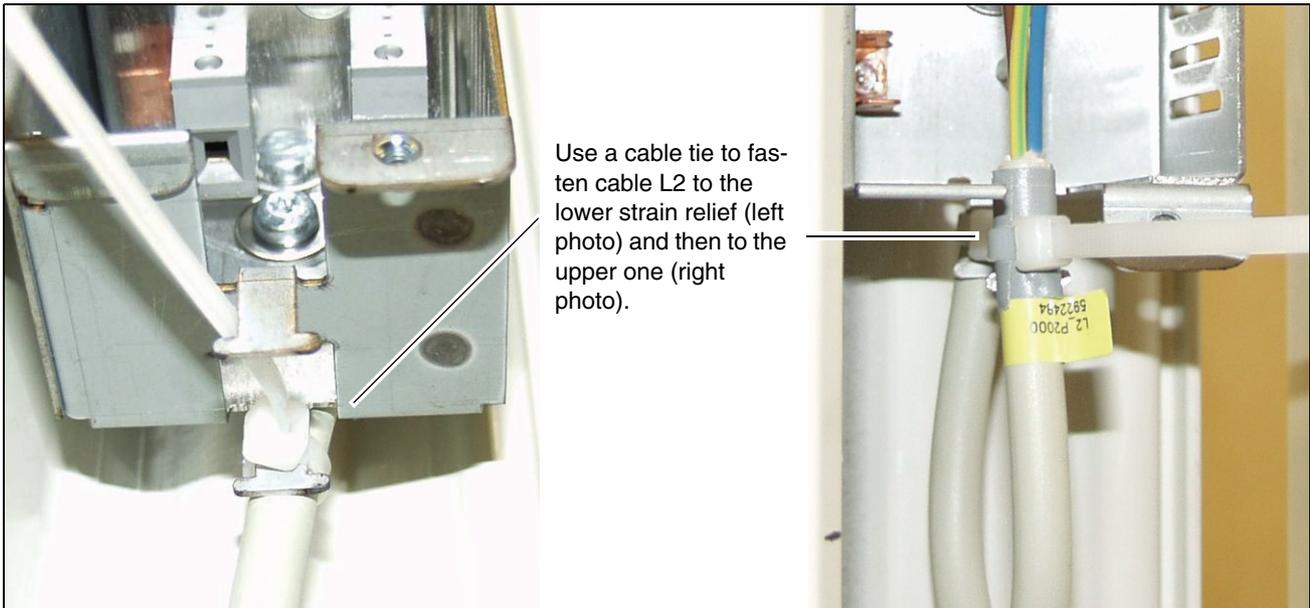
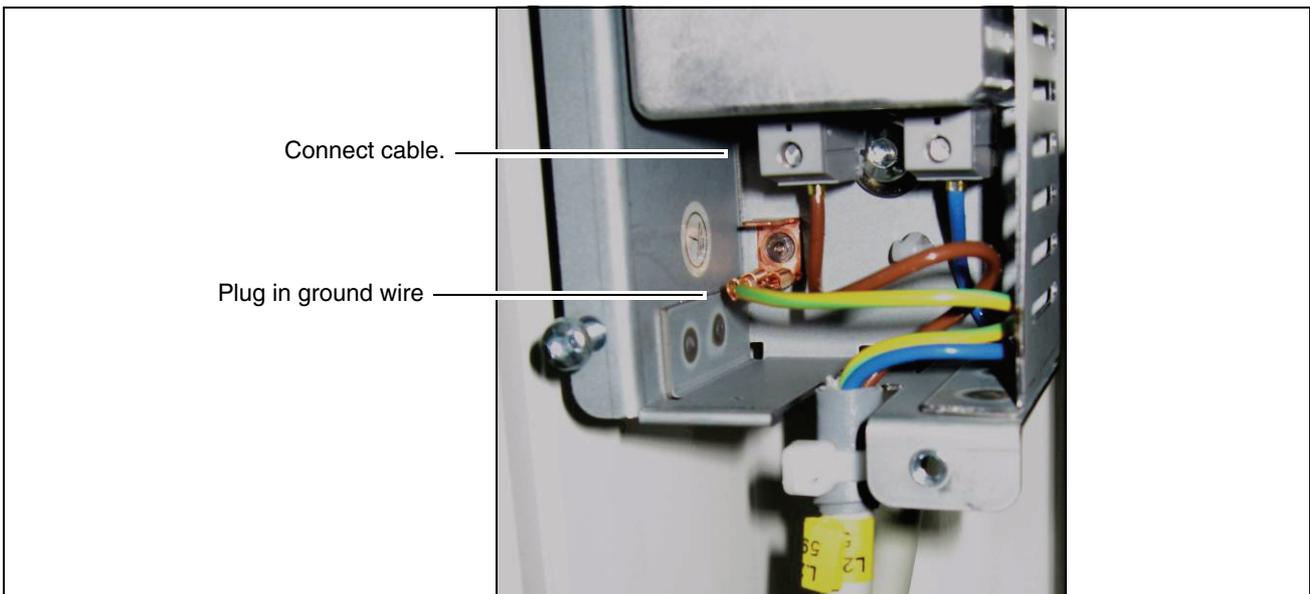
**i NOTE: What to do after replacement?**

- *After inserting the new spindle above and below the height adjustment motor, grease it generously with Chesterton 622.*
  - *Check the function of the height adjustment motor with the UP/DOWN keys on the user interface.*
  - *Readjust the travel height (see "Service routine S018" on page 5-73).*
-

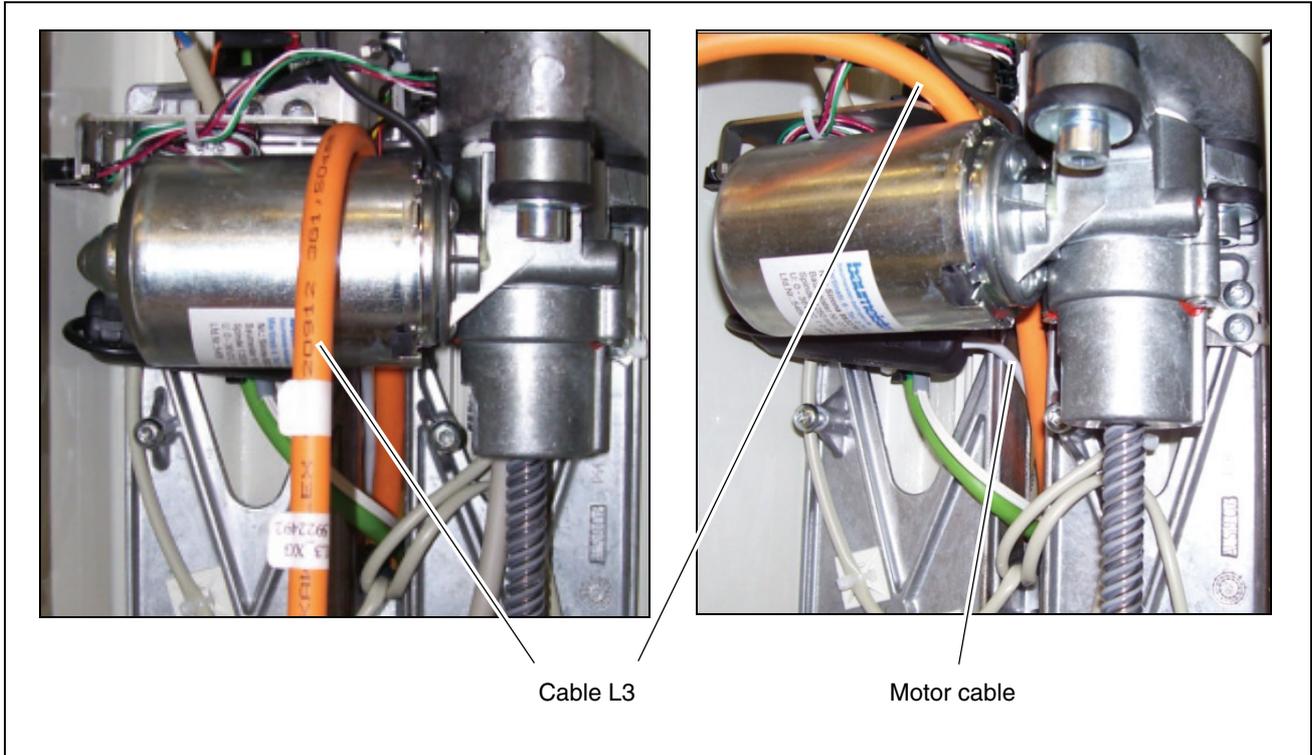
### 6.1.4 Laying cables when replacing the height adjustment motor

#### Plugging connector X2 into DX32

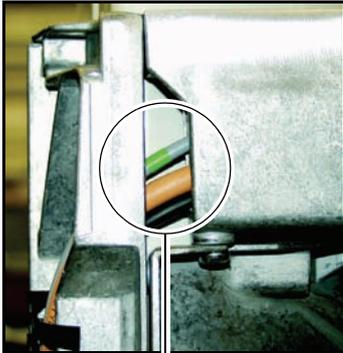
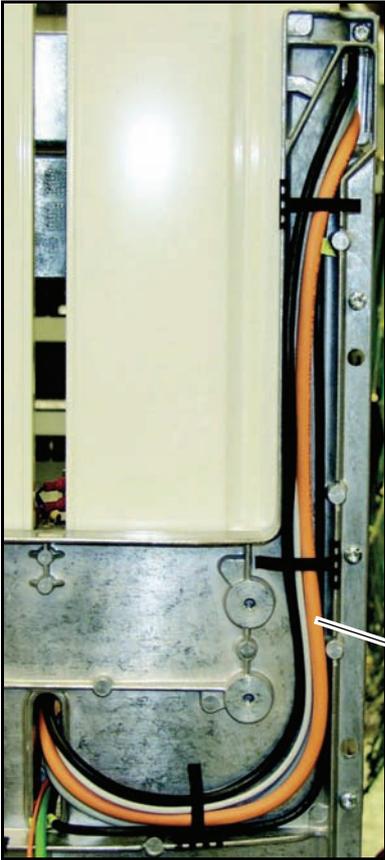


**Fastening cable L2 to DX32****Connecting cable L2 to DX32**

Motor cable and cable L3



Laying the motor cables



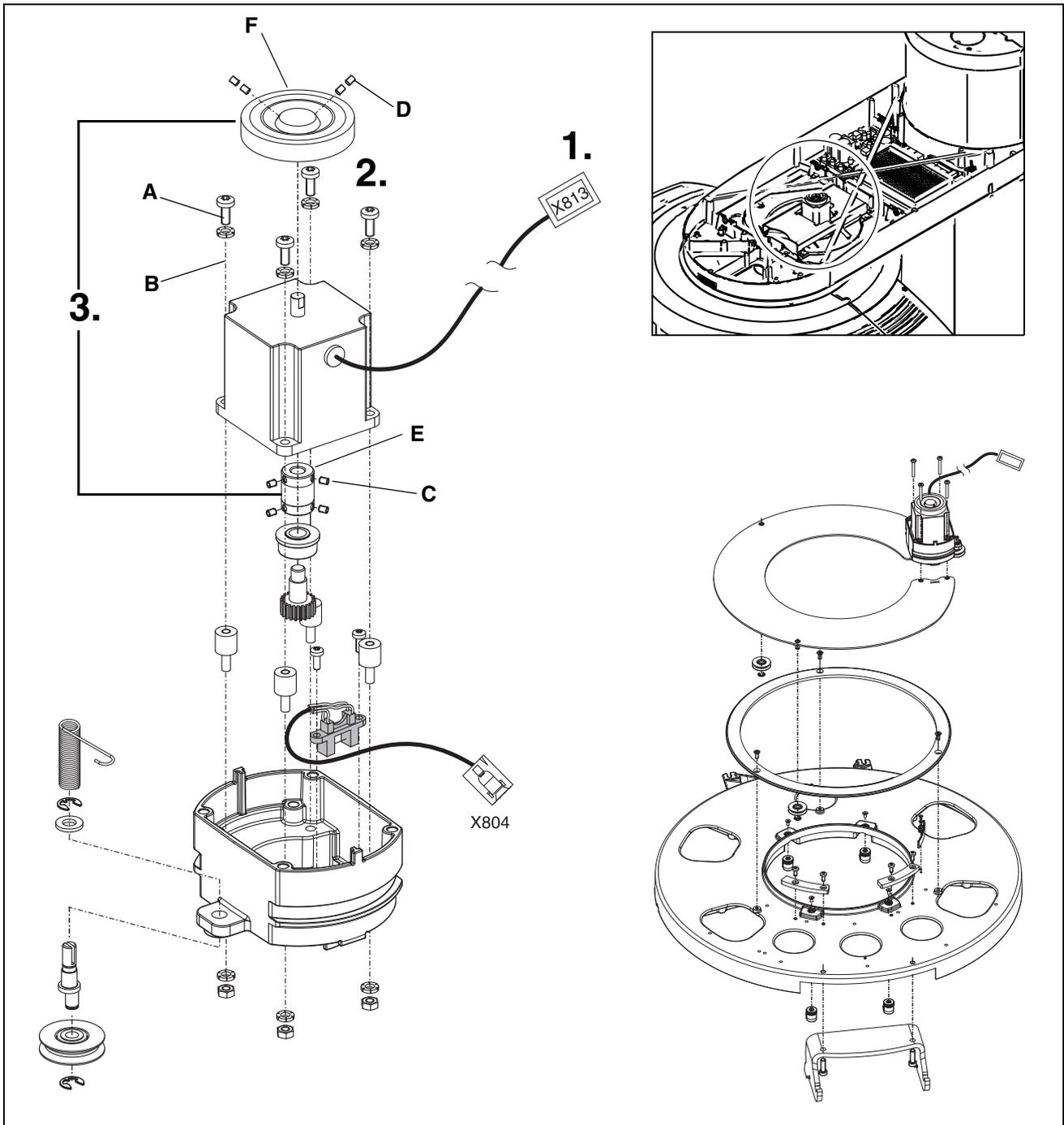
Green mark must lie in recess.



Plug connector X402 into DX1

Lay cable in cable harness and secure its position with cable clamps

## 6.2 Replacing the ring motor (M1\_3)



### Removing the covers

- Remove the covers (see section 1.11):
  - Arm cover

### Removing the defective motor

1. Detach the motor cable from the cable harness and pull it off of connector **X813** on board **DX1**.
2. Loosen the four screws **A** on the ring motor and remove the motor including the screws and the serrated washers **B**.

**Reusing the coupling and flywheel**

3. Loosen set screws **C** and **D** and remove coupling **E** and absorber **F** from the defective motor.
  - Attach the coupling and absorber to the new motor and retighten the set screws.

---

**i** **NOTE**

*Seal set screws **C** and **D** with Loctite 242 before tightening them.*

---

**Installing the new motor**

- Insert the new motor including coupling and absorber in the ring.

---

**i** **NOTE**

*While inserting the motor, turn it back and forth slightly until the pinion engages in the ring gear.*

---

- Use the screws and serrated washers **B** to screw the new motor onto the ring securely.
4. Run the motor cable along its original path and plug it back into connector **X813** on board **DX1**.

---

**i** **NOTE**

*Don't forget to reattach all cable ties and clamps.*

---

**Attaching the covers**

- Reattach the covers.

---

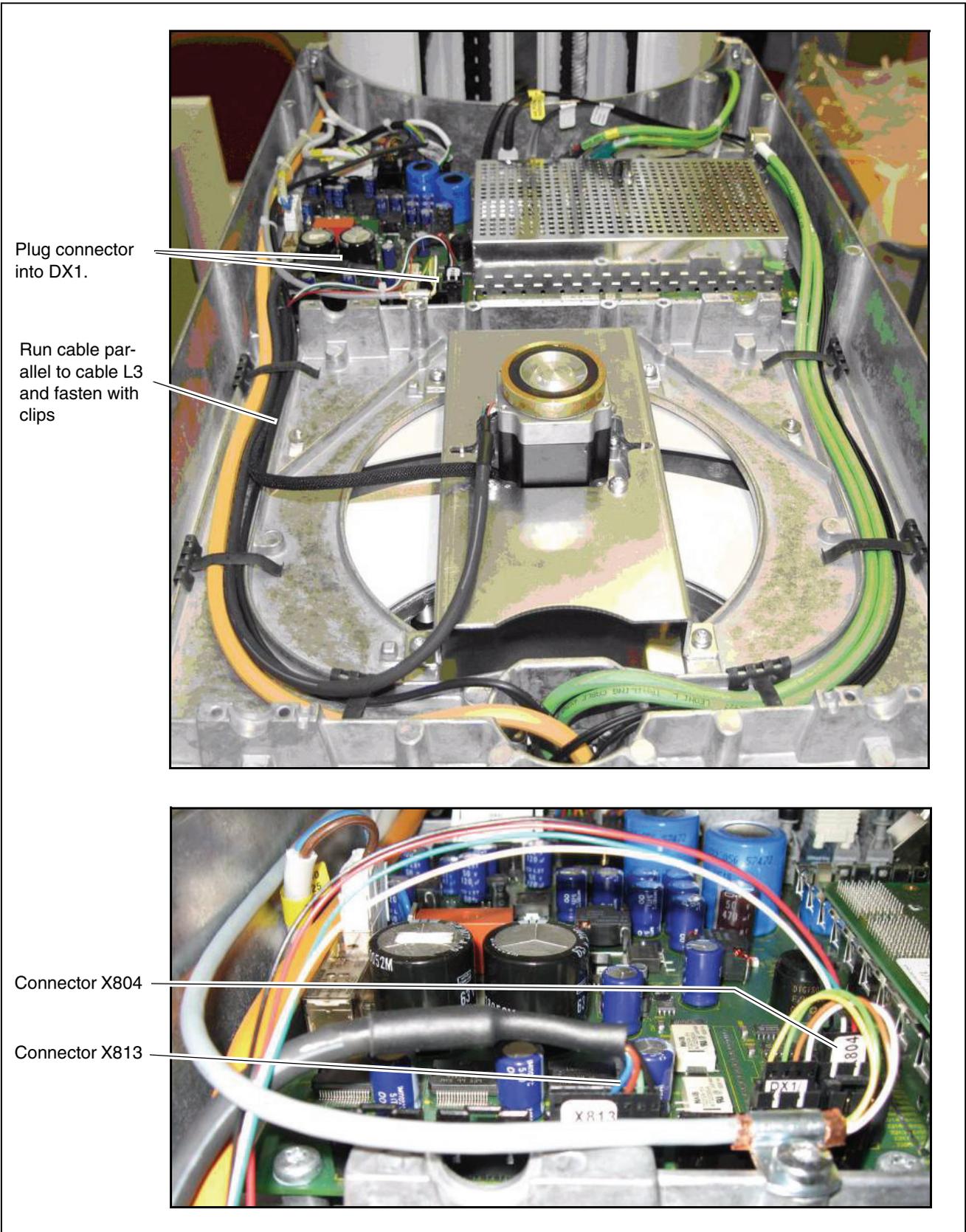
**i** **NOTE: What to do after replacement?**

– Check the function of the ring motor.

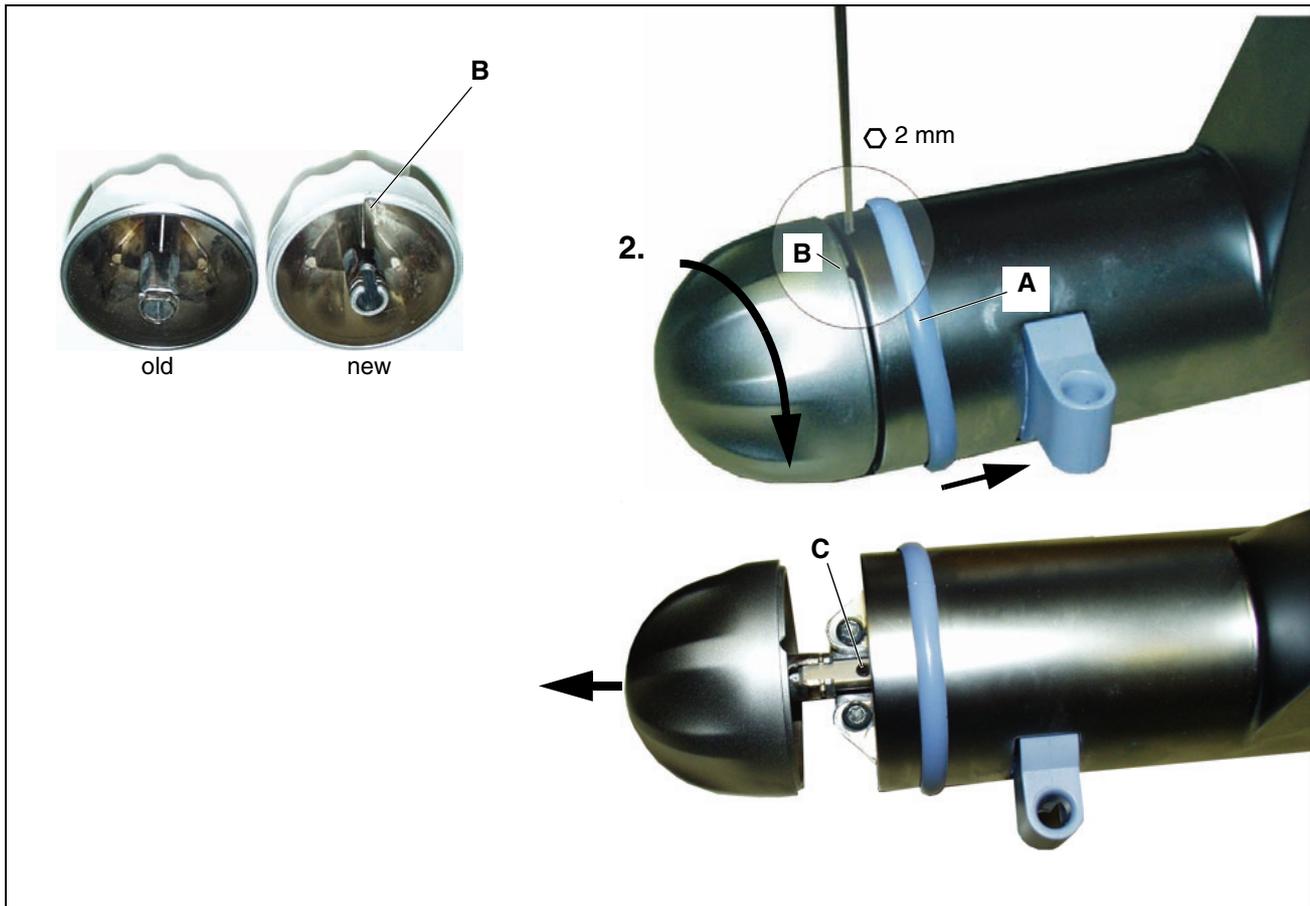
– Perform the complete system calibration procedure (see chapter 4).

---

### 6.2.1 Laying cables when replacing the ring motor



## 6.3 Replacing the rotary knob



### Dismantling the rotary knob

1. Slide plastic ring **A** toward the rear.
2. Turn the rotary knob and look for notch **B**.
3. Loosen setscrew **C** with an Allen key (2mm). Then pull the rotary knob off.

#### **i** NOTE

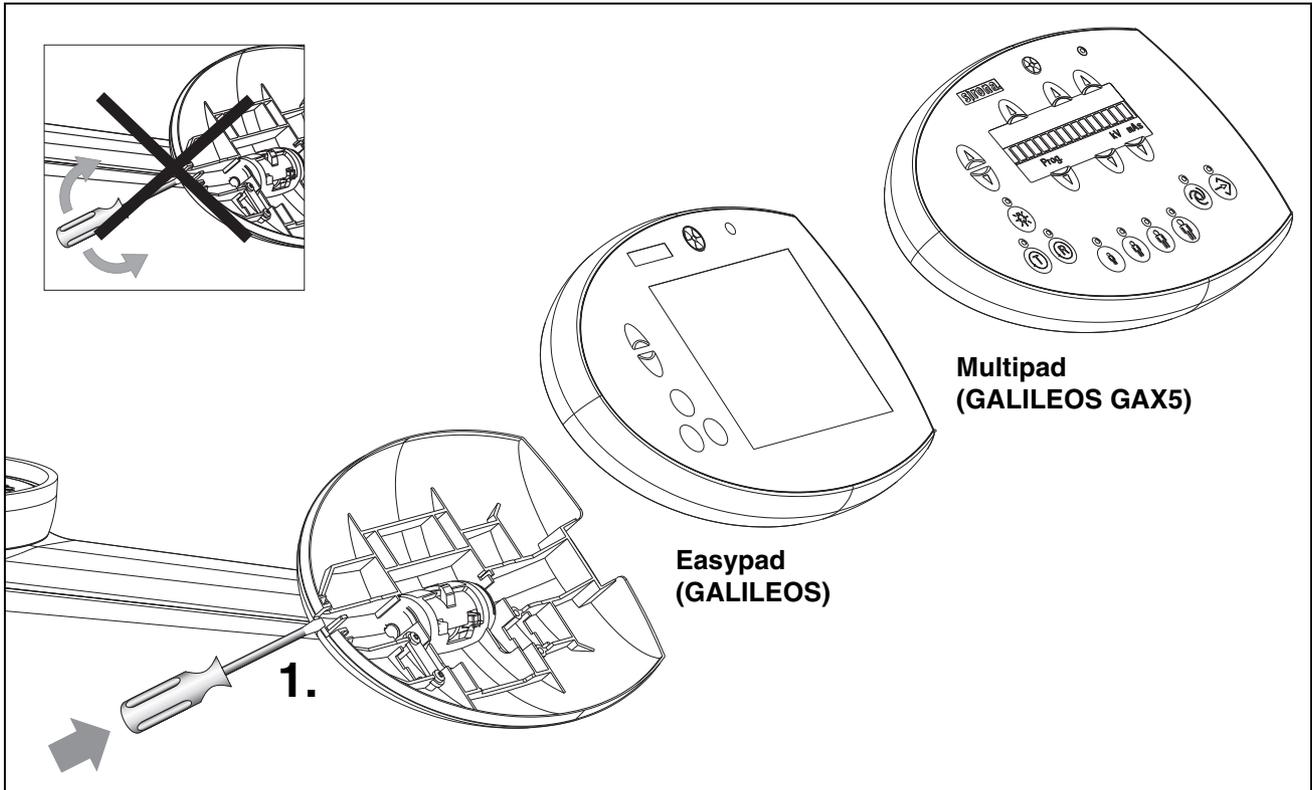
*If notch B is not visible, you can simply pull off the rotary knob.*

4. Pull the rotary knob off.

### Installing the rotary knob

Install the rotary knob by performing the steps above for dismantling in reverse order.

## 6.4 Replacing the Easypad (GALILEOS) or Multipad (GALILEOS GAX5)



### Removing the defective user interface

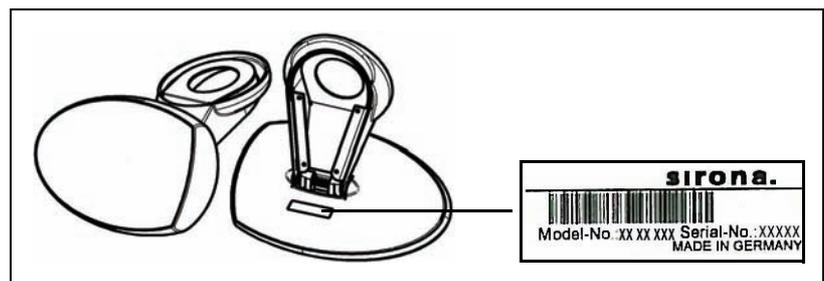
1. Press into slit **A** of the housing cover with a screwdriver (**do not pry!**) and remove the defective user interface from the control panel.

### Installing the new user interface

- Pull cables **L9** and **L10** off of connectors **X102** (L9) and **X103**(L10) on board **DX7** (Easypad) or **DX71** (Multipad).
- Plug the cables of the new user interface into connectors **X102**(L9) and **X103** (L10) on board **DX7** (Easypad) or **DX71** (Multipad) and clip the new user interface onto the control panel.

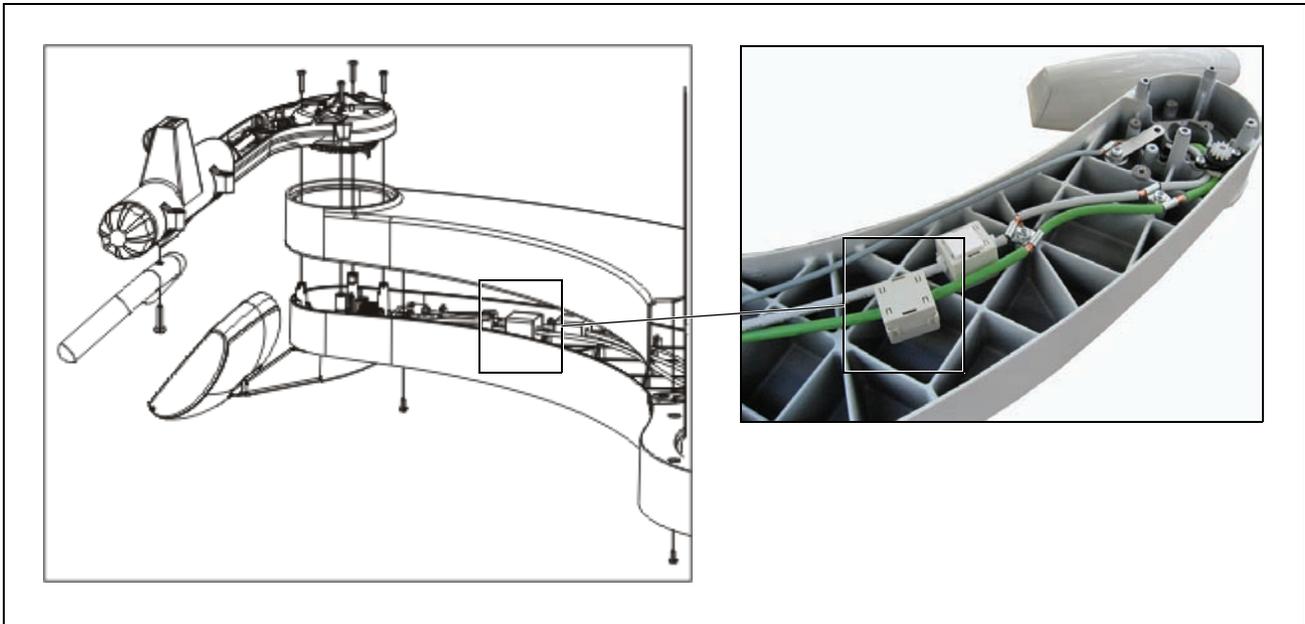
### Updating the ID label

- After replacing the user interface, update the ID label on the cover of the control panel. This involves gluing the ID label supplied in position as shown in the image.



**i NOTE**

For GALILEOS (Easypad) only: Cable **L10** (green cable) must be equipped with ferrite core **B**, unless this has already been done.

**i NOTE: What to do after replacement?**

- Since board DX7 (Easypad) or DX71 (Multipad) is always replaced along with the control panel, be sure to also observe the "Measures following replacement of boards" (see section 6.11.3)
- Check the control panel for correct functioning as well as the function of the display elements. (After the unit is switched ON all of the display elements must light up briefly!)
- Perform a software update to the current system version (see section 1.6).

**For GALILEOS (Easypad) only:**

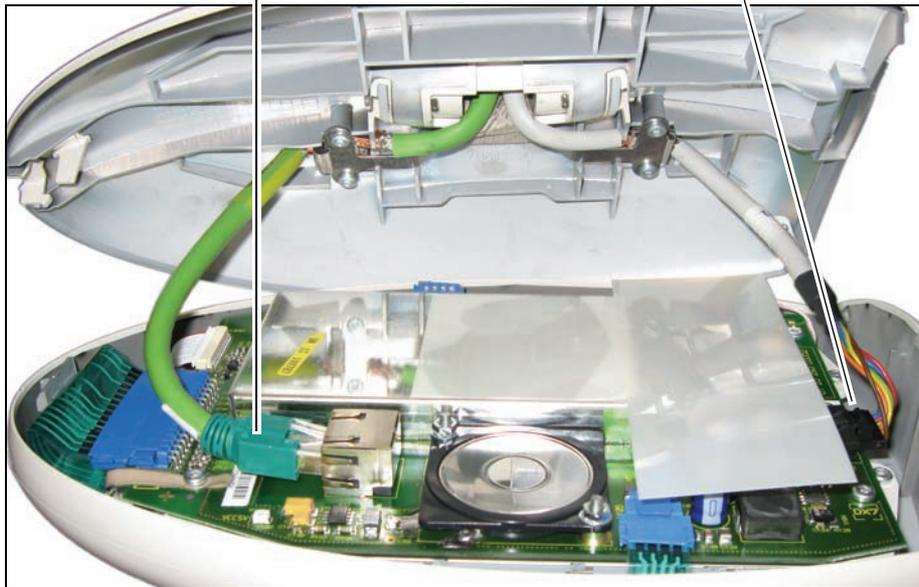
- Following replacement of the control panel, the language set on board DX7 is set to the factory setting by default (00 = German, English, French, Italian). If the configured system language set (displayable via service routine S017.5 or the "extended detail query" in SIXABCON) has a configuration other than 00, this configuration will be copied to board DX7 by the update function.

### 6.4.1 Laying cables when replacing the control panel

#### Easypad (GALILEOS)

Plug cable L10 (green)  
into DX7 (X103).

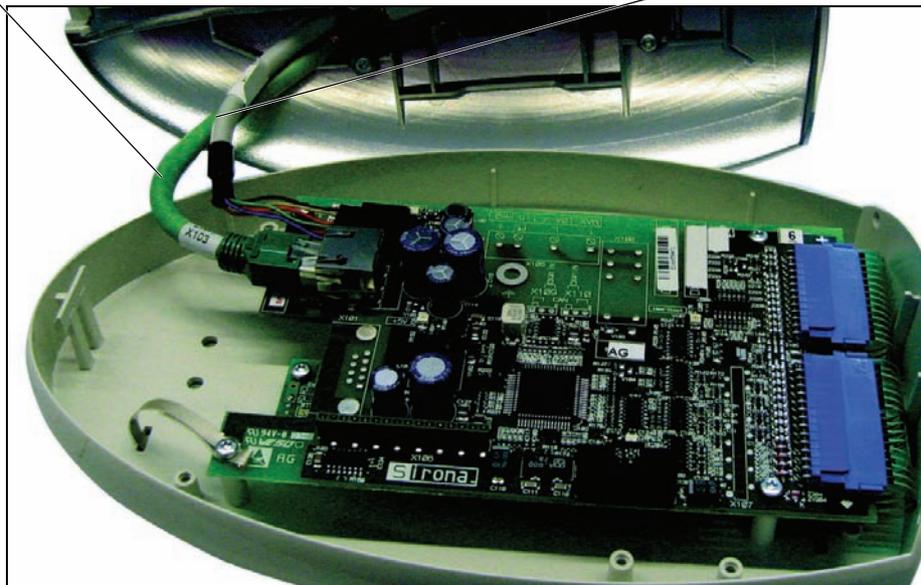
Plug cable L9 (gray)  
into DX7 (X102).



#### Multipad (GALILEOS GAX5)

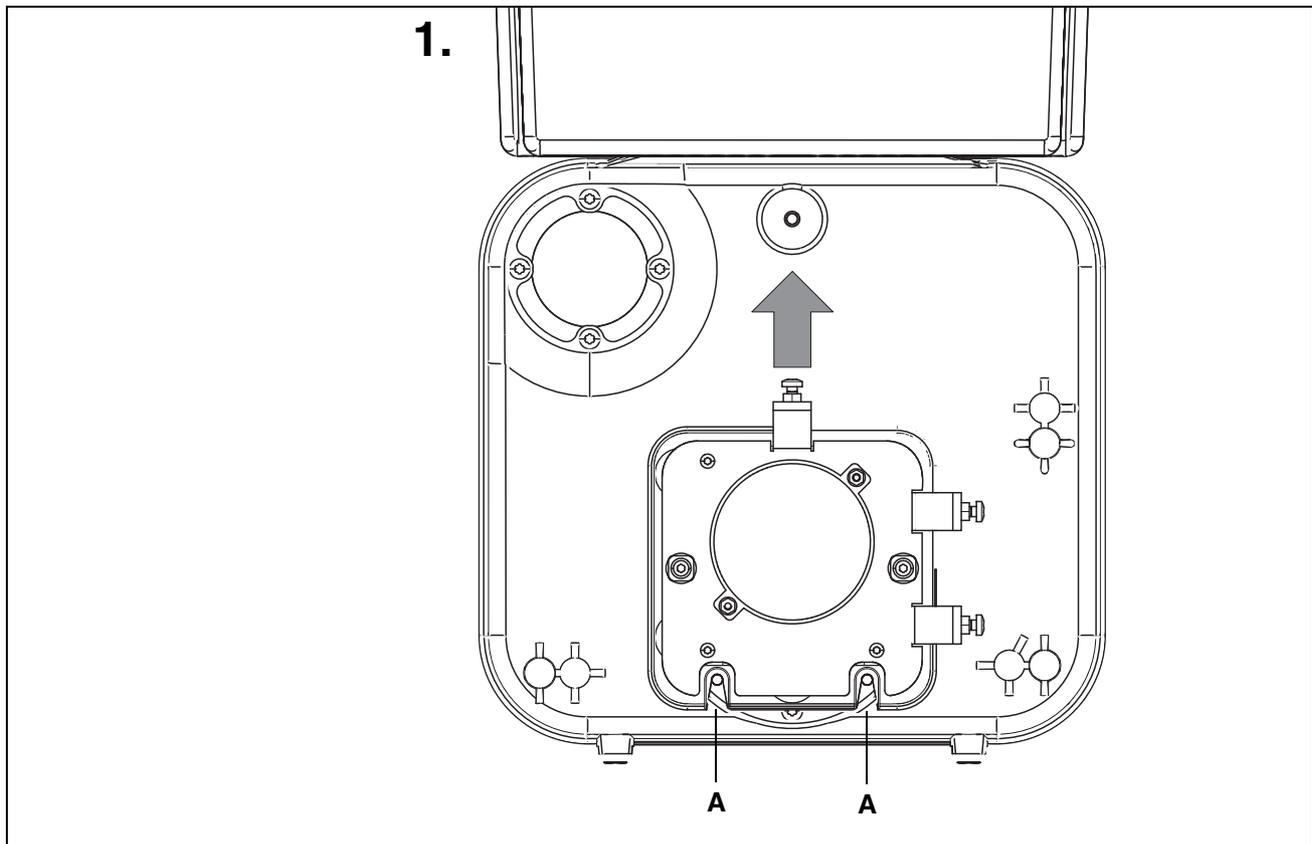
Plug cable L10 (green)  
into DX7 (X103).

Plug cable L9 (gray)  
into DX7 (X102).



## 6.5 Replacing the fixed diaphragm

### 6.5.1 Fixed diaphragm for GALILEOS necessary



#### Removing the covers

- Remove the covers (see also section 1.11):
  - Tube assembly, front
  - Tube assembly, rear

#### Removing the defective diaphragm unit

1. Loosen the two screws (**A**) (approx. 2 - 3 turns) and push the diaphragm upward.

#### Installing the new diaphragm unit

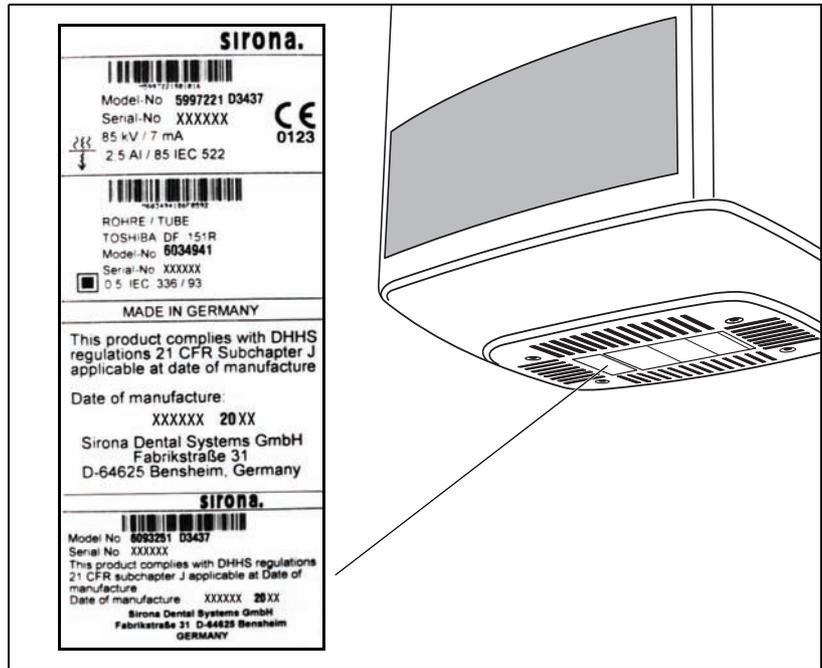
- Assemble by following the same procedure in reverse order.

#### Attaching the covers

- Reattach the covers.

### Updating the ID label

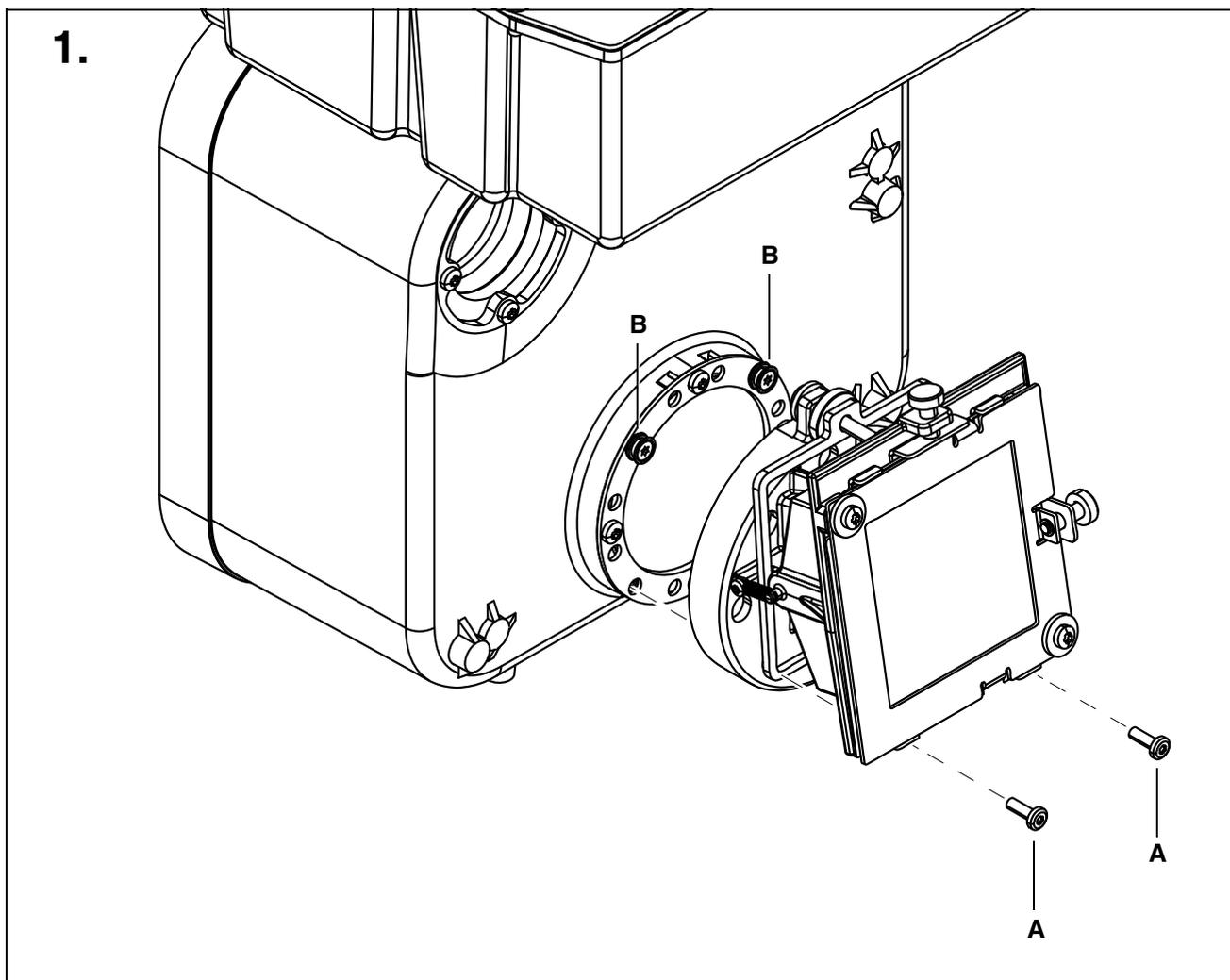
- After replacing the diaphragm unit, update the ID label on the cover of the control panel. This involves gluing the ID label supplied in position as shown in the image.



### **i** NOTE: What to do after replacement?

– Perform a complete unit calibration (see chapter 4).

### 6.5.2 Fixed diaphragm for GALILEOS Replacing the GAX5



#### Removing the covers

- Remove the covers (see also section 1.11):
  - Tube assembly, front
  - Tube assembly, rear

#### Removing the defective diaphragm unit

2. Loosen the two screws **(A)** and take the diaphragm out of the brackets **B**.

#### Installing the new diaphragm unit

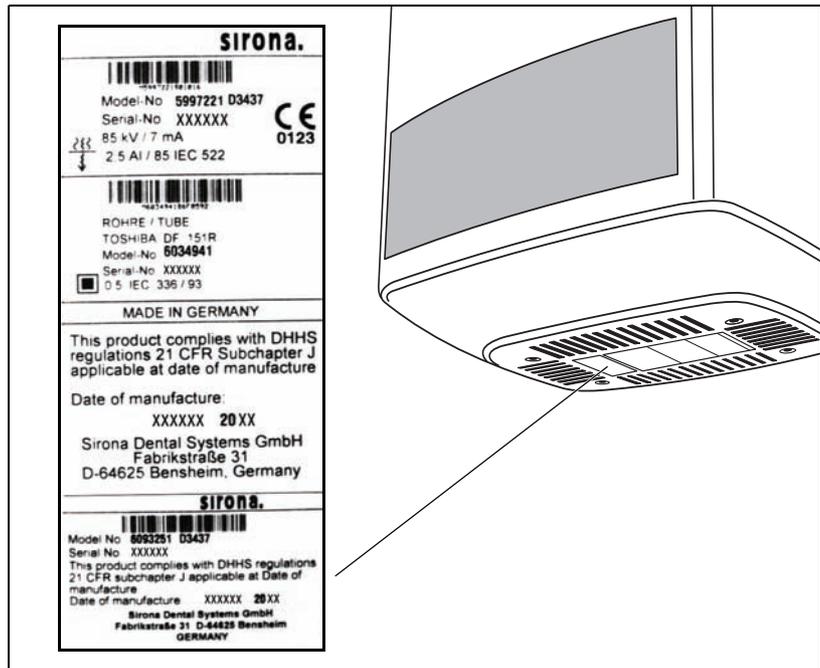
- Assemble by following the same procedure in reverse order.

#### Attaching the covers

- Reattach the covers.

### Updating the ID label

- After replacing the diaphragm unit, update the ID label on the cover of the control panel. This involves gluing the ID label supplied in position as shown in the image.



### **i** NOTE: What to do after replacement?

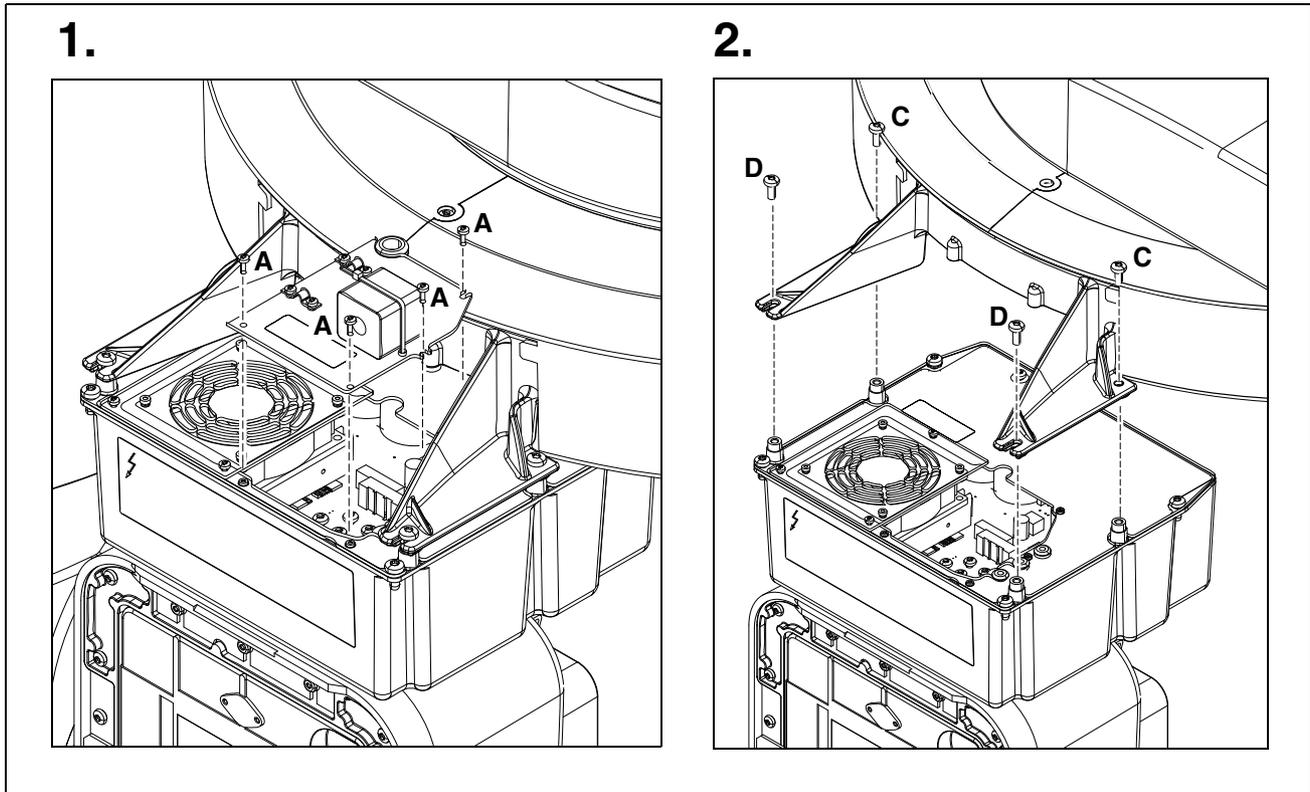
- Perform a complete unit calibration (see chapter 4).

## 6.6 Replacing the X-ray tube assembly



### **DANGER**

**PERILOUS SHOCK HAZARD.** It is essential to switch the unit off and to wait at least another 4 minutes before starting the repair or taking off a cover panel!



#### Removing the covers

- Remove the covers (see also section 1.11):
  - Tube assembly, front
  - Tube assembly, rear

#### Removing the diaphragm unit

- Remove the diaphragm unit (see section 6.5).
- Turn the rotating element so that the tube assembly (as viewed from the front) is located on the right side of the unit (i.e. not above the swivel arm).

**Removing the defective tube assembly**

1. Loosen the four screws **A** and remove cover plate **B** incl. the cable shielding (L3). **Caution! Also pull cable L3 off of connector X3 and the ground cable off of connector X304 on board DX6.**

**i NOTE**

*The ferrite core and cable shielding can remain on the cover plate.*

- Detach cables **L5**, **L6** and **L15** from the rubber grommets and pull the cables off of sockets **J6** (L5), **J2-J3** (L6) and **J5** (L15) on board **DX6**.
2. Loosen the two rear screws **C** on the tube assembly.  
Hold the tube assembly firmly in place (**notice: heavy!**), loosen the two front screws **D** (3 - 4 turns) and remove the tube assembly toward the front.

**i NOTE**

**Tip:** *If you leave the two front screws on the rotating element, you can immediately hang the tube assembly on them when reinstalling it.*

**Installing the new tube assembly**

- Hang the new tube assembly on the two front screws of the rotating element and tighten them securely.
- Insert the two rear screws and tighten them firmly.
- Plug cables **L3**, **L5**, **L6** and **L15** as well as the ground cable back onto board **DX6** and reattach the cables to the rubber grommets.
- Attach the cover plate.

**Installing the diaphragm unit**

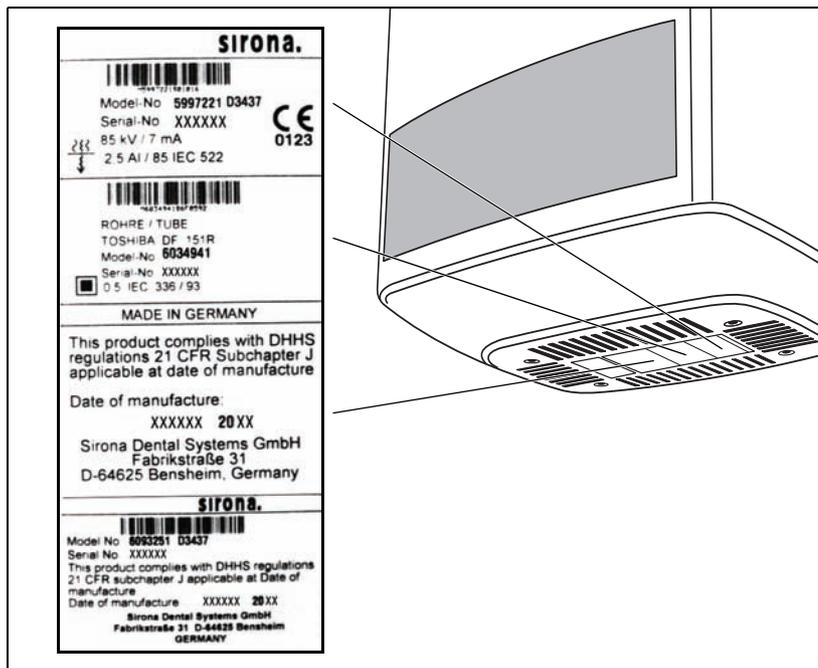
- Install the diaphragm unit (see section 6.5).

**Attaching the covers**

- Reattach the covers.

**Updating the ID label**

- After replacing the X-ray tube assembly, update the ID label on the cover of the control panel. This involves gluing the ID label supplied in position as shown in the image.

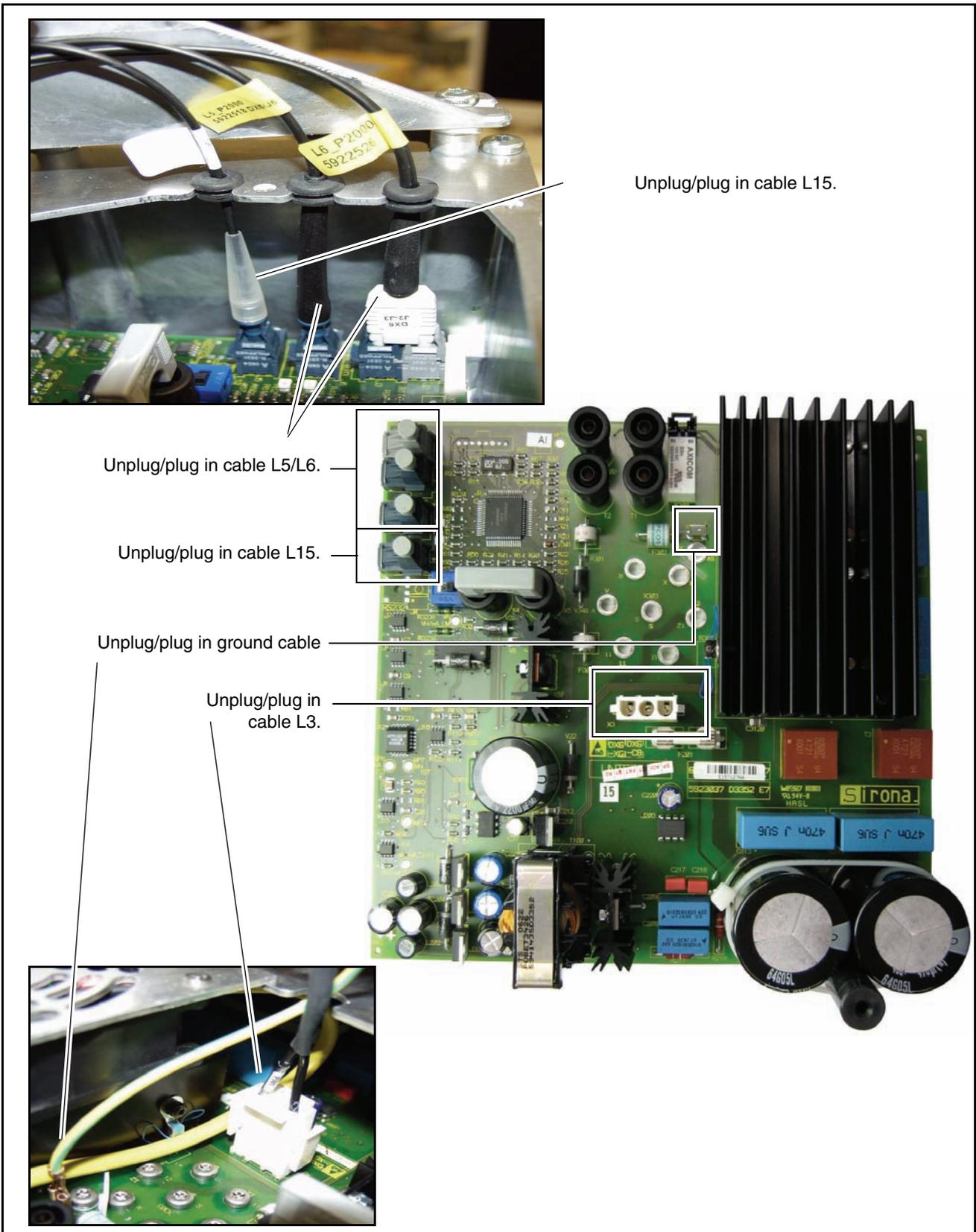



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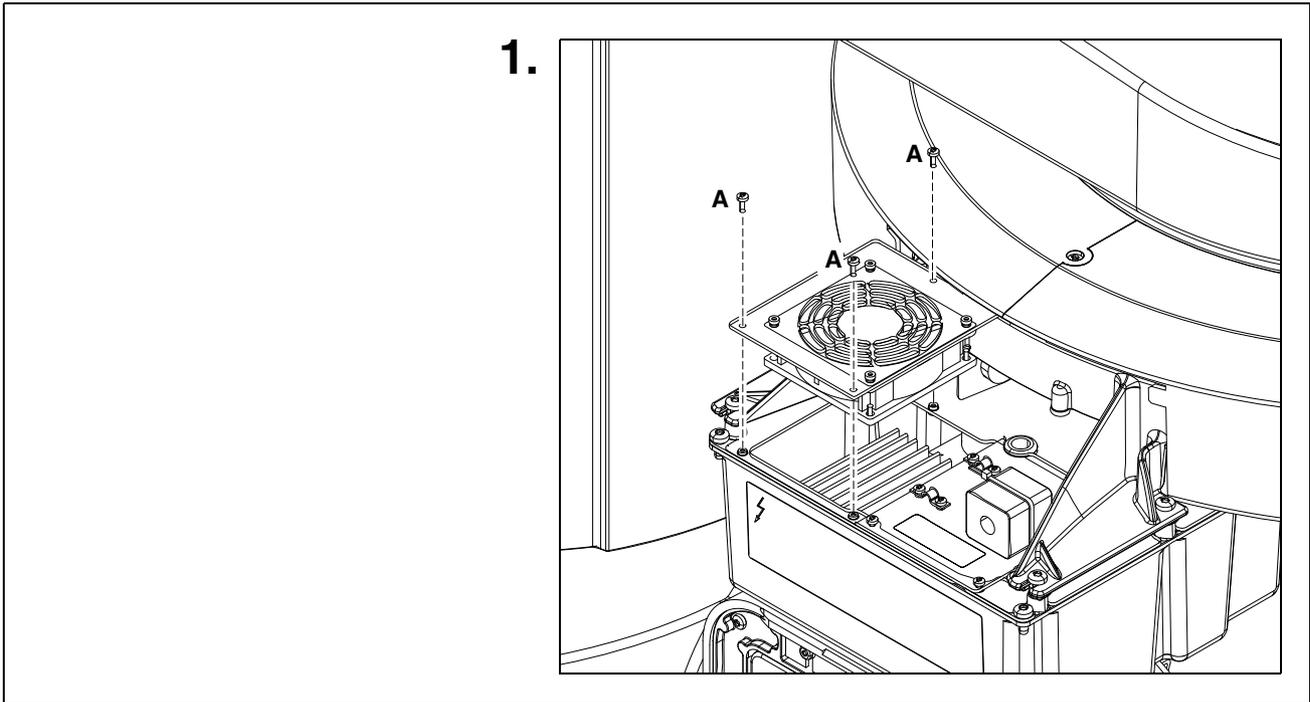
**i NOTE: What to do after replacement?**

- Since board DX6 is replaced along with the tube assembly, be sure to also observe the "Measures following replacement of boards" (see section 6.11.3)
  - Perform the complete system calibration (see chapter 4).
  - Perform an acceptance test (for Germany only) without calling in an expert.
-

### 6.6.1 Cables and connectors for replacement of the tube assembly



## 6.7 Replacing the fan (tube assembly)

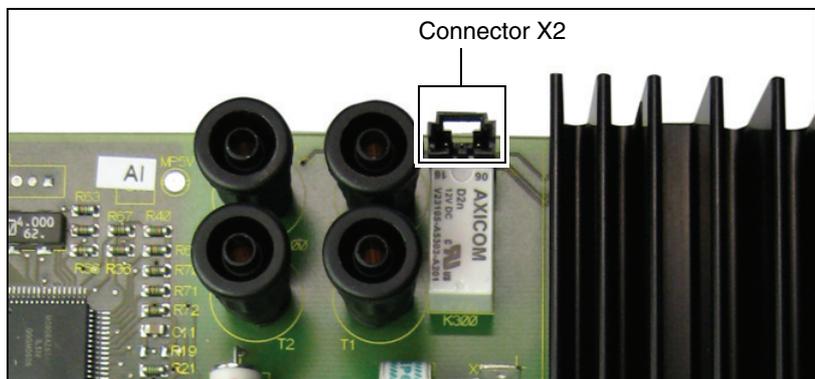


### Removing the covers

- Remove the covers (see section 1.11):
  - Tube assembly cover, front

### Replacing the fan

1. Loosen the three screws **A** and carefully remove the cover plate including the fan. **Attention: Cable!**
- Pull the fan cable off of connector **X2** on board **DX6**.

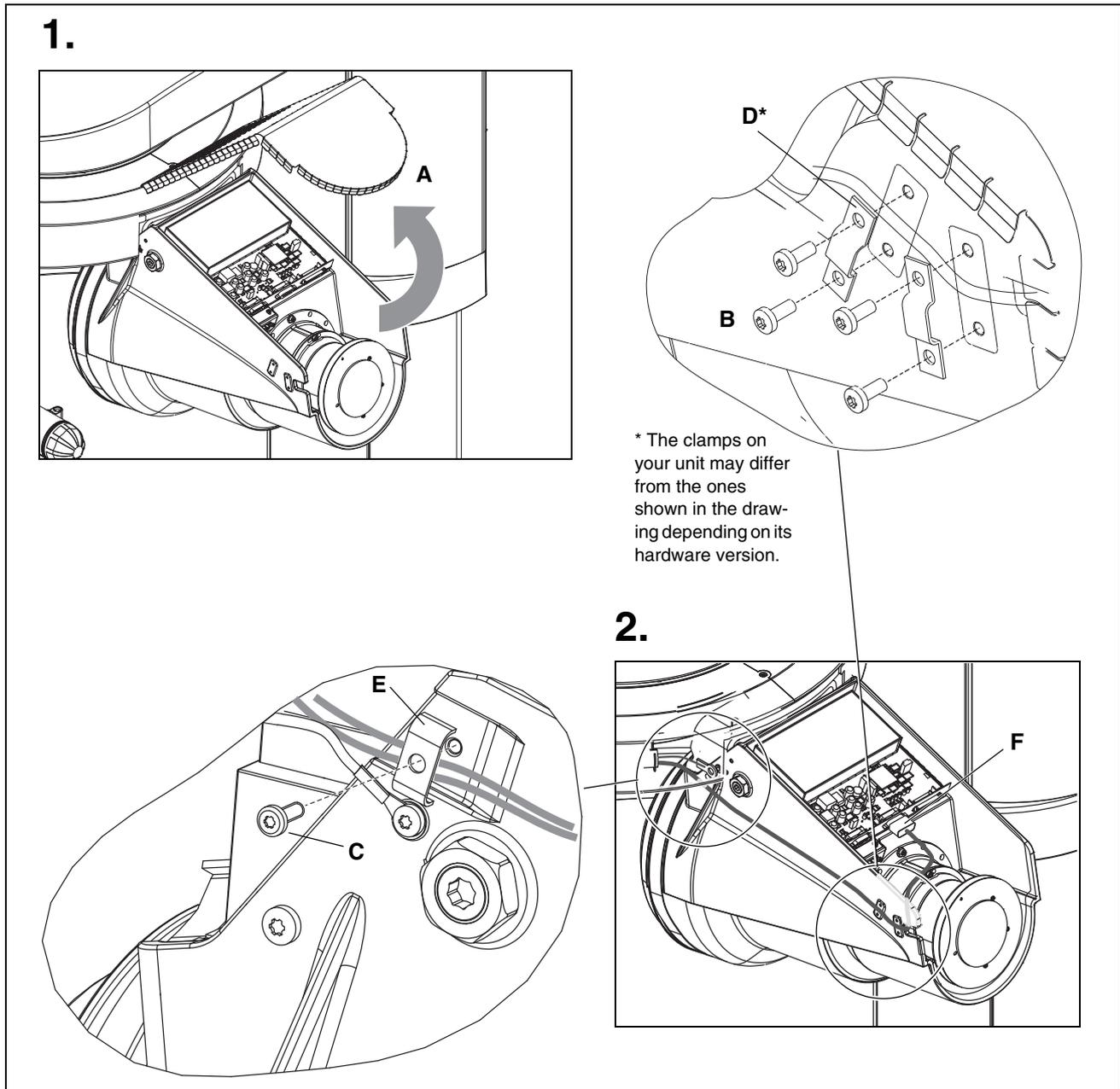


- Install the new fan in the reverse order of removal.

### **i** NOTE: What to do after replacement?

- Check the function of the fan using service routine S005.4 (see section 5.5.2).
- No further action required.

## 6.8 Replacing X-ray detector



### Removing the covers

- Remove the covers (see section 1.11):
  - X-ray detector cover

### Remove cable

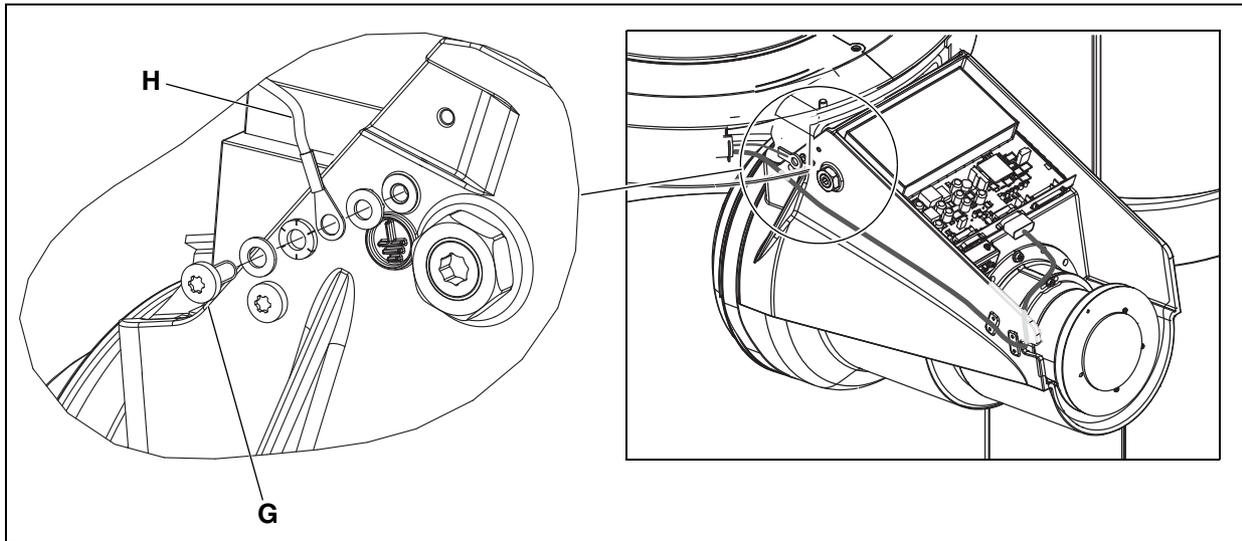
1. Carefully pull cover plate **A** upwards to remove it from the X-ray detector.

**⚠ CAUTION**

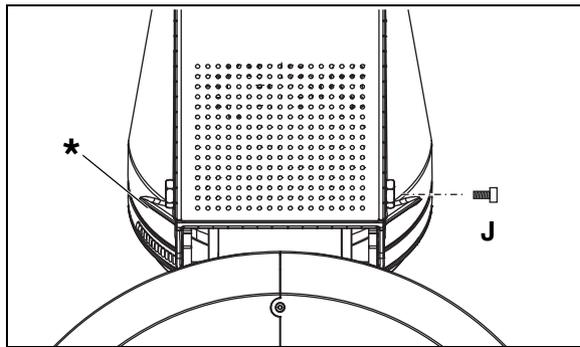
*Risk of injury! The cover plate may have sharp edges.*

2. Loosen screws **B** and **C**, as well as clamps **D** and **E**. Detach cable **L13** from connector **X201 (F)** on board **DX89**.

3.



4.



\* Depending on the unit hardware version involved, there may be a second screw located on the side opposite screw J. If so, this screw must be loosened in order to remove the X-ray detector. This second screw does not have to be used during reassembly.

3. Loosen screw **G** and disconnect the grounding cable **H**.

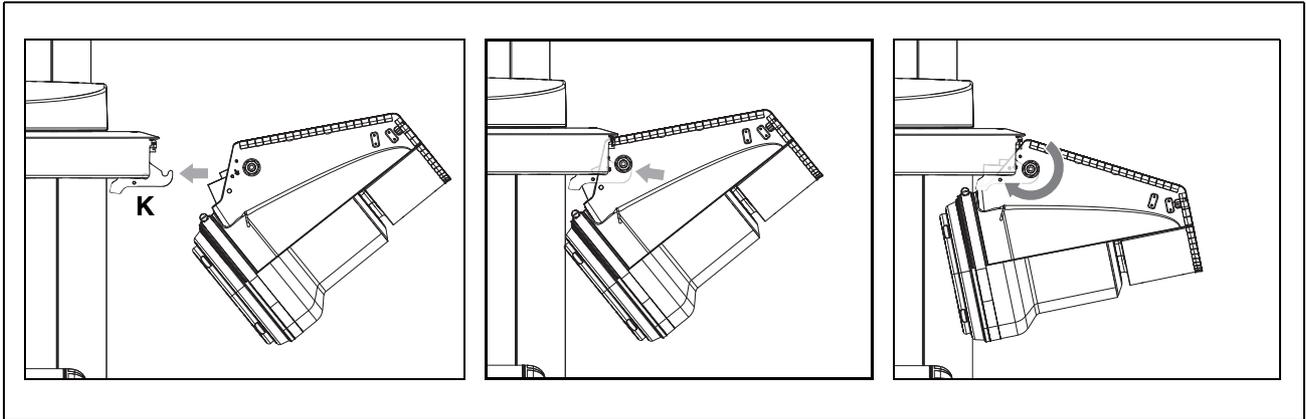
**⚠ CAUTION**

*Make sure that the grounding cable does not slip into the ring. Secure it with a cable tie or piece of adhesive tape if necessary.*

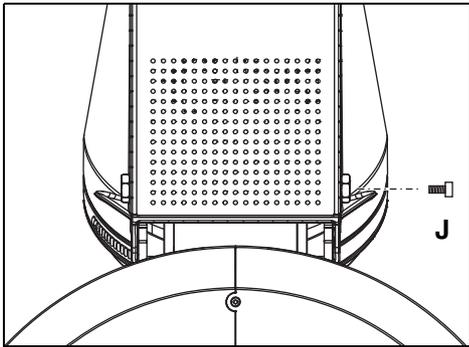
**Removing the X-ray detector**

4. Loosen the screw **J**, swing the X-ray detector upward slightly and lift it out of the holder on the ring (**Attention: heavy!**).

5.



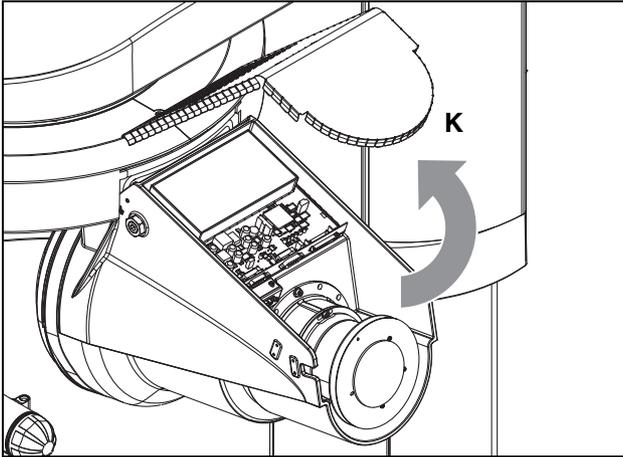
6.



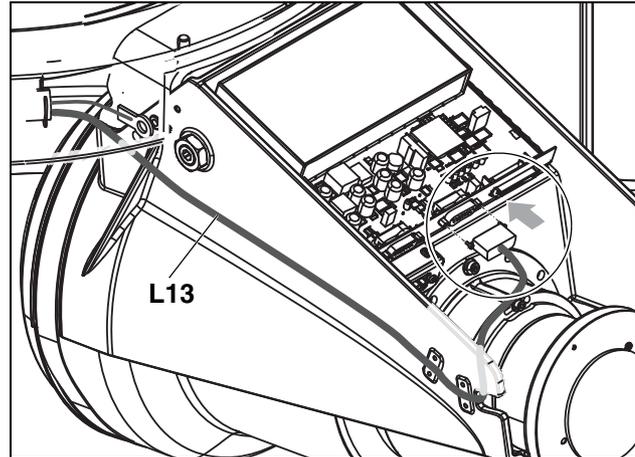
#### Installing the X-ray detector

5. Hook the X-ray detector into holder **K** from above, using the ring on the GALILEOS.  
The dead weight of the X-ray detector will cause it to tilt into the correct position.
6. Secure it in place using the screw (**J**).

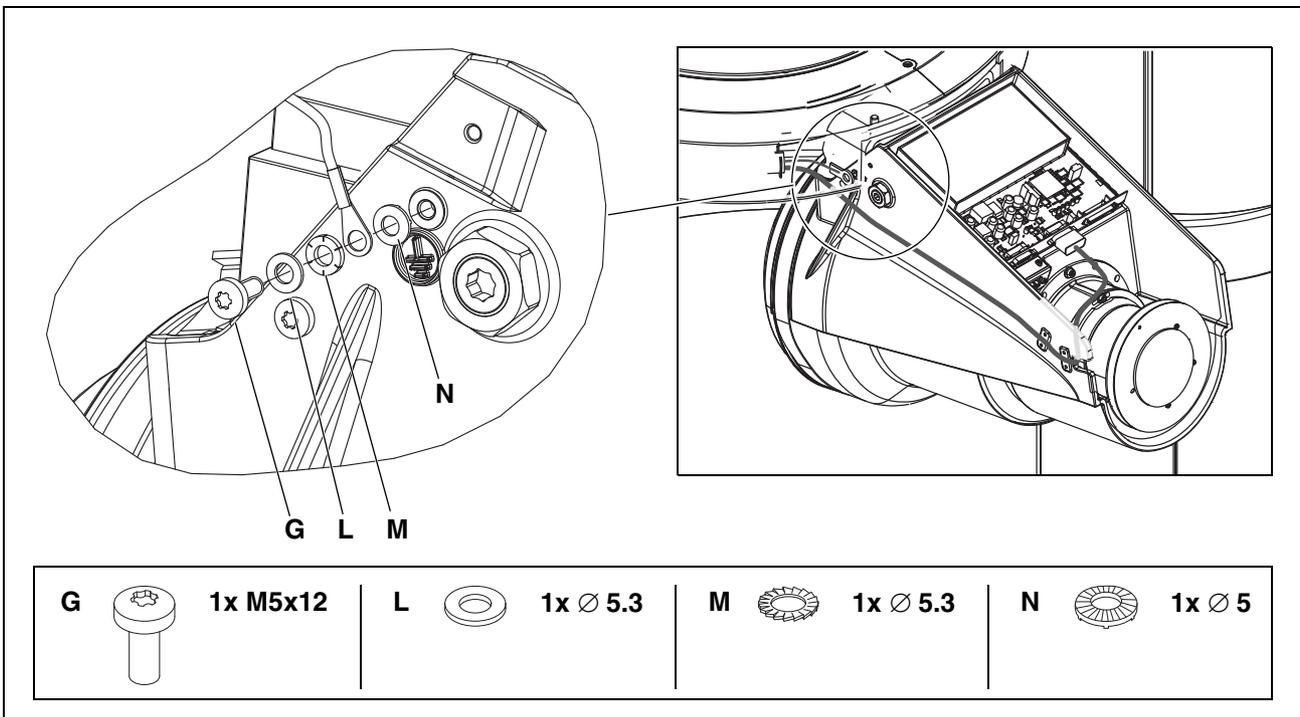
7.



8.



9.



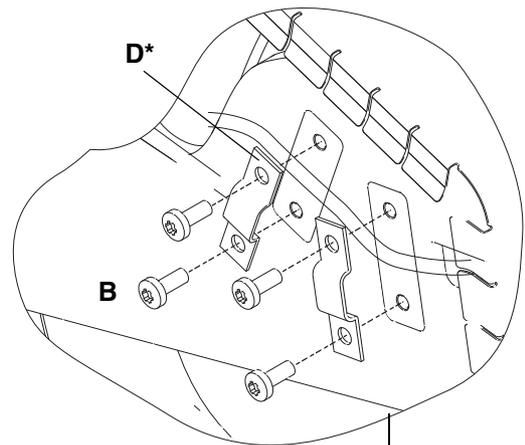
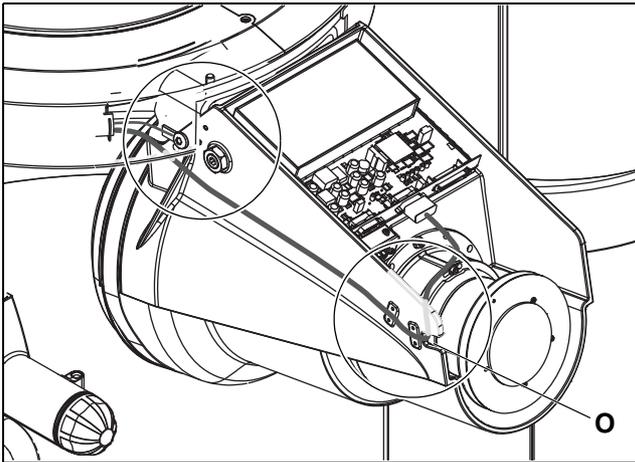
7. Carefully pull cover plate **K** upwards to remove it from the X-ray detector.

**⚠ CAUTION**

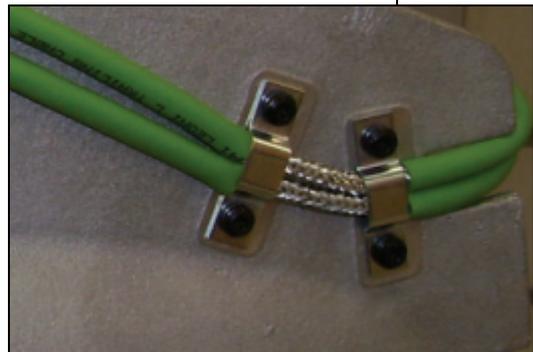
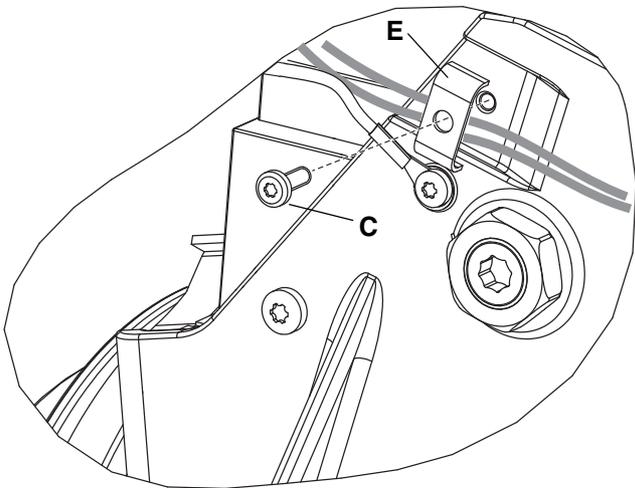
*Risk of injury! The cover plate has sharp edges.*

8. Plug cable **L13** (from the ring) onto connector X201 on PCB DX89, and use the two screws to secure it.
9. Connect the grounding cable from the ring with screw **G** as well as with washer **L**, serrated washer **M** and contact washer **N**.

10.

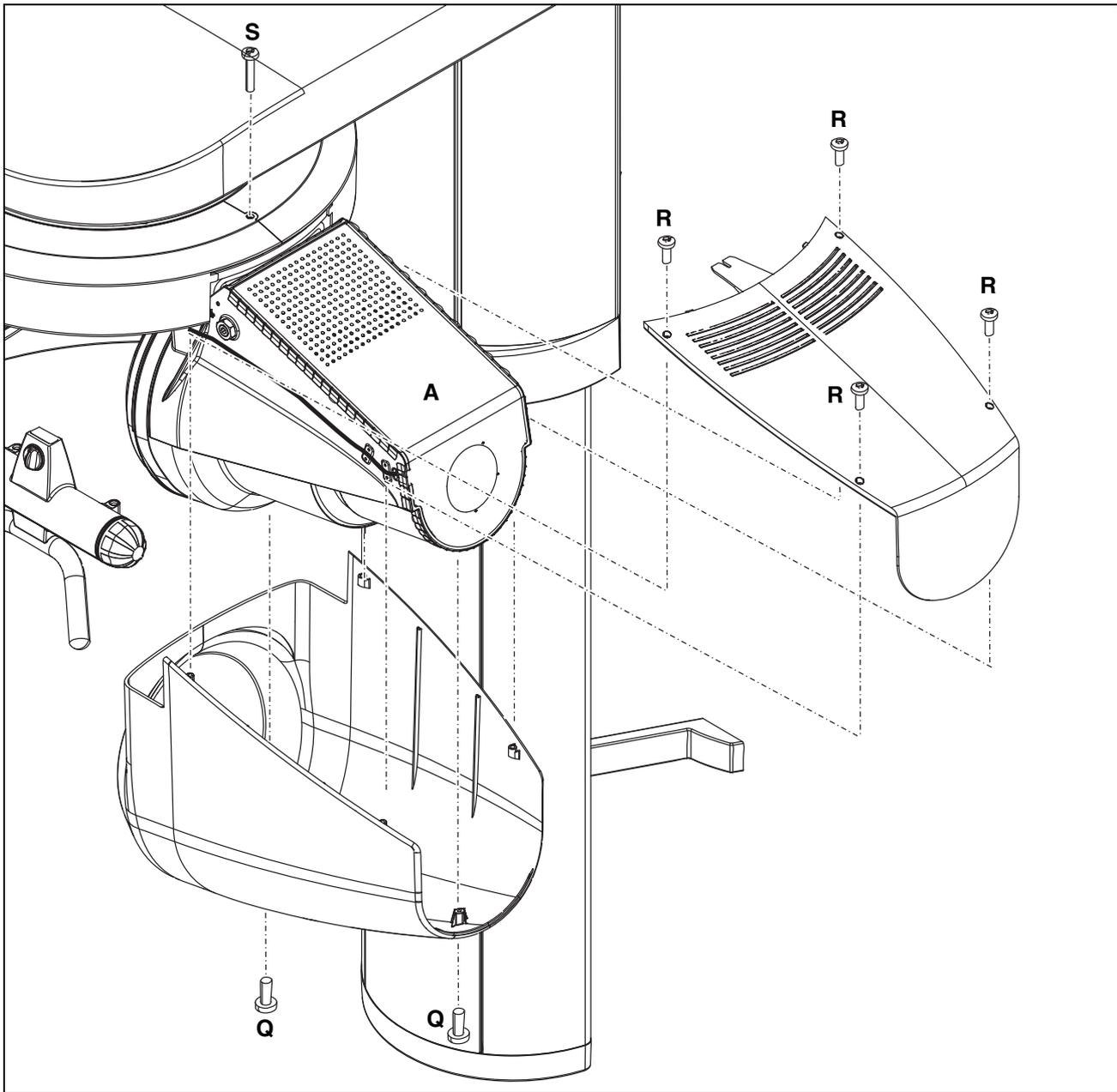


\* The clamps on your unit may differ from the ones shown in the drawing depending on its hardware version.



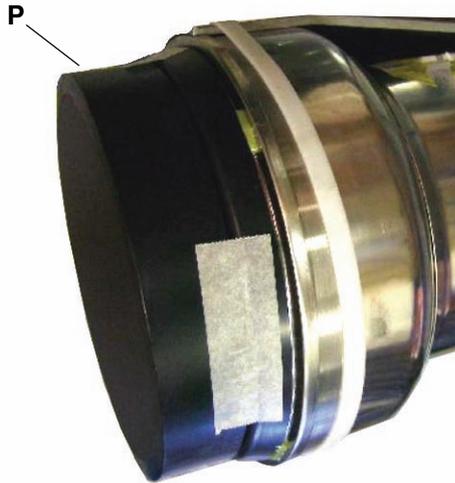
10. Run cable L13 as shown on the drawing and attach the cable shield with the 2 clamps D and screws B to the housing of the X-ray detector. Secure the cable with clamp E and screw C.

## 11.-13.

**⚠ CAUTION**

Make sure that cable L13 runs correctly through groove O on the X-ray detector.

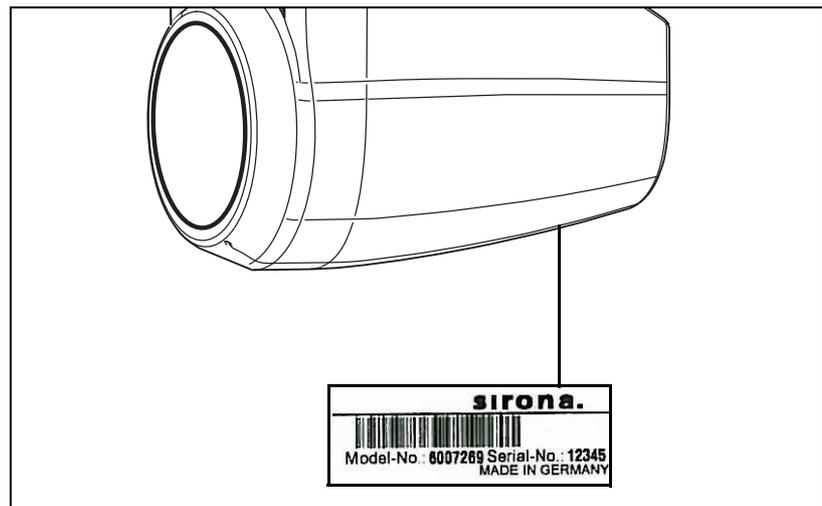
11. Re-attach cover plate A.

**Attaching the covers**

- Remove plastic cap **P** from in front of the input window of the new X-ray detector.
12. Use the two screws (**Q**) to attach the lower cover part to the X-ray detector.
  13. Place the upper cover part on top of the lower cover part. (Caution! The tab on the upper cover part must be pushed underneath the ring cover.) Then use the four screws (**R**) and screw **S** to secure the upper cover part.

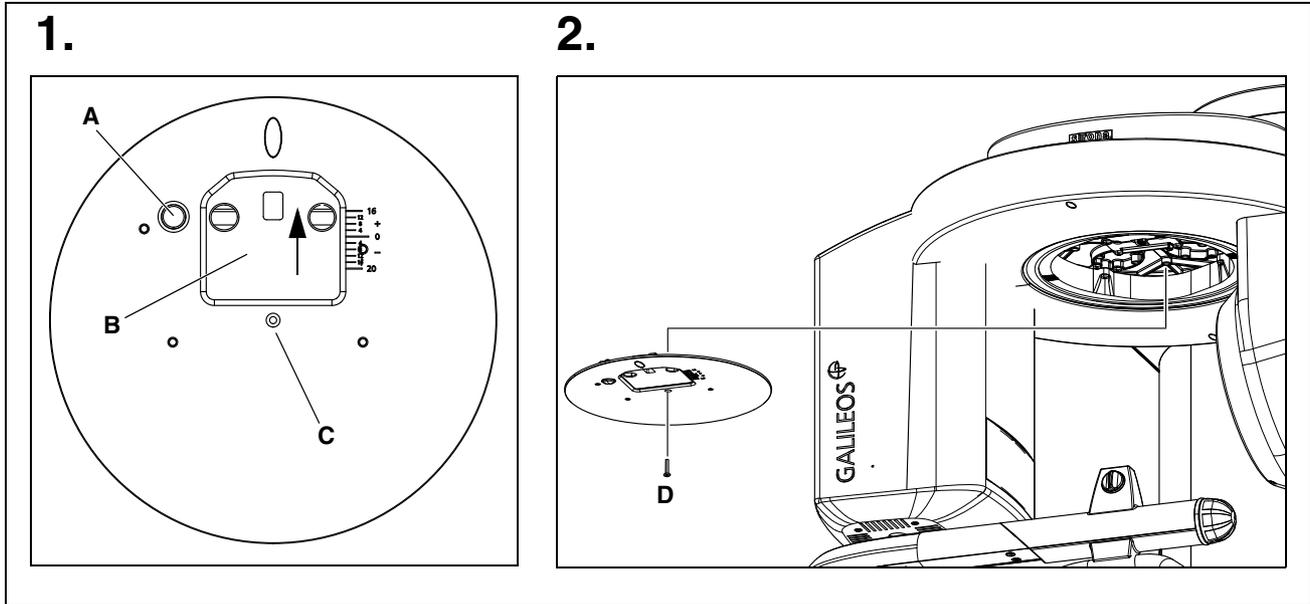
**Updating the ID label**

- After replacing the X-ray detector, update the ID label on the cover of the detector. This involves gluing the ID label supplied in position as shown in the image.

**i NOTE: What to do after replacement?**

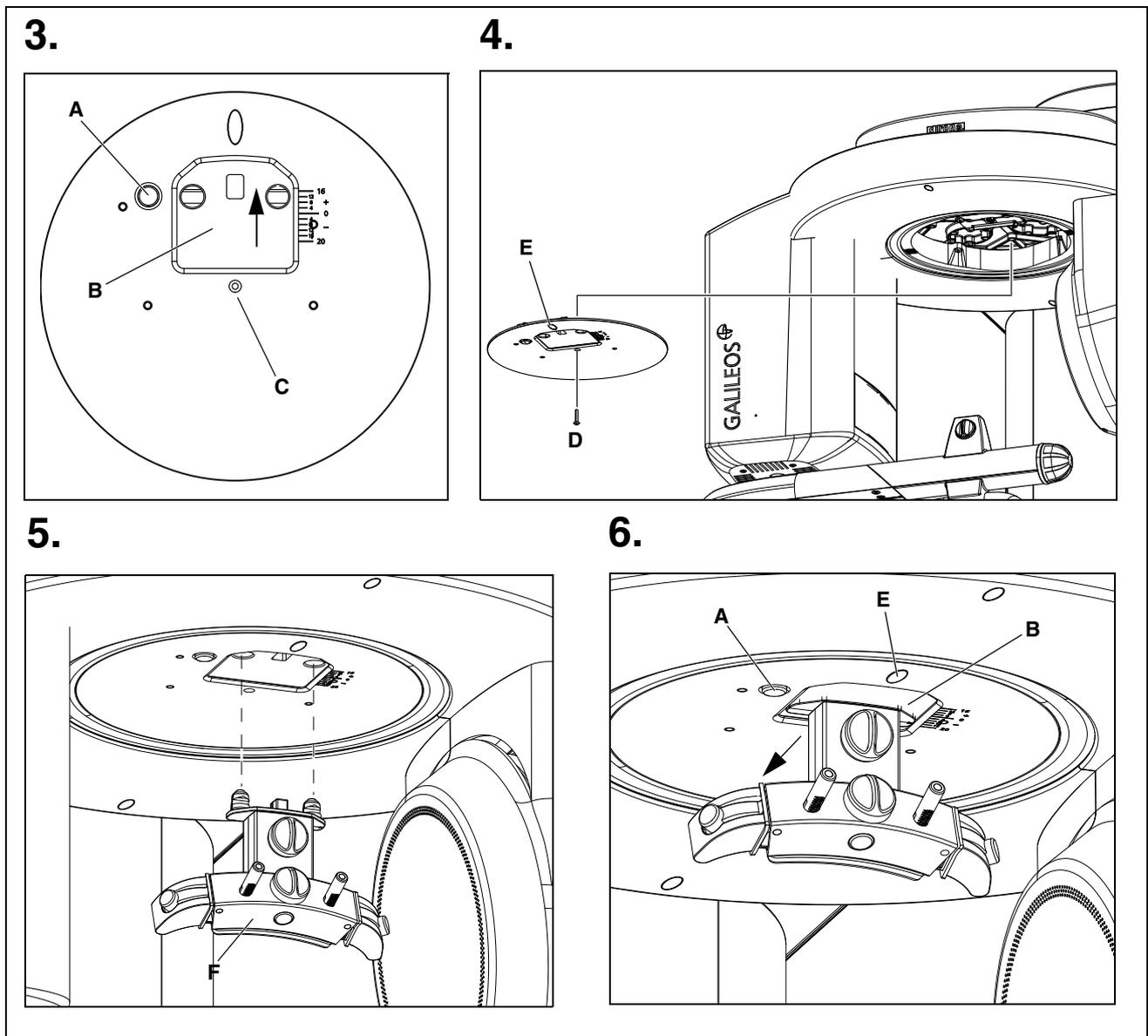
- Perform an update to the latest overall software version (V03.03.01 or higher) (see page 1-10).
- Save the configuration data from board DX89 (to board DX11) via service routine S009.7 (see page 5-44).
- Perform a complete unit calibration (see chapter 4).

## 6.9 Replace receptacle element for head fixation device (for GALILEOS with head fixation device)



### Remove defective receptacle element

- Using the Up/Down buttons on the control panel, switch the device on and move it to a comfortable working height to remove the receptacle element.
  - Remove the head fixation device (see operating instructions).
1. If hole **C** on the defective receptacle element is not available: Press the locking button **A** and move the flange **B** forward to expose the bore hole **C**.
  2. Loosen screw **D** and remove the defective receptacle element.



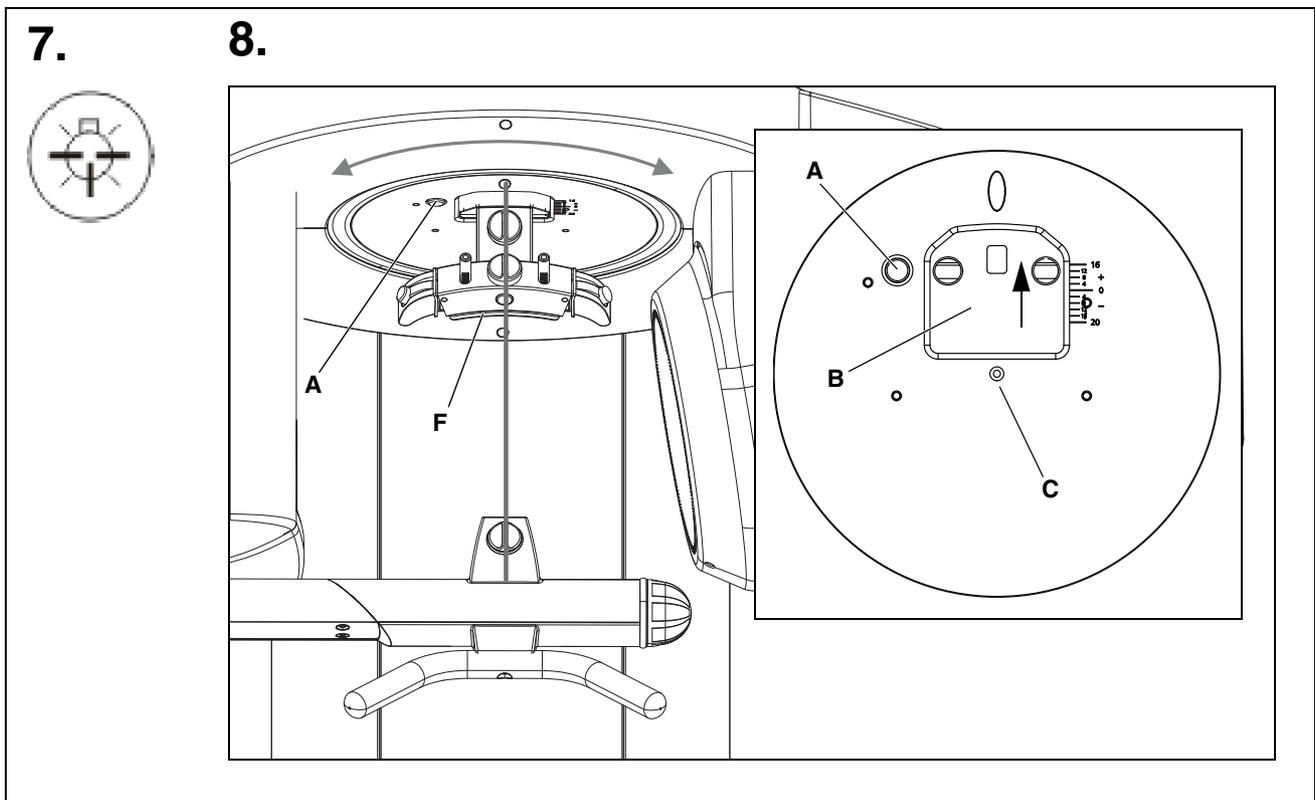
### Install the new receptacle element

3. If the bore hole **C** on the new scanning unit is not available:  
Press the locking button **A** and move the flange **B** forward to expose the bore hole **C**.
4. Screw the new scanning unit with the screw **D** to the device so that the laser localizer **E** is facing forward.

#### **i** NOTE

*Do not tighten the screw yet. It should still be possible to turn the scanning unit.*

5. Place the head fixation **F** in the scanning unit (see operating instructions).
6. Press the locking button **A** and push the flange **B** including the head fixation back so that the laser localizer **E** is exposed.



### Laservisier justieren

7. Switch the laser light on using the light localizer button on the control panel.

#### CAUTION

Keep a minimum distance of 100 cm between the eye and the laser. Do not look into the laser beam.

8. Adjust the light localizer.
 

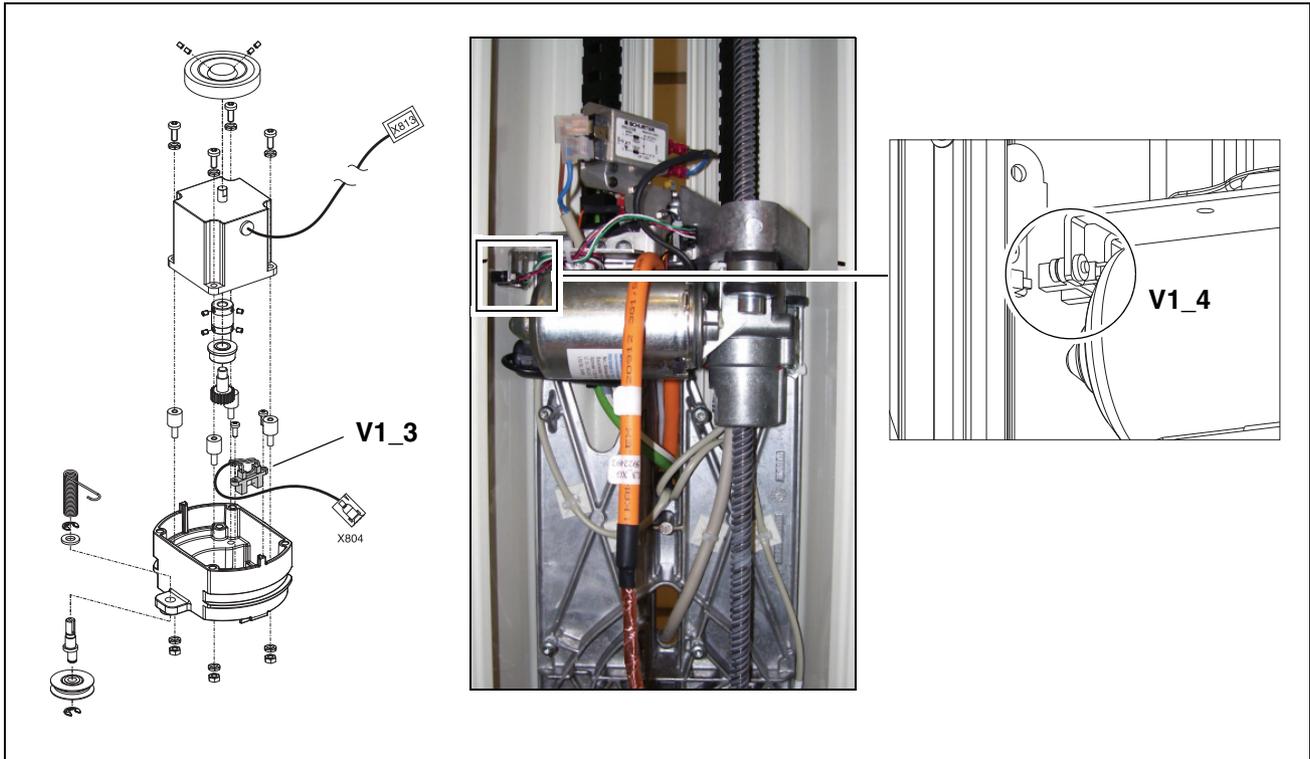
To do this, turn the knob of the head fixation to the vertical position. Then align the scanning unit so that the laser light is shown in the middle of the vertical knobs of the head fixation and the bite holder.

  - Press the locking button **A** and push the flange **B** including the head fixation **F** back to the front so that the bore hole **C** is exposed. Tighten the screw **D** firmly.

The scanning unit should not be turned when pushing the head fixation back and tightening the screw.

  - Switch the unit off again.

## 6.10 Replacing the light barriers



The following light barriers can be replaced:

- Light barrier at ring motor, starting position of rotation: **V1\_3**
- Light barrier at HA motor, height adjustment: **V1\_4**

## 6.11 Replacing circuit boards

### CAUTION

Please observe the usual precautionary measures for handling printed circuit boards (ESD). Touch a ground point to discharge static electricity before touching any boards.



### CAUTION

**When replacing the boards DX6 (X-ray tube assembly)/DX11 or DX89/DX11:**

Never replace these boards together. After replacing one of these boards, first proceed as specified in section 6.11.3 and then restart the unit. Only then may you begin replacement of the other module.

### CAUTION

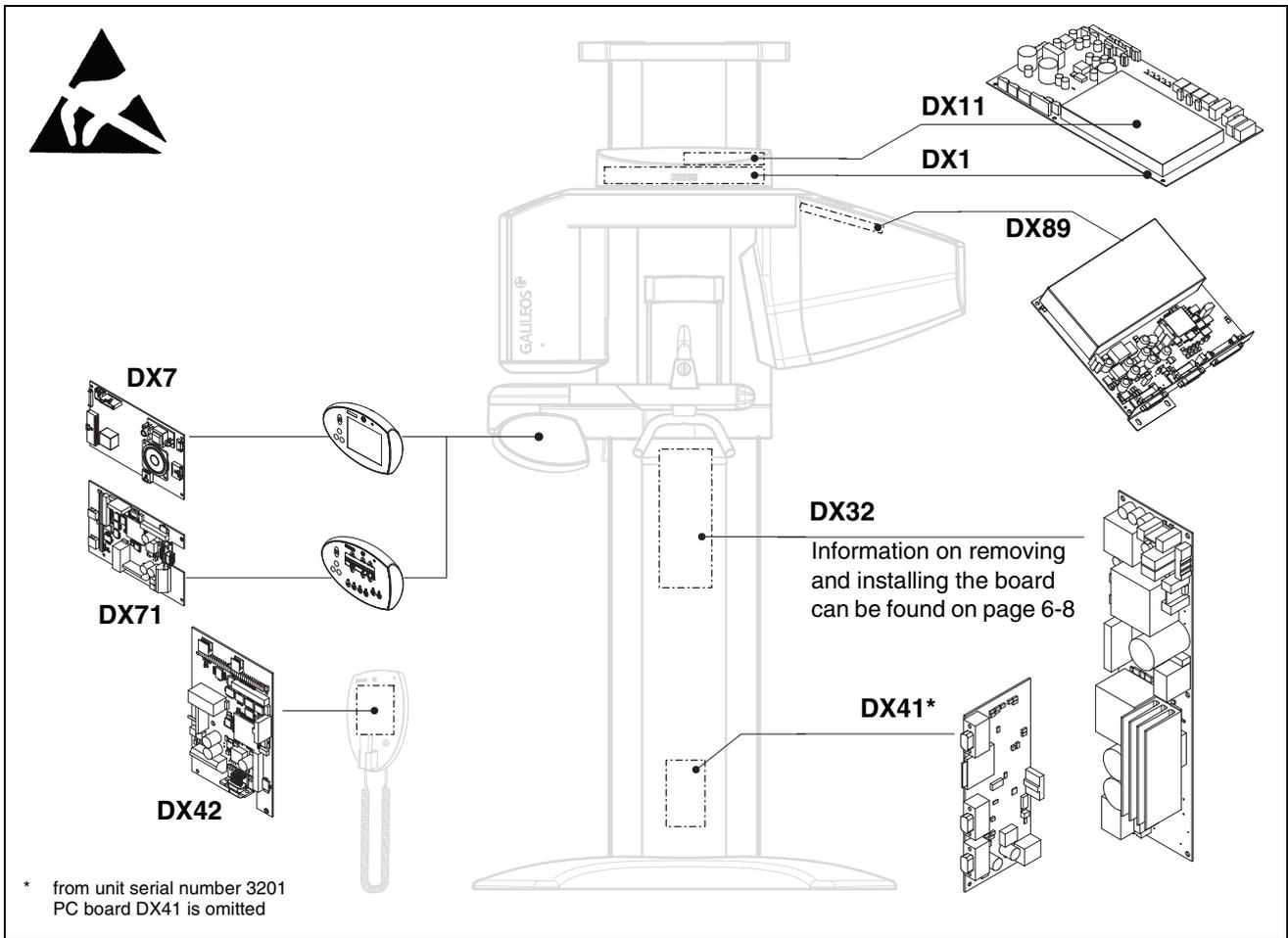
**Before replacing board DX11:**

- If the old DX11 board is still functioning:  
Call up the "extended detail query" in SIXABCON and check the switching plate configuration for the swivel arm. If this deviates from 01, it must be set again via the service routine S017.7 (see page 5-64) after inserting a new DX11.
- For GALILEOS: If the old DX11 is still working:  
Open the "extended detail query" in SIXABCON, search for the "Language Set ID" (for "Extended Configuration DX7") and note down the configuration of the language set index. If it deviates from 00, the language set index must be reset following installation of a new DX11 board with service routine S017.5 (see page 5-60).
- When board DX11 is replaced, the user preference settings (patient symbols, entry position, default contrast mode, etc.) are also lost. Instruct the user accordingly or set these values after replacing the board, provided that they were properly noted down before the board was replaced.

### CAUTION

Be sure to follow the instructions provided in section "Measures following replacement of boards" (see page 6-45)!

This Service Manual describes all of the action required after replacing modules and boards known at the time of its printing. You will find more up-to-date information and supplements concerning this subject on the latest GALILEOS XG CD and on the Sirona dealer page on the Internet. For this reason, you should always check for the latest information on the replacement of modules and performing updates before you start replacing any modules or boards.



**i NOTE**

The connectors on the boards are labeled on delivery of the system.

**Tip:** Check the designations on the connectors when pulling off the cables and label them correctly if necessary.

**6.11.1 Replacing board DX32**

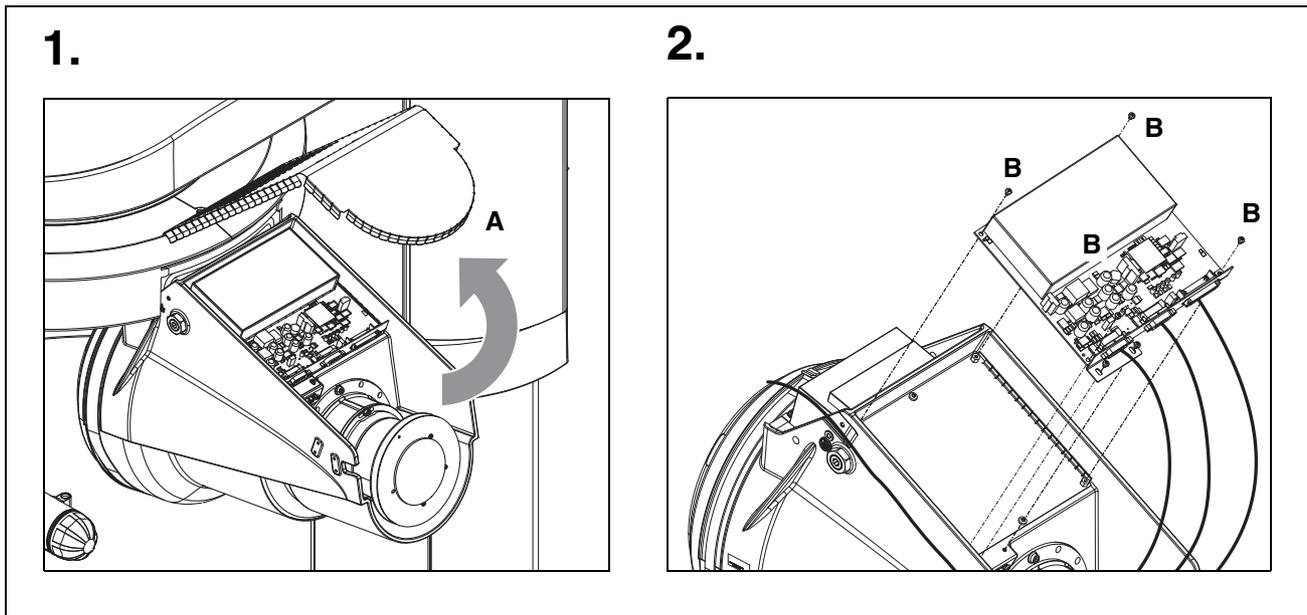
**i NOTE**

The removal of board DX32 is described in section 6.1.2 on page 6-8. Install the board by following the same procedure in reverse order.

**⚠ CAUTION**

After replacing board DX32, be sure to observe the measures following replacement of boards on page 6-45 and following.

## 6.11.2 Replace board DX89

**Removing the covers**

- Remove the covers (see section 1.11):
  - X-ray detector cover

**Removing the board**

1. Carefully pull cover plate **A** upwards to remove it from the X-ray detector.
2. Remove the four screws **B** and remove board DX89 from the X-ray detector.

- Pull cables L13 (X201), L27 (X203) and L28 (X400) off of board DX89.

**Installing the board**

- Install the new board DX 89 in the reverse order of removal.

**!** **CAUTION**

After replacing board DX89, be sure to observe the measures following replacement of boards on page 6-45 and following.

### 6.11.3 Measures following replacement of boards

---

 **CAUTION**

*After replacing boards or modules containing boards, check to make sure that the software version of the module corresponds to the current software status of the system. The software versions of the modules can be queried via service routine S008.2 or the extended detail query in SIXABCON. You can also check the info screen in advance to determine whether the current software constellation is permissible. If this is not the case, the version number of the entire software is marked by an asterisk (e.g. V03.03.01\*)*

*In case of software incompatibilities, carry out a software update or downgrade (see section 1.6).*

*Always carry out the measures described below exactly in the order specified and do not perform any other actions in between.*

---

The following table provides an overview of various possible replacement situations and cross-references to detailed descriptions of the actions required for the corresponding situations following board replacement.

Board	Constellation	Actions	Page
DX1	<ul style="list-style-type: none"> <li>● Inserting a <b>new DX1</b></li> </ul>	<ul style="list-style-type: none"> <li>● No further action is required.</li> </ul>	
	<ul style="list-style-type: none"> <li>● <b>GALILEOS</b></li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>		
DX11	<ul style="list-style-type: none"> <li>● <b>Replacing a DX11</b></li> <li>●</li> </ul>		
	<p><b>i</b> <b>NOTE</b>  <i>Board DX11 with software version V02.62.01 or higher requires a SIDEXIS Software version of V2.0 or higher in order to perform an update. This makes it necessary to perform an overall system update to software version V03.03.01 or higher or SIDEXIS V2.0 or higher.</i></p>		
	<ul style="list-style-type: none"> <li>● Inserting a <b>new DX11</b></li> <li>● <b>GALILEOS</b></li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.4, <b>Case A.</b></li> </ul>	<b>6-49</b>
	<ul style="list-style-type: none"> <li>● Inserting a <b>DX11 from another unit</b></li> <li>● <b>GALILEOS</b></li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.4, <b>Case B.</b></li> </ul>	<b>6-52</b>
	<ul style="list-style-type: none"> <li>● Inserting a <b>new DX11</b></li> <li>● <b>GALILEOS GAX5</b></li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.4, <b>Case C.</b></li> </ul>	<b>6-54</b>
	<ul style="list-style-type: none"> <li>● Inserting a <b>DX11 from another unit</b></li> <li>● <b>GALILEOS GAX5</b></li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.4, <b>Case D.</b></li> </ul>	<b>6-57</b>

Board	Constellation	Actions	Page
DX6 (Tube assembly)	<ul style="list-style-type: none"> <li>● <b>Replacing an X-ray tube assembly incl. DX6</b></li> </ul>		
	<ul style="list-style-type: none"> <li>● Inserting a <b>new X-ray tube assembly</b></li> <li>● GALILEOS</li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.5, <b>Case E.</b></li> </ul>	<b>6-59</b>
	<ul style="list-style-type: none"> <li>● Inserting an <b>X-ray tube assembly from another unit</b></li> <li>● GALILEOS</li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.5, <b>Case F.</b></li> </ul>	<b>6-61</b>
	<ul style="list-style-type: none"> <li>● Inserting a <b>new X-ray tube assembly</b></li> <li>● GALILEOS GAX5</li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.5, <b>Case G.</b></li> </ul>	<b>6-62</b>
	<ul style="list-style-type: none"> <li>● Inserting an <b>X-ray tube assembly from another unit</b></li> <li>● GALILEOS GAX5</li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Please proceed as described in section 6.11.5, <b>Case H.</b></li> </ul>	<b>6-64</b>
DX7 (Easypad)	<ul style="list-style-type: none"> <li>● <b>Inserting a new Easypad incl. DX7</b></li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Switch the unit ON.</li> <li>● Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6.</li> </ul> <p><b>i NOTE</b> Following replacement of the Easypad, the language set on board DX7 is set to the factory setting by default (00 = German, English, French, Italian). If the configured system language set (displayable via service routine S017.5 or the "extended detail query" in SIXABCON) has a configuration other than 00, this configuration will be copied to board DX7 by the update function.</p>	<b>1-12</b>
DX71 (Multipad)	<ul style="list-style-type: none"> <li>● <b>Inserting a new Multipad incl. DX71</b></li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Switch the unit ON.</li> <li>● Perform a software update of the unit to version V03.06.01 or higher as described in section 1.6.</li> </ul>	
DX32 (Stand)	<ul style="list-style-type: none"> <li>● <b>Inserting a new DX32</b></li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● No further action is required.</li> </ul>	
DX41* (Stand)	<ul style="list-style-type: none"> <li>● <b>Inserting a new DX41</b></li> <li>● Only for GALILEOS up to serial number 3200</li> </ul>	<ul style="list-style-type: none"> <li>● Switch the unit ON.</li> <li>● Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6.</li> </ul>	<b>1-12</b>

Board	Constellation	Actions	Page
<b>DX42</b> (Remote control)	<ul style="list-style-type: none"> <li>● <b>Inserting a new DX42</b></li> <li>● <b>Inserting a new DX42</b></li> <li>● GALILEOS</li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Switch the unit ON.</li> <li>● Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6.</li> <li>● Up to unit serial number 3199: Set jumper X109 and X110 to "Configuration with DX41" (inside jumper) (see also Section 6.11.6).</li> </ul>	<b>1-12</b>
	<ul style="list-style-type: none"> <li>● <b>Inserting a new DX42</b></li> <li>● GALILEOS GAX5</li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Switch the unit ON.</li> <li>● Perform a software update of the unit to version V03.06.01 or higher as described in section 1.6.</li> </ul>	
<b>DX89</b> (X-ray detector)	<ul style="list-style-type: none"> <li>● <b>Inserting a new DX89</b></li> <li>● <b>Inserting a new DX89</b></li> <li>● GALILEOS</li> <li>● System software version <b>V03.03.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Switch the unit ON.</li> <li>● Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6.</li> </ul>	<b>1-12</b>
	<ul style="list-style-type: none"> <li>● <b>Inserting a new DX89</b></li> <li>● GALILEOS GAX5</li> <li>● System software version <b>V03.06.01 or higher</b></li> </ul>	<ul style="list-style-type: none"> <li>● Restore the configuration data for board DX89 with the aid of service routine S009.7 (see page 5-44).</li> </ul>	

\* Board DX41 is omitted in unit serial number 3201 and higher.  
Board DX41 is available as a spare part for units up to unit serial number 3199.

**Case A:** New DX11 GALILEOS system software version V03.03.01 or higher

### 6.11.4 Replacing a DX11

**⚠ CAUTION**

After a new DX11 is inserted, the IP address is initially reset to the factory setting. Before you set the unit to a new IP address, make sure that the IP address you're assigning has not been assigned to any other unit.

1. Switch the unit ON.

**i NOTE**

Do not acknowledge any error messages at this point.

2. Install the current SIDEXIS software version (V2.0 or higher).

**i NOTE**

If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS must be installed before you install the current version.

3. Perform a software update to Version V03.03.01 or higher (automatic update) (see also section 1.6).

4. If multiple systems are installed in a single network: Set the IP address via SIXABCON.

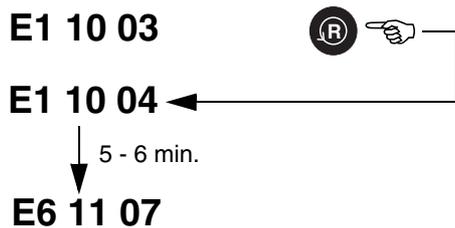
5. Switch the unit OFF.

Wait approx. 1 minute. Then switch the unit ON again.

The error message **E1 10 03** (format flash file system) is displayed. The message "No Key" is displayed on the EasyPad.

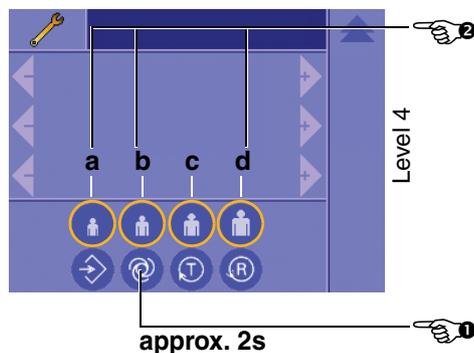
6. Acknowledge the error message with the **R key** .

The formatting of the flash file system is started automatically. Error message **E1 10 04** is displayed during the entire process (approx. 5 - 6 min.). When the formatting is finished, the error message is automatically acknowledged by the system and error message **E6 11 07** (undefined system class) is displayed.



7. Acknowledge the error message with the **R key** .

The access level for the service menu (level 4) is automatically started.



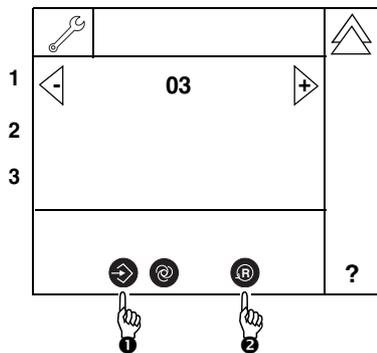
8. Press and hold down the Service key until the patient symbol keys light up (approx. 2 s).

9. Then press the patient symbol keys in the following order within 4 s: **b - d - a**.

Once the key combination has been entered correctly, service routine 017, test step 1 (select/confirm system class) is started automatically. The **Memory key**  is lit.

**i NOTE**

Acknowledge any additional error messages with the **R key** .



10. Confirm the "GALILEOS" system class (03):

To do this, first press the **Memory button** (R key lights up) and then the **R key** .

**E6 15 05**



**E6 15 04**



11. Quit the service routine via the **double arrow key** .
12. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
Error message **E6 15 05** (undefined system serial number) is displayed.
13. Acknowledge the error message with the **R key** .  
Error message **E6 15 04** (undefined activation data) is displayed.
14. Acknowledge the error message with the **R key** .
15. Open the Service menu (see page 5-6).
16. Start service routine **S008.3**, check the unit serial number and confirm it if it is correct (see page 5-37).

**i NOTE**

The unit serial number is located on the rating plate of the unit.

**! CAUTION**

In case of a wrong serial number, cancel the update and contact the Sirona Customer Service Center!

17. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The message "No Key" should no longer appear.
18. Open the Service menu (see page 5-6).
19. Start service routine **S017** and perform the system configuration (test step 2-15) (see page 5-53).

**i NOTE**

The DX41 board must be configured via the service routine S017.9.  
On units with a serial number  $\geq 1080$ , the switching plate configuration of the swivel arm must be checked and/or set via the service routine S017.7.

**i NOTE**

Inform the customer of the options for configuring the software revision, e.g. the welcome screen and the acoustic exposure signal. Activate these functions if they are required.

**E1 11 20**

20. If the travel height of the unit has to be limited:  
Set the travel height with service routine **S018.2** (see page 5-73).
  21. Perform another software update to the current system software version as described in section 1.6. This updates all modules in accordance with the configuration.
  22. Acknowledge the error message with the **R key** .
  23. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
  24. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.7 on page 1-17).
- **The process is completed.**

**Case B:** DX11 from another unit  
GALILEOS  
system software version  
V03.03.01 or higher

 **CAUTION**

*Exchange is only possible within the same system class, e.g. the DX11 must come from a GALILEOS unit if it is to be installed in a GALILEOS unit!*

 **CAUTION**

*After inserting the board, you must reconfigure the IP address to match the IP address of the existing X-ray component. Before you set the unit to the correct IP address, make sure that this address has not been assigned to any other unit.*

1. Switch the unit ON.

 **NOTE**

*Do not acknowledge any error messages at this point.*

2. Install the current SIDEXIS software version (V02.00 or higher).

 **NOTE**

*If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS must be installed before you install the current version.*

3. Perform a software update to software version V03.03.01 or higher as described in section 1.6.

 **NOTE**

*When installing a new DX11 which already has the same software status as the overall system, you must nevertheless perform a software update to this status, so that an administrative entry can be written to the memory of the DX11.*

4. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
Error message **E6 15 05** (undefined system serial number) is displayed.  
The message "No Key" is displayed on the EasyPad.

**E6 15 05**



5. Acknowledge the error message with the **R key**  .  
Error message **E6 15 04** (undefined activation data) is displayed.

**E6 15 04**



6. Acknowledge the error message with the **R key**  .
7. Open the Service menu (see page 5-6).
8. Start service routine **S008.3** (see page 5-37).
9. Get the unit serial number from the rating plate of the unit and enter it (see page 5-37).

 **NOTE**

*Any serial number which is unknown to the unit will not be accepted by the unit.*

*The serial number entered must be identical with the one on the rating plate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.*

10. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.

**i** **NOTE**

*In systems that already run with system software version V03.03.01 or higher, please check that there is a XML file in the PDATA/P2K\_Config with the network name of the system (Extended details). This file contains up-to-date information about the previous system configuration! See also section 1.7 on page 1-17).*

## E1 11 20



11. Acknowledge the error message with the **R key** .

12. Open the Service menu (see page 5-6).

13. Start service routine **S017** and perform the system configuration (test step 2-15) (see page 5-53).

**i** **NOTE**

*The DX41 board must be configured via the service routine S017.9. On units with a serial number  $\geq 1080$ , the switching plate configuration of the swivel arm must be checked and/or set via the service routine S017.7.*

14. If the travel height of the unit has to be limited:  
Set the travel height with service routine **S018.2** (see page 5-73).
15. Perform another software update to the current system software version as described in section 1.6. This updates all modules in accordance with the configuration.
16. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
17. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.7 on page 1-17).

- **The process is completed.**

**Case C:** New DX11  
GALILEOS GAX5  
system software version  
V03.06.01 or higher

**⚠ CAUTION**

After a new DX11 is inserted, the IP address is initially reset to the factory setting. Before you set the unit to a new IP address, make sure that the IP address you're assigning has not been assigned to any other unit.

1. Switch the unit ON.

**i NOTE**

Do not acknowledge any error messages at this point.

2. Install the current SIDEXIS software version (V2.3 or higher).

**i NOTE**

If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS must be installed before you install the current version.

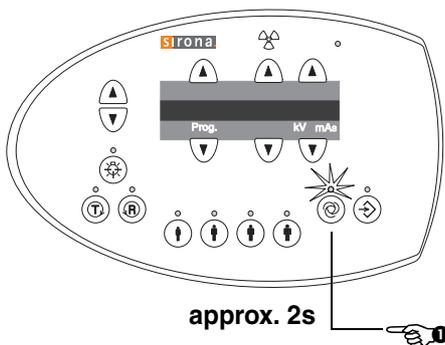
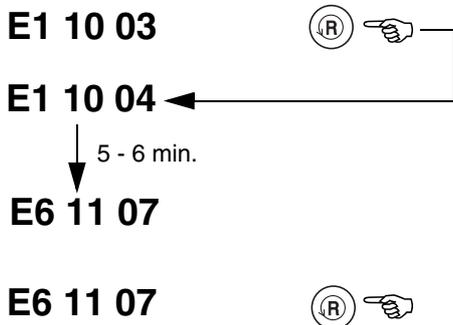
3. Perform a software update to Version V03.06.01 or higher (automatic update) (see also section 1.6).
4. If multiple systems are installed in a single network:  
Set the IP address via SIXABCON.
5. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The error message **E1 10 03** (format flash file system) is displayed. The message "No Key" is displayed on the Multipad.

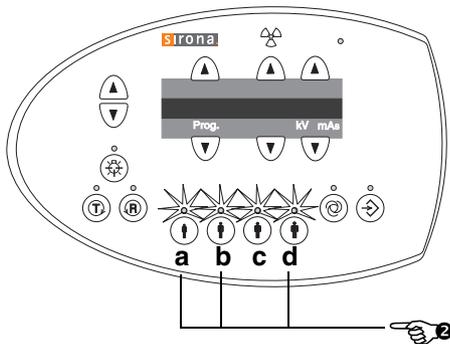
6. Acknowledge the error message with the **R key** .

The formatting of the flash file system is started automatically. Error message **E1 10 04** is displayed during the entire process (approx. 5 - 6 min.). When the formatting is finished, the error message is automatically acknowledged by the system and error message **E6 11 07** (undefined system class) is displayed.

7. Acknowledge the error message with the **R key** .

8. Press and hold down the Service key until the LEDs above the patient symbol keys light up (approx. 2 s).



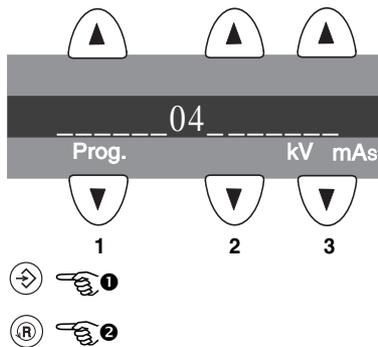


- Then press the patient symbol keys in the following order within 4 s:  
**b – d – a.**

Once the key combination has been entered correctly, service routine 017, test step 1 (select/confirm system class) is started automatically. The LED above the **Memory key**  lights up.

**i NOTE**

Acknowledge any additional error messages with the **R key** .



- Confirm the "GALILEOS GAX5" system class (04):

To do this, first press the **Memory button**  (LED above the R key lights up) and then the **R key** .

**E6 15 05**



**E6 15 04**



- Quit the service routine via the **Top arrow key**  above selection field 3.
- Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
Error message **E6 15 05** (undefined system serial number) is displayed.
- Acknowledge the error message with the **R key** .  
Error message **E6 15 04** (undefined activation data) is displayed.
- Acknowledge the error message with the **R key** .
- Open the Service menu (see page 5-6).
- Start service routine **S008.3**, check the unit serial number and confirm it if it is correct (see page 5-37).

**i NOTE**

The unit serial number is located on the rating plate of the unit.

**! CAUTION**

In case of a wrong serial number, cancel the update and contact the Sirona Customer Service Center!

- Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The message "No Key" should no longer appear.

18. Open the Service menu (see page 5-6).
19. Start service routine **S017** and perform the system configuration (test step 2-15) (see page 5-53).

---

**i** **NOTE**

*The DX41 board must be configured via the service routine S017.9. On units with a serial number  $\geq 1080$ , the switching plate configuration of the swivel arm must be checked and/or set via the service routine S017.7.*

---

**i** **NOTE**

*Inform the customer of the options for configuring the software revision, such as the acoustic exposure signal. Activate these functions if they are required.*

---

20. If the travel height of the unit has to be limited:  
Set the travel height with service routine **S018.2** (see page 5-73).
21. Perform another software update to the current system software version as described in section 1.6. This updates all modules in accordance with the configuration.
22. Acknowledge the error message with the **R** key .
23. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
24. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.7 on page 1-17).

- **The process is completed.**

**E1 11 20**



Case D: DX11 from another unit  
GALILEOS GAX5  
system software version  
V03.06.01 or higher

 **CAUTION**

*Exchange is only possible within the same system class, e.g. the DX11 must come from a GALILEOS GAX5 unit if it is to be installed in a GALILEOS GAX5 unit!*

 **CAUTION**

*After inserting the board, you must reconfigure the IP address to match the IP address of the existing X-ray component. Before you set the unit to the correct IP address, make sure that this address has not been assigned to any other unit.*

1. Switch the unit ON.

 **NOTE**

*Do not acknowledge any error messages at this point.*

2. Install the current SIDEXIS software version (V2.3 or higher).

 **NOTE**

*If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS must be installed before you install the current version.*

3. Perform a software update to Version V03.06.01 or higher (automatic update) (see also section 1.6).

 **NOTE**

*When installing a new DX11 which already has the same software status as the overall system, you must nevertheless perform a software update to this status, so that an administrative entry can be written to the memory of the DX11.*

4. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
Error message **E6 15 05** (undefined system serial number) is displayed.  
The message "No Key" is displayed on the Multipad.

**E6 15 05**



5. Acknowledge the error message with the **R key**  .  
Error message **E6 15 04** (undefined activation data) is displayed.

**E6 15 04**



6. Acknowledge the error message with the **R key**  .

7. Open the Service menu (see page 5-6).
8. Start service routine **S008.3** (see page 5-37).
9. Get the unit serial number from the rating plate of the unit and enter it (see page 5-37).

 **NOTE**

*Any serial number which is unknown to the unit will not be accepted by the unit. The serial number entered must be identical with the one on the rating plate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.*

10. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.

**E1 11 20****i NOTE**

*In systems that already run with system software version V03.03.01 or higher, please check that there is a XML file in the PDATA/P2K\_Config with the network name of the system (Extended details). This file contains up-to-date information about the previous system configuration! See also section 1.7 on page 1-17).*

11. Acknowledge the error message with the **R key**  .

12. Open the Service menu (see page 5-6).

13. Start service routine **S017** and perform the system configuration (test step 2-15) (see page 5-53).

**i NOTE**

*The DX41 board must be configured via the service routine S017.9. On units with a serial number  $\geq 1080$ , the switching plate configuration of the swivel arm must be checked and/or set via the service routine S017.7.*

14. If the travel height of the unit has to be limited:  
Set the travel height with service routine **S018.2** (see page 5-73).

15. Perform another software update to the current system software version as described in section 1.6. This updates all modules in accordance with the configuration.

16. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.

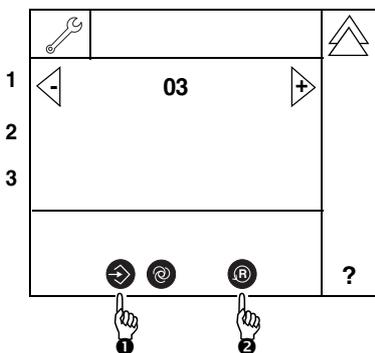
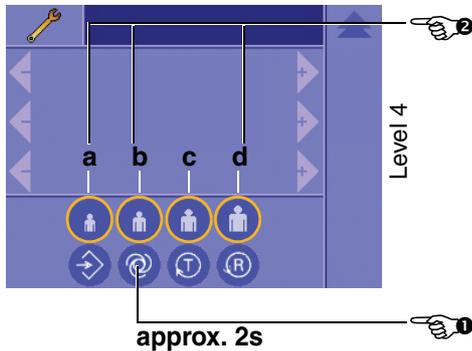
17. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.7 on page 1-17).

● **The process is completed.**

**Case E:** New tube assembly  
**GALILEOS**  
 system software version  
**V03.03.01 or higher**

### 6.11.5 Replacing an X-ray tube assembly incl. DX6

**E6 11 07**



**E6 15 05**



1. Switch the unit ON.
2. If the software status of the newly installed DX6 board is not compatible with the current overall system software version, perform a software update to the current system version as described in section 1.6.
3. Switch the unit OFF.  
 Wait approx. 1 minute. Then switch the unit ON again.  
 Error message **E6 11 07** (undefined system class) is displayed.  
 The message "No Key" is displayed on the EasyPad.
4. Acknowledge the error message with the **R key** .  
 The access level for the service menu is automatically started.

**i NOTE**

Acknowledge any additional error messages with the **R key** .

5. Press and hold down the Service key until the patient symbol keys light up (approx. 2 s).
6. Then press the patient symbol keys in the following order within 4 s: **b – d – a**.  
 Once the key combination has been entered correctly, service routine 017, test step 1 (select/confirm system class) is started automatically. The **Memory key** is lit.
7. Confirm the "GALILEOS" system class (03):  
 To do this, first press the **Memory key** (R key lights up) and then the **R key** .

8. Quit the service routine via the **double arrow key** .
9. Switch the unit OFF.  
 Wait approx. 1 minute. Then switch the unit ON again.  
 Error message **E6 15 05** (undefined system serial number) is displayed.
10. Acknowledge the error message with the **R key** .

11. Open the Service menu (see page 5-6).
12. Start service routine **S008.3**, check the unit serial number and confirm it if it is correct (see page 5-37).

---

**i** **NOTE**

*The unit serial number is located on the rating plate of the unit.*

---

**!** **CAUTION**

*In case of a wrong serial number, cancel the update and contact the Sirona Customer Service Center!*

---

13. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The message "No Key" should no longer appear.
14. Install the current SIDEXIS software version (V2.0 or higher).

---

**i** **NOTE**

*If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS must be installed before you install the current version.*

---

15. Perform a software update to Version V03.03.01 or higher (automatic update) (see also section 1.6).

**E1 11 20**



16. Acknowledge the error message with the **R key** .

17. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
18. Perform an acceptance test (for Germany only) without calling in an expert.
19. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.6 on page 1-12).

- **The process is completed.**

Case F: Tube assembly from another unit  
GALILEOS  
system software version  
V03.03.01 or higher

**E6 15 05**



**E6 15 04**



**E1 11 20**



### **CAUTION**

*Exchange is only possible within the same system class, e.g. the tube assembly must come from a GALILEOS unit if it is to be installed in a GALILEOS unit!*

1. Switch the unit ON.  
Error message **E6 15 05** (undefined system serial number) is displayed. The message "No Key" is displayed on the EasyPad.
2. Acknowledge the error message with the **R key**  .  
Error message **E6 15 04** (undefined activation data) is displayed.
3. Acknowledge the error message with the **R key**  .
4. Open the Service menu (see page 5-6).
5. Start service routine **S008.3** (see page 5-37).
6. Get the unit serial number from the rating plate of the unit and enter it (see page 5-37).

### **NOTE**

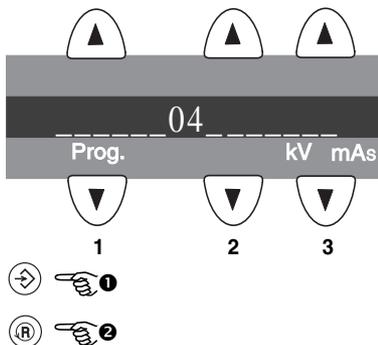
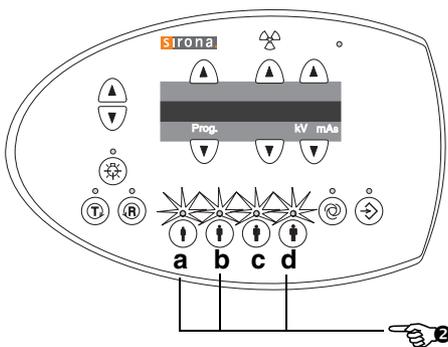
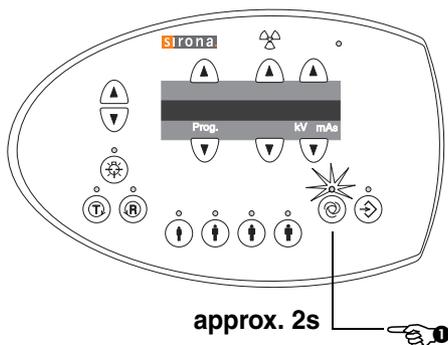
*Any serial number which is unknown to the unit will not be accepted by the unit.*

*The serial number entered must be identical with the one on the rating plate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.*

7. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The message "No Key" should no longer appear.
  8. Acknowledge the error message with the **R key**  .
  9. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
  10. Perform an acceptance test (for Germany only) without calling in an expert.
  11. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.6 on page 1-12).
- **The process is completed.**

**Case G: New tube assembly  
GALILEOS GAX5  
system software version  
V03.06.01 or higher**

## E6 11 07



1. Switch the unit ON.
2. If the software status of the newly installed DX6 board is not compatible with the current overall system software version, perform a software update to the current system version as described in section 1.6.
3. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
Error message **E6 11 07** (undefined system class) is displayed.  
The message "No Key" is displayed on the Multipad.

4. Acknowledge the error message with the **R key** .

### **i** NOTE

Acknowledge any additional error messages with the **R key** .

5. Press and hold down the Service key until the LEDs above the patient symbol keys light up (approx. 2 s).

6. Then press the patient symbol keys in the following order within 4 s:  
**b – d – a**.

Once the key combination has been entered correctly, service routine 017, test step 1 (select/confirm system class) is started automatically. The LED above the **Memory key** lights up.

7. Confirm the "GALILEOS GAX5" system class (04):

To do this, first press the **Memory button** (LED above the R key lights up) and then the **R key** .

8. Quit the service routine via the **Top arrow key** above selection field 3.

**E6 15 05**

9. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
Error message **E6 15 05** (undefined system serial number) is displayed.
10. Acknowledge the error message with the **R key** .
11. Open the Service menu (see page 5-6).
12. Start service routine **S008.3**, check the unit serial number and confirm it if it is correct (see page 5-37).

---

**i NOTE**

*The unit serial number is located on the rating plate of the unit.*

---

**CAUTION**

*In case of a wrong serial number, cancel the update and contact the Sirona Customer Service Center!*

---

13. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The message "No Key" should no longer appear.
14. Install the current SIDEXIS software version (V2.3 or higher).

---

**i NOTE**

*If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS must be installed before you install the current version.*

---

15. Perform a software update to Version V03.06.01 or higher (automatic update) (see also section 1.6).

**E1 11 20**

16. Acknowledge the error message with the **R key** .
17. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
18. Perform an acceptance test (for Germany only) without calling in an expert.
19. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.6 on page 1-12).

- **The process is completed.**

Case H: Tube assembly from another unit  
GALILEOS GAX5  
system software version  
V03.06.01 or higher

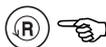
**E6 15 05**



**E6 15 04**



**E1 11 20**



**⚠ CAUTION**

*Exchange is only possible within the same system class, e.g. the tube assembly must come from a GALILEOS GAX5 unit if it is to be installed in a GALILEOS GAX5 unit!*

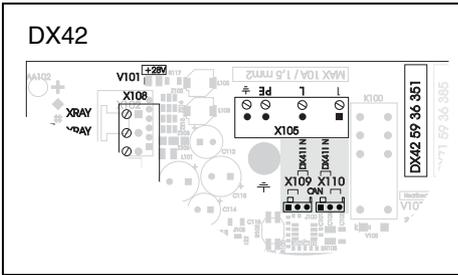
1. Switch the unit ON.  
Error message **E6 15 05** (undefined system serial number) is displayed. The message "No Key" is displayed on the Multipad.
2. Acknowledge the error message with the **R key** .  
Error message **E6 15 04** (undefined activation data) is displayed.
3. Acknowledge the error message with the **R key** .
4. Open the Service menu (see page 5-6).
5. Start service routine **S008.3** (see page 5-37).
6. Get the unit serial number from the rating plate of the unit and enter it (see page 5-37).

**i NOTE**

*Any serial number which is unknown to the unit will not be accepted by the unit. The serial number entered must be identical with the one on the rating plate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.*

7. Switch the unit OFF.  
Wait approx. 1 minute. Then switch the unit ON again.  
The message "No Key" should no longer appear.
  8. Acknowledge the error message with the **R key** .
  9. Perform a complete system calibration (see chapter 4).  
No more error messages may appear following successful calibration.
  10. Perform an acceptance test (for Germany only) without calling in an expert.
  11. Select the "Extended details" via SIXABCON.  
This generates an XML file (with the system parameters) which is filed under the network name of the system in the PDATA/P2K\_Config folder (see also section 1.6 on page 1-12).
- **The process is completed.**

### 6.11.6 Check jumper on board DX42 (replacement of board DX42)

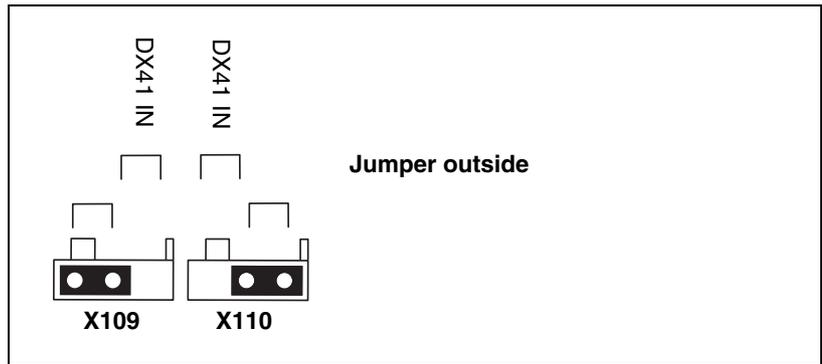


For unit serial number 3201 and higher, there are two jumpers on board DX42 which are configured *with* or *without* board DX41 via the unit hardware version.

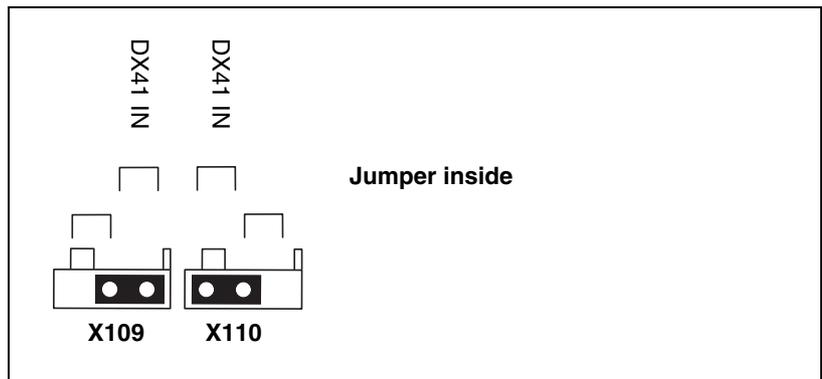
If board DX42 is supplied as a spare part (from April 2008 on), the jumpers will be set to *operation without board DX41*. If a new DX42 board (supplied from April 2008) is to be inserted in a unit with a system hardware version < 3201 as a spare part, the jumpers must be reconfigured in accordance with the following diagram.

### 6.11.7 Jumper position on circuit board DX42

**Unit operation *without* DX41**  
(factory setting from April 2008,  
unit serial number ≥ 3201)



**Unit operation *with* DX41**  
(factory setting from April 2008,  
unit serial number < 3201)



## 6.12 Replacing cables

**CAUTION**

*Switch the unit OFF before you start replacing cables or removing connectors.*

---

**CAUTION**

*Be careful not to twist the cables or kink the fiber-optic light guides when installing them.*

---

**NOTE**

*An overview of all cables can be found in section 1.8.*

*Always check the cables before replacing them (see section 3.7).*

*The cables are labeled with small flags.*

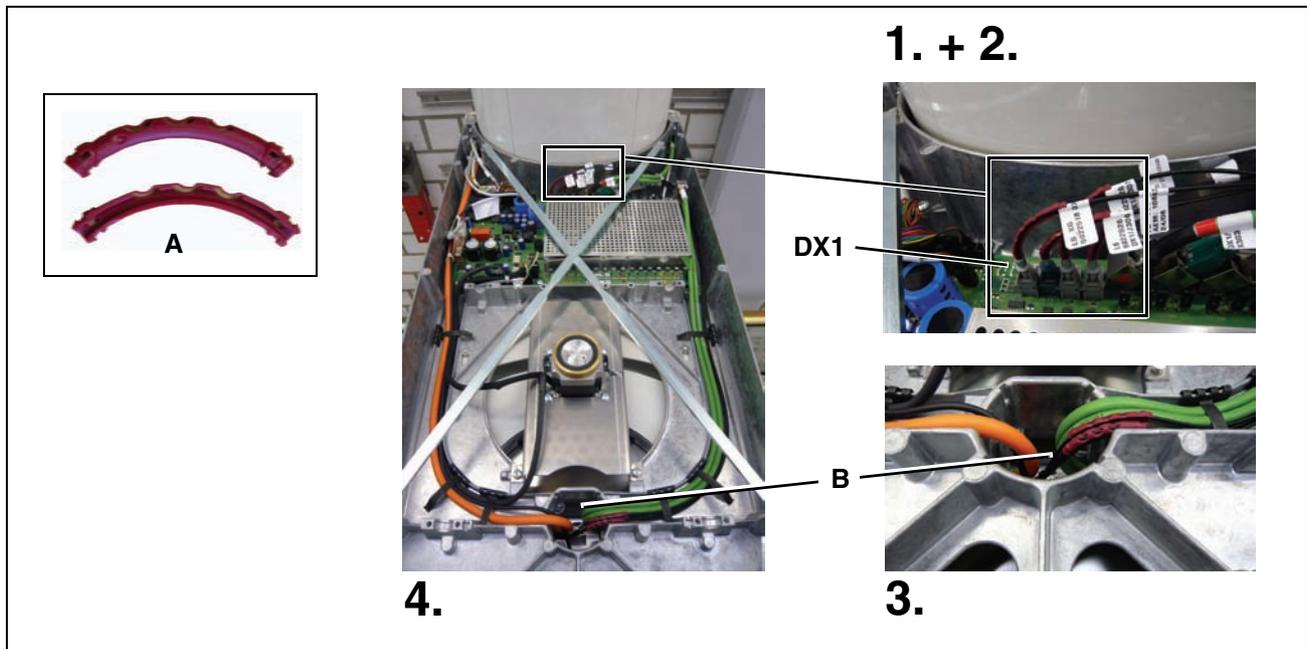
*They specify the designation and part number of the cable.*

*The plugs and sockets on the cables are designated on the boards and cables. Check the designations of the cables when pulling them off.*

*Some of the cables are marked with green adhesive tape. Mark the corresponding positions on the unit before removing an old cable. Lay the new cable so that the cable markings again come to rest at the corresponding positions marked on the unit while removing the old cable.*

---

### 6.12.1 Replacing the fiber-optic cables L5, L6 and L15



When changing the fiber-optic cables L5, L6 and L15, please observe the following notes:

- Remove the defective fiber-optic cable.

#### **!** CAUTION

*Do not bend or twist fiber-optic cables. The curve radius must not be smaller than 20 mm, as the cables can otherwise break!*

#### **i** NOTE

*If a radius limiter is not yet installed: When replacing one cable, retrofit all existing fiber-optic cables (L5, L6 or L15) with the radius limiters included with delivery! The radius limiters improve torsional and bending force tolerance.*

1. Attach the radius limiter **A** to the cable near to the connector which is plugged into the board **DX1**.
2. Plug the connector of the new fiber-optic cable to the same color assignment on the board **DX1**.
3. Lay the fiber-optic cables up to point **B** and attach the radius limiter **A** to the cable at point **B** (around 900 mm away from the connectors on the DX1).
4. Guide the fiber-optic cable to board **DX6** and plug the connector of the new fiber-optic cable to the same color assignment on board **DX6**.

### 6.12.2 Replacing cable L7 and L108 (in cable track 2)

#### Removing cables L7 and L108 from board DX1

- Switch the unit ON.
- Move the slide downward to a pleasant working position using the UP/DOWN keys on the EasyPad.
- Switch the unit OFF again.
- Remove the covers (see section 1.11):
  - Arm
- Remove the two cross braces and the cover plate of board DX1.
- Pull fiber optic cable L7 and cable L108 off of board DX1.



---

**CAUTION**

*Immediately after pulling off the cables, wrap the detent of connector X303 (cable L108) with adhesive tape to protect it against breaking off.*

---

#### Moving the unit up and removing the profile covers

- Switch the unit ON.
- Move the slide upward using the UP/DOWN keys on the EasyPad.
- Switch the unit OFF again.
- Remove the covers (see section 1.11):
  - Intermediate piece
  - Profile covers (top and bottom)



---

**NOTE**

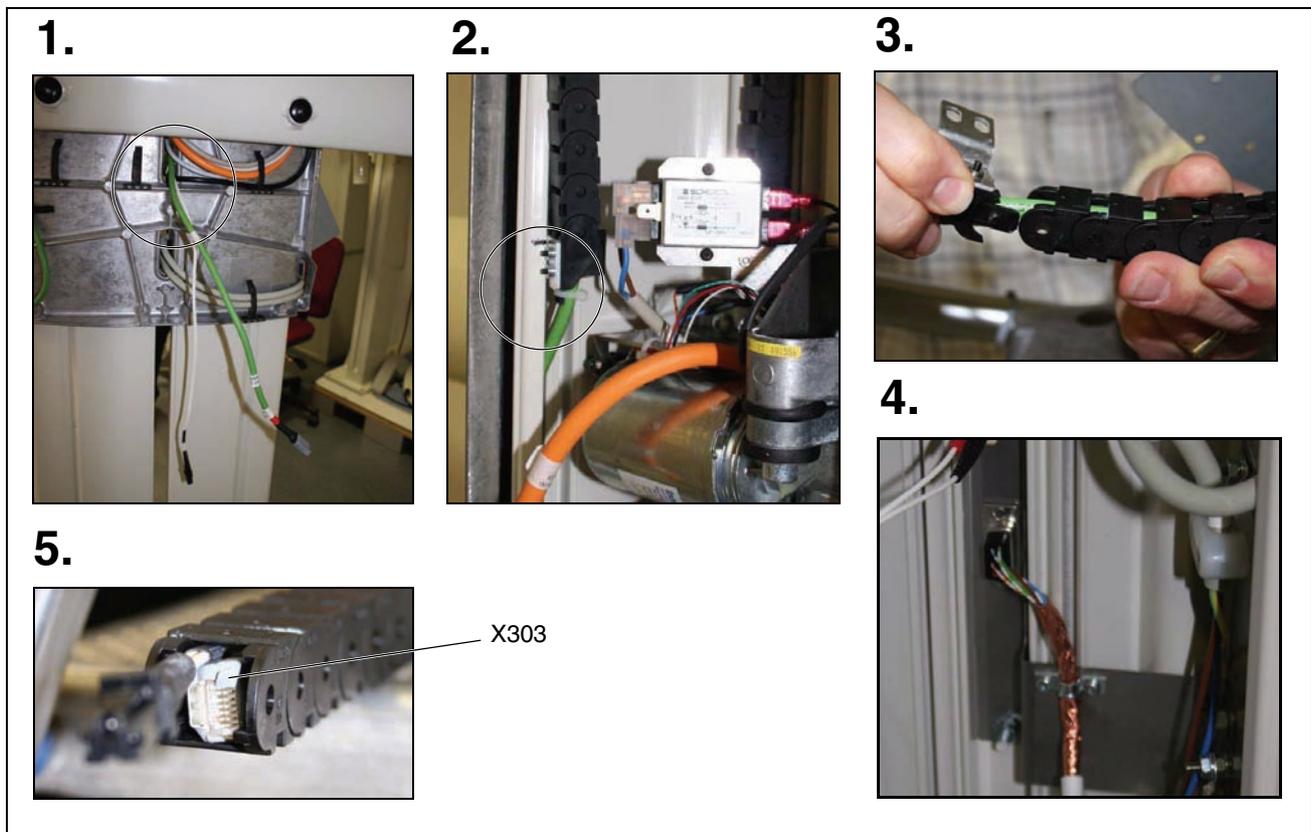
*Tip: When unscrewing the upper profile cover, press it against the unit and let it slide down after detaching it.*

*If the height adjustment motor is inoperative, you can also move the slide manually.*

---

#### Removing board DX32

- Remove board DX32 (see section 6.1.2).



### Removing the cable track

1. Detach fiber optic cable L7 and cable L108 from the cable clamps at the rear of the unit and pull the cables through the slit in the slide toward the front into the stand.
2. Unscrew the angle brackets on both sides of the cable track.
3. Remove the motor-side end piece from the cable track.
  - Remove both cable covers (on the right and on the left in the stand) and pull the cable track (behind the motor) down and out of the stand.
4. If cable L7 is defective:
  - Unscrew cable L7 from the interface board and remove the shielding.

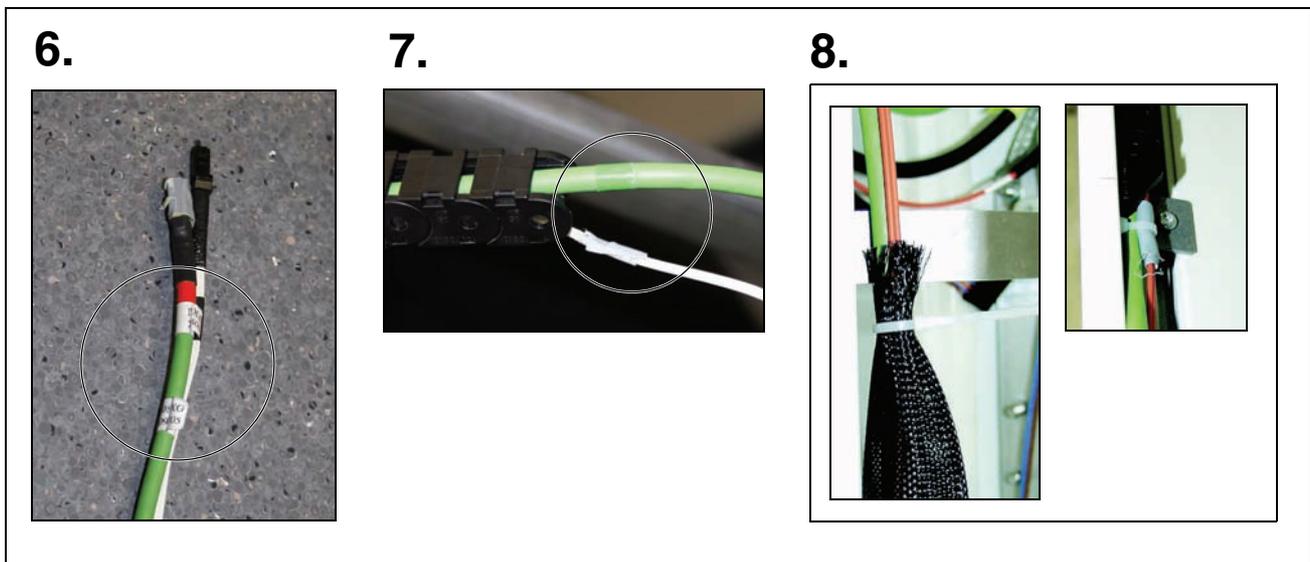
#### **i** NOTE

*This step is not required if cable L7 is intact and therefore will be reused. Unless it is not possible to lay down the cable track flat near the stand (see next step)*

- Remove the cable ties from the cable track and lay the cable track down on a flat surface stretched out.
5. Carefully pull both cables (together) out of the cable track and out of the fabric tube.

#### **!** CAUTION

*At the same time, be sure to check the position of connector X303 on cable L108 (see photo above).*

**Drawing new cables into the cable track**

- If cable L108 is defective:  
Wrap the detent of connector X303 on new cable L108 with adhesive tape to protect it against breaking off.
- Lay the cable track down on a flat surface stretched out.
- 6. Fasten the two (new) cables together with adhesive tape above the flag labels.
- 7. Push both cables (together) into the cable track up to the cable markings.

**⚠ CAUTION**

*Push the green cable. The white cable is carried along. In this way, you can prevent the sensitive fiber optic cable from being damaged.*

**i NOTE**

*New cables have no cable markings. Orientate yourself according to the marking on the second (old) cable and make sure that both cables protrude equally far out of the cable track once they have been drawn in. Then make a mark on the new cable.*

**Reinstalling the cable track in the unit**

- 8. Before installing the cable track in the stand, fasten the cables to both ends of the cable track using cable ties.

**⚠ CAUTION**

*The cable ties should only fix the position of the cables. They must not be fastened too tightly, as overtightening them could damage fiber optic cable L7.*

- The actual installation of the cable track is performed in the reverse order of its removal.

### 6.12.3 Laying cable L1 and the grounding strap (in cable track 1)

The procedure for replacing cable L1 and the grounding strap is basically analogous to the procedure described in chapter 6.12.2.

# 7 Maintenance

GALILEOS

## Contents

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7.4	Checking the cables for damage .....	7 – 6
7.5	Checking the idling rollers .....	7 – 7
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7.7	Checking the cable shields .....	7 – 10
7.8	Checking the protective ground wires .....	7 – 11
7.9	Checking the device leakage current .....	7 – 15

## 7

# Maintenance

---

** DANGER**

**PERILOUS SHOCK HAZARD.** It is essential to switch the unit off and to wait at least another 1 minute before starting the repair or taking off a cover panel!

---

** CAUTION**

- Switch the unit OFF before connecting a measuring instrument.
  - Select the correct current/voltage type and adjust the measuring range to match the expected readings.
  - Perform continuity tests only on units which are switched OFF.
  - Observe the prescribed cool-down intervals if several exposures must be taken to check a measurement.
- 

** CAUTION**

Please observe the usual precautionary measures for handling printed circuit boards (ESD).

Touch a ground point to discharge static electricity before touching any boards.

---

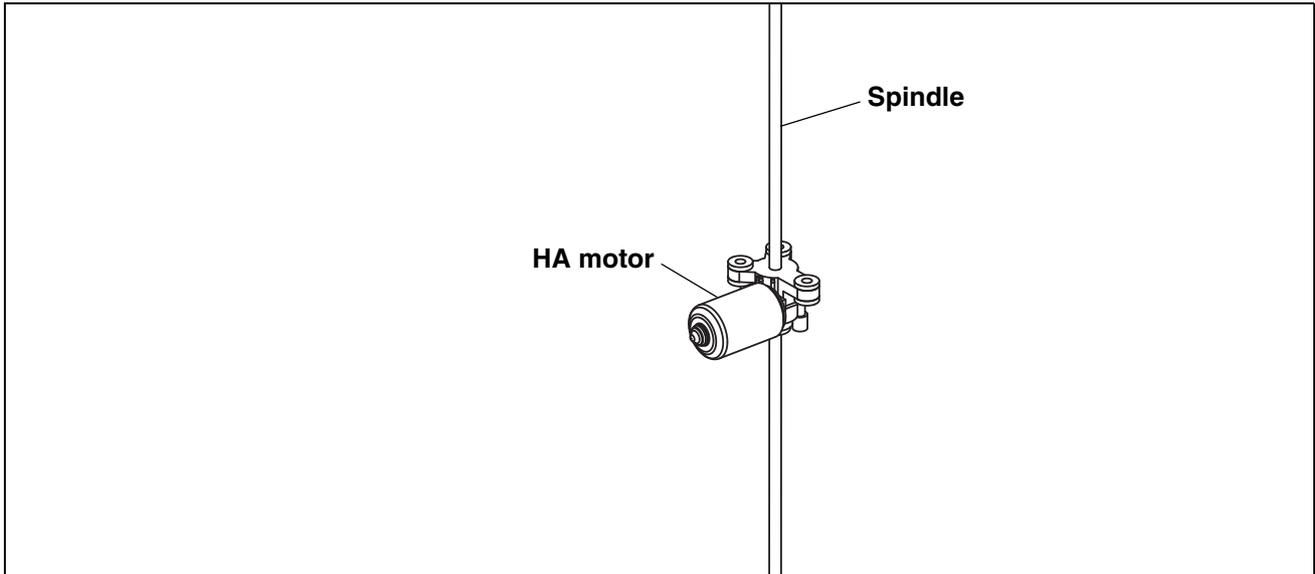


## 7.1 Calibrating the unit

Calibration of the unit is described in detail in Chapter 4 of this Service Manual.



## 7.2 Checking the height adjustment



### Check the threaded rod and motor for abrasion

- Perform a visual inspection of the motor and the threaded rod for abrasion.

If abrasion clearly has occurred:

→ Replace the height adjustment motor including spindle (see page 6-5)

### Check whether the height adjustment produces atypical running noises



- Use the UP/DOWN keys on the Easypad to move the unit up and down through its entire adjustment range.

If the height adjustment is mechanically defective, atypical running noises may occur:

Speed-dependent hammering noises:

Bearing on the height adjustment motor is damaged.

→ Replace the height adjustment motor including spindle (see page 6-5)

### Check whether precise, jolt-free height adjustment is possible



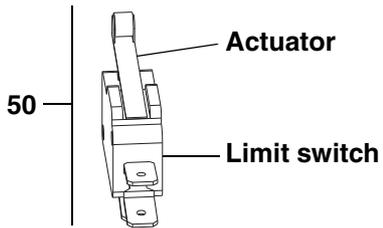
- Use the UP/DOWN keys on the Easypad to move the unit and observe the movement of the slide: The slide must begin moving with a soft start and then speed up its movement.

If precise height positioning with a soft start is not possible:

→ Lubricate the spindle with a light coat of **Chesterton 622**

### **i** NOTE

*If the unit is not used for a longer period of time, a slight jolt may occur the first time it starts moving. However, the next time it starts moving, it must execute a jolt-free soft start.*

**Check whether the height adjustment limit switches are functioning properly**

- Manually actuate both limit switches one after the other while the height adjustment motor is running: The motor must stop.

If the limit switches are not functioning:

- Check the corresponding microswitch and replace if necessary
- Check cable L19, replace if necessary

**Check whether an audible signal can be heard during height adjustment**

- Run the unit up and down: An audible signal must sound.

If no audible signal sounds:

- Replace board DX1 (see page 6-42)

### 7.3 Fan and temperature

#### Check whether the fan is functioning

- Check the function of the fan using service routine S005.4 (see page 5-25).

If the fan is defective:

‡ Replace the fan (see page 6-30)

#### Check whether the temperature sensor is supplying plausible values

- Read the temperature in the single tank via service routine S005.5 (see page 5-27).

If the displayed temperature reading is not plausible:

‡ Replace the tube assembly (see page 6-26)

### 7.4 Checking the cables for damage

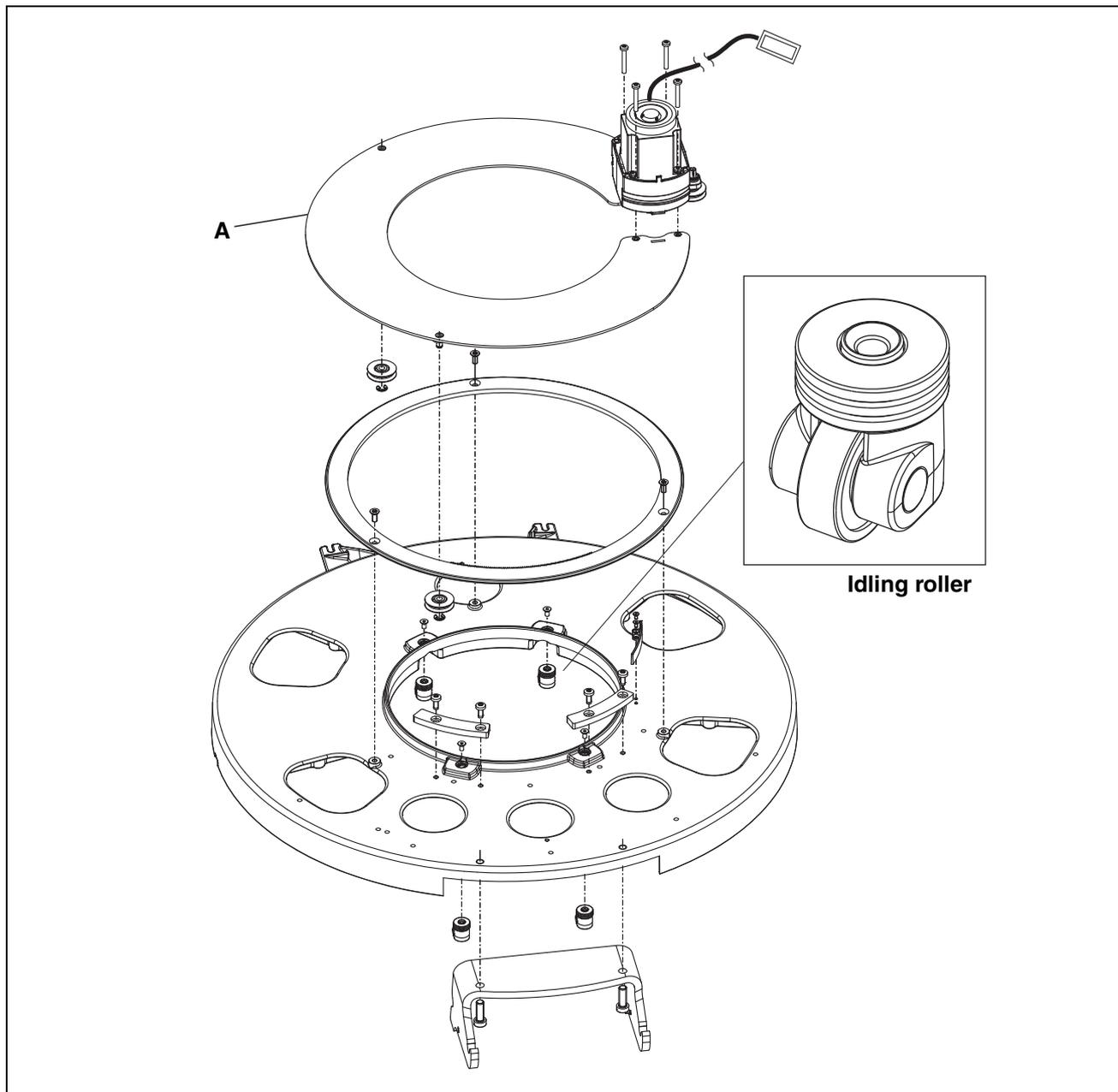
#### Check whether the cables feeding the unit are OK

- Perform a visual check of the power cable, protective ground wire, control cables and data cables.

If cables are externally damaged:

‡ Replace the respective cables

## 7.5 Checking the idling rollers



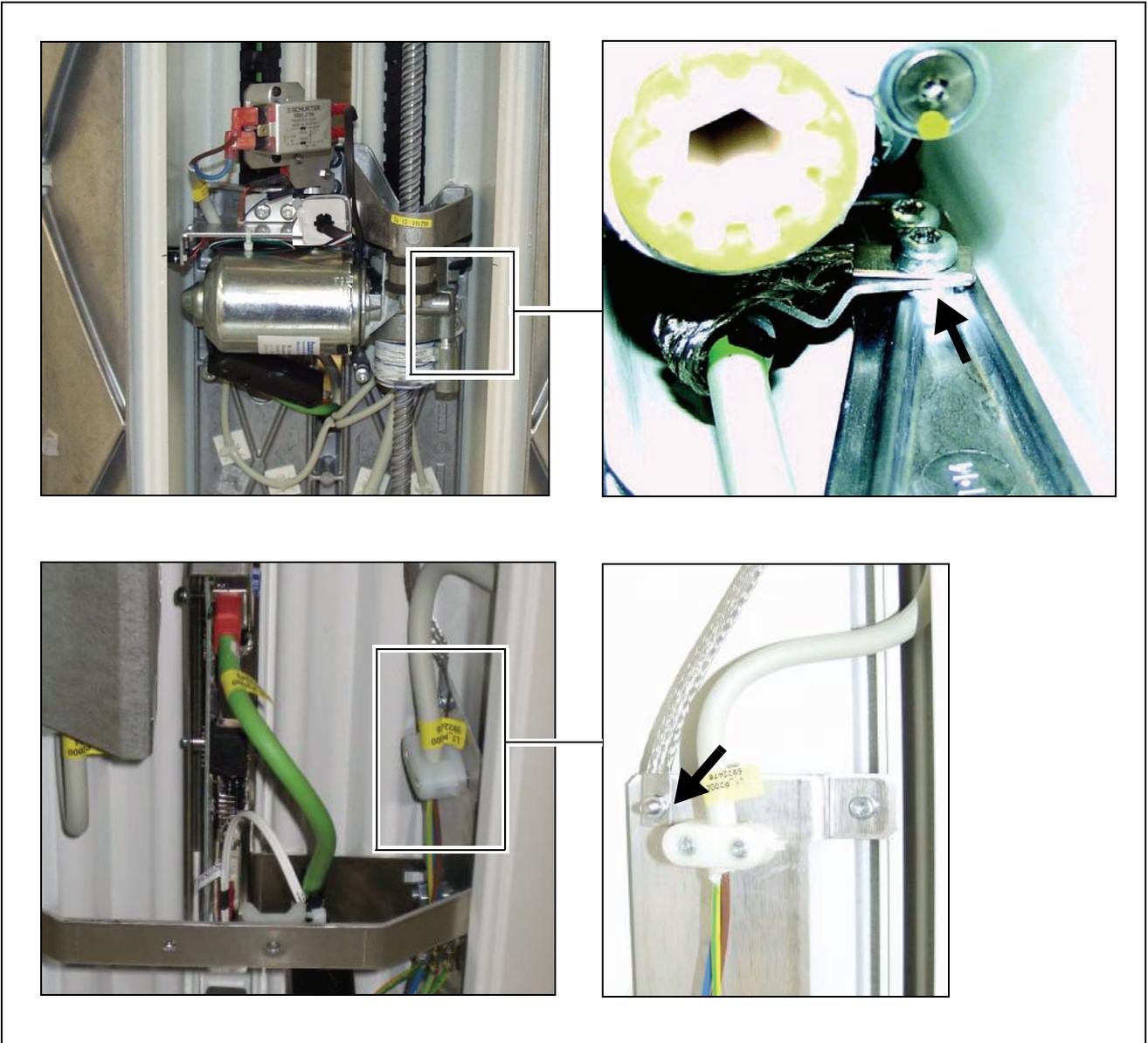
**Check whether the idling rollers are OK** ● Rotate ring **A** by hand and check it for smooth and easy running.

If the ring does not run smoothly and easily:

→ Remove the housing covers and check the idle rollers for dirt and foreign particles. Clean and remove foreign particles if necessary.

### 7.6 Checking the grounding straps

#### Grounding strap in the stand



#### Grounding strap on the image detector



**Check whether the grounding straps have complete and firm contact**

- Perform a visual and “hands-on” inspection of the grounding straps to ensure that they have complete and firm contact at the positions marked.

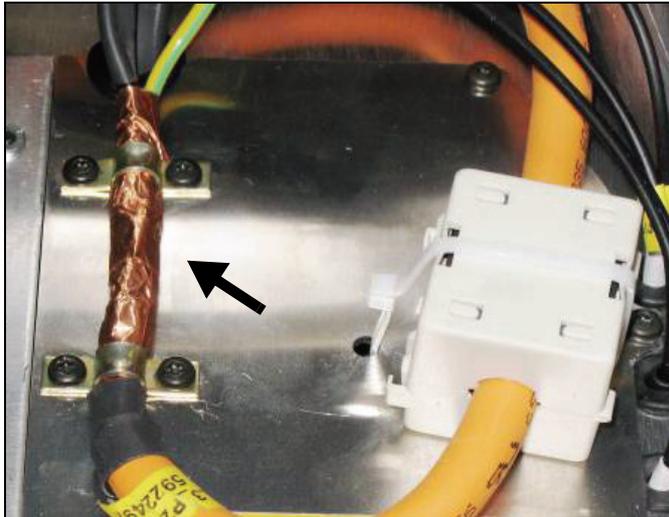
If the grounding straps do not have proper contact:

‡ Fasten them properly

If the grounding straps are damaged:

‡ Replace the grounding straps

7.7 Checking the cable shields



Shield on the tube assembly



Shield on the X-ray detector



Shield on housing DX32

**Check whether the cable shielding is OK**

- Perform a visual and “hands-on” inspection of the cable shields to ensure that they have complete and firm contact at the positions marked.

If the cable shields do not have proper contact:

- ‡ Fasten them properly

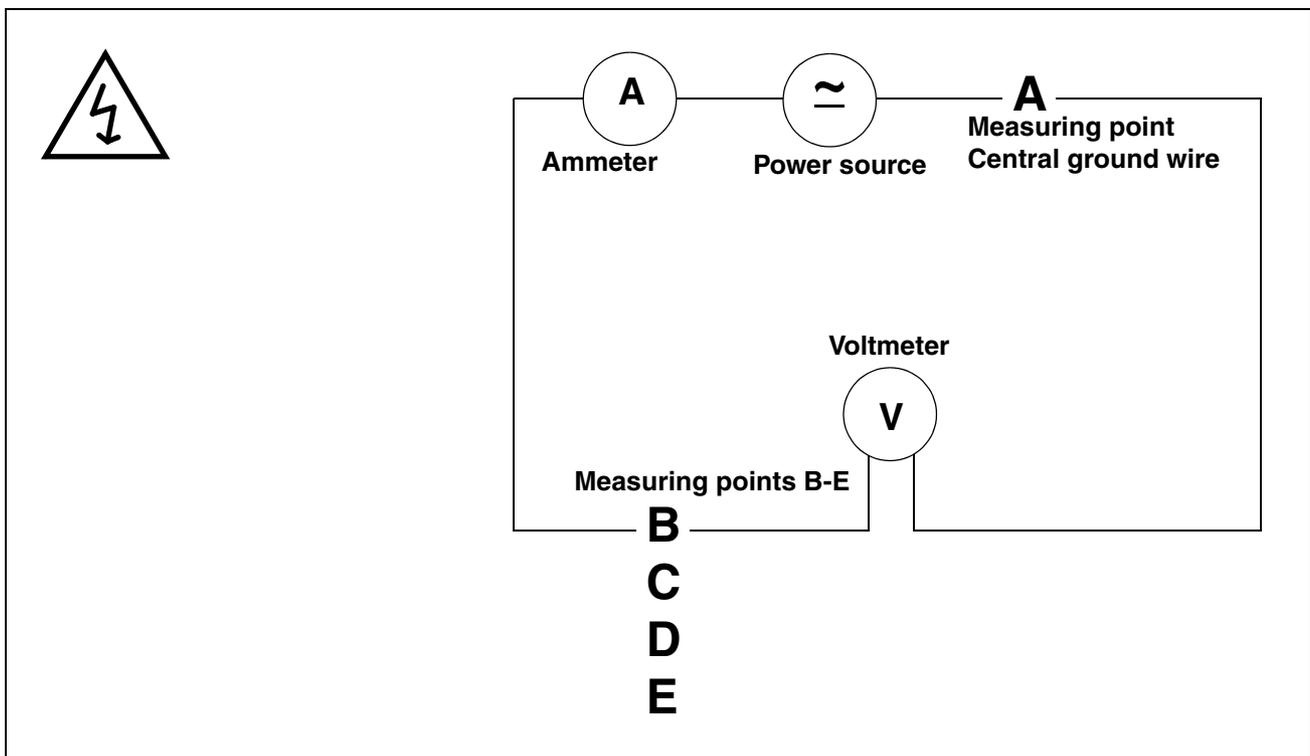
## 7.8 Checking the protective ground wires

### **DANGER**

**PERILOUS SHOCK HAZARD.** It is essential to switch the unit off and to wait at least another 1 minute before beginning the check!

- Switch **OFF** the line voltage at the main switch of the building installation.
- Disconnect the power cable and the second protective ground wire from the building installation.
- Remove the following cover parts (see section 1.11):
  - Profile cover, lower
  - Tube assembly cover, front
  - Tube assembly cover, rear

### Measuring setup for protective ground wire test

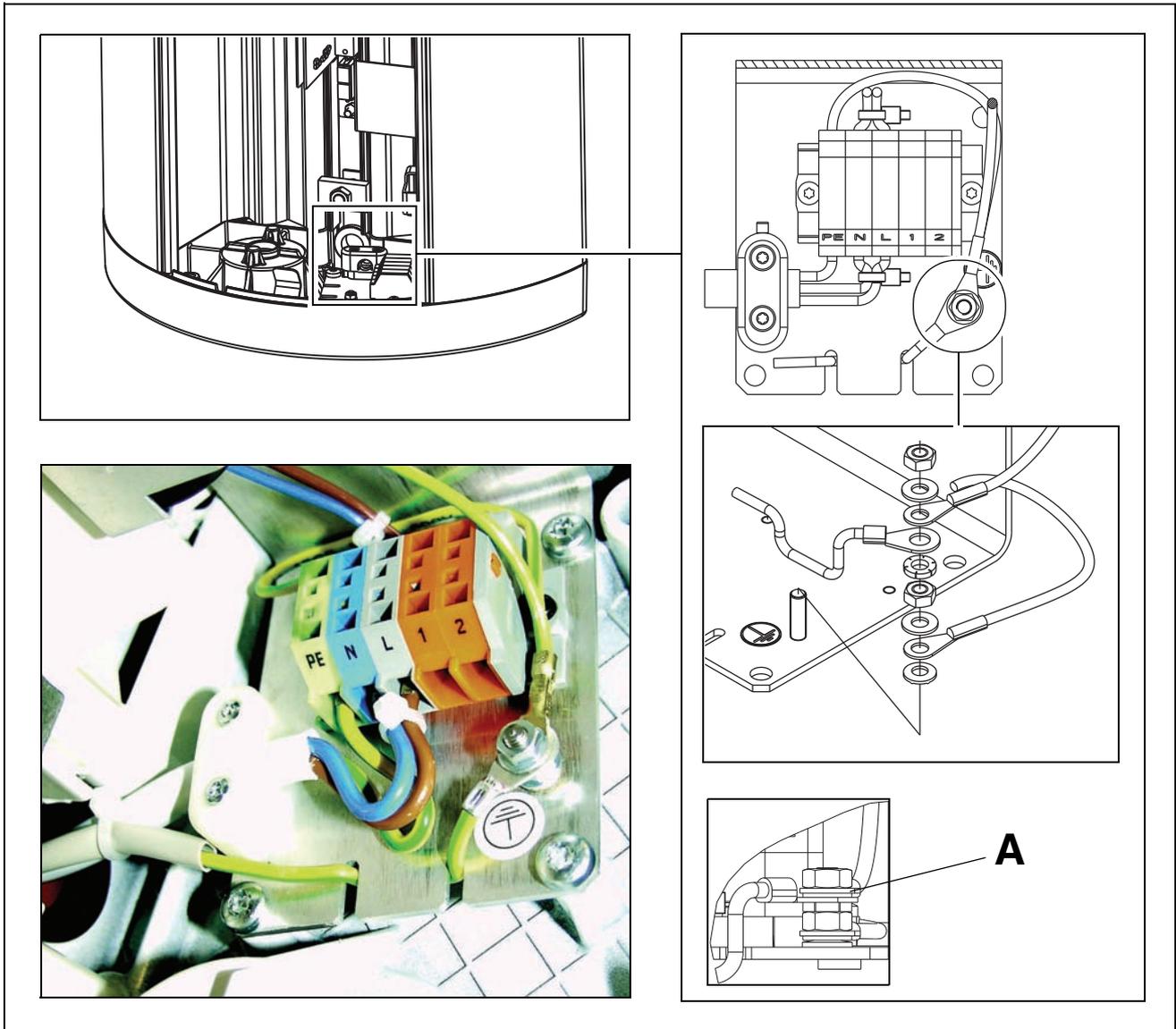


**Check whether the ground wire resistance complies with the specifications**

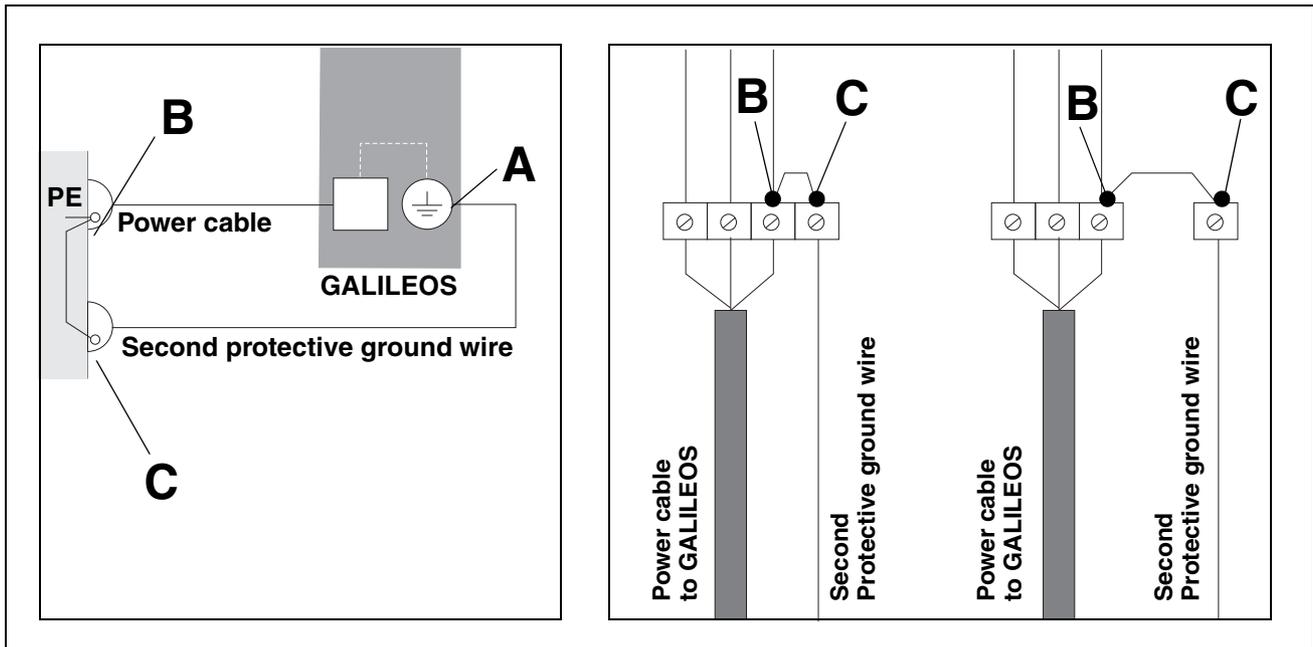
A and B	GNYE wire	0,1Ω
A and C	2. Protective ground wire	0,1Ω
A and D	Housing DX32	0,2Ω
A and E	Tube assembly housing	0,2Ω

- A power source with a current of at least 0.2 A and a no-load voltage of 24 V max. and 4 V min. is required.
- Connect the power source between the measuring points specified in the table for at least 5 s and measure:
  - the voltage drop with the voltmeter
  - the current with the ammeter and
  - calculate the resistance using the formula  $R = U/I$

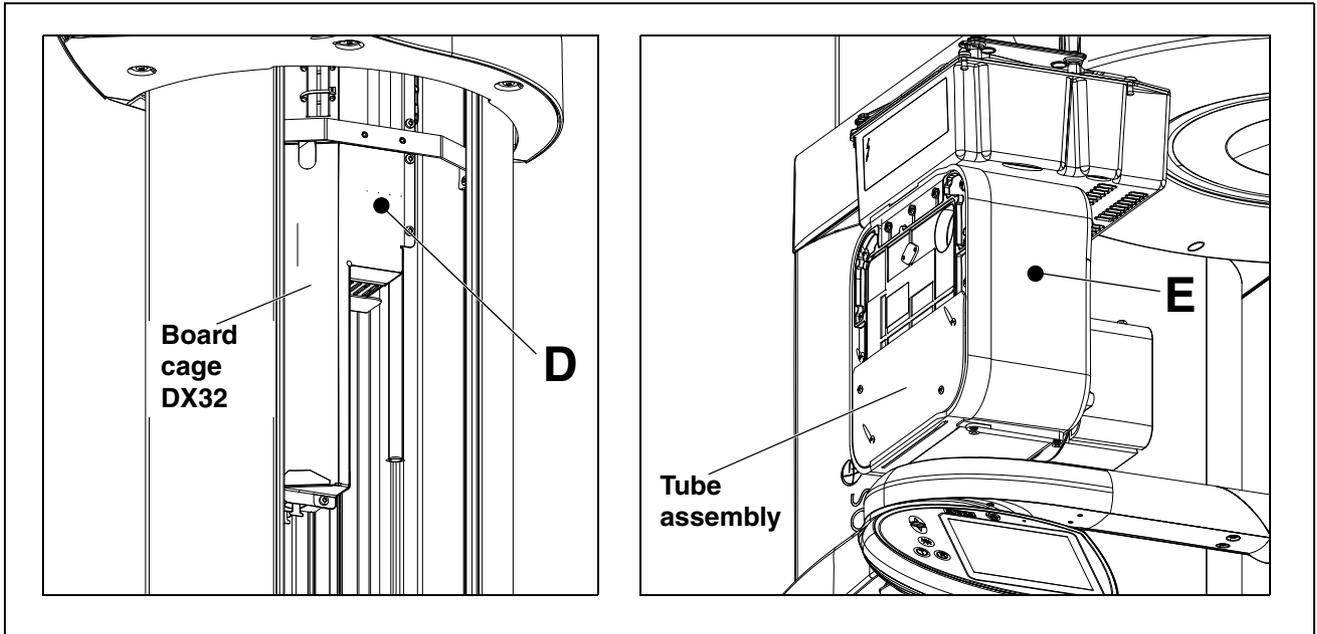
**Measuring point A: Central ground wire**



Measuring points B and C: GNYE power connection and 2nd ground wire



## Measuring points D and E: Board cage DX32 and tube assembly



housing

**i** NOTE

If the resistance exceeds the value specified in the adjacent table, check whether the protective ground wire is fastened according to specifications:

- Check whether the flat washer, toothed lock washer and cable lug are fitted on the protective ground wire in the right order (see page 8-13) and whether the nuts of the ground wire connections are tightened securely.

If the ground wire is not fastened according to specifications, fasten the ground wire properly (see page 8-13).

**Do not connect the power cable and the second ground wire to the building installation yet, but perform a measurement of the device leakage current first (see section 7.9).**

## 7.9 Checking the device leakage current



### **DANGER**

**PERILOUS SHOCK HAZARD. It is essential to switch the unit off and to wait at least another 1 minute before beginning the check!**



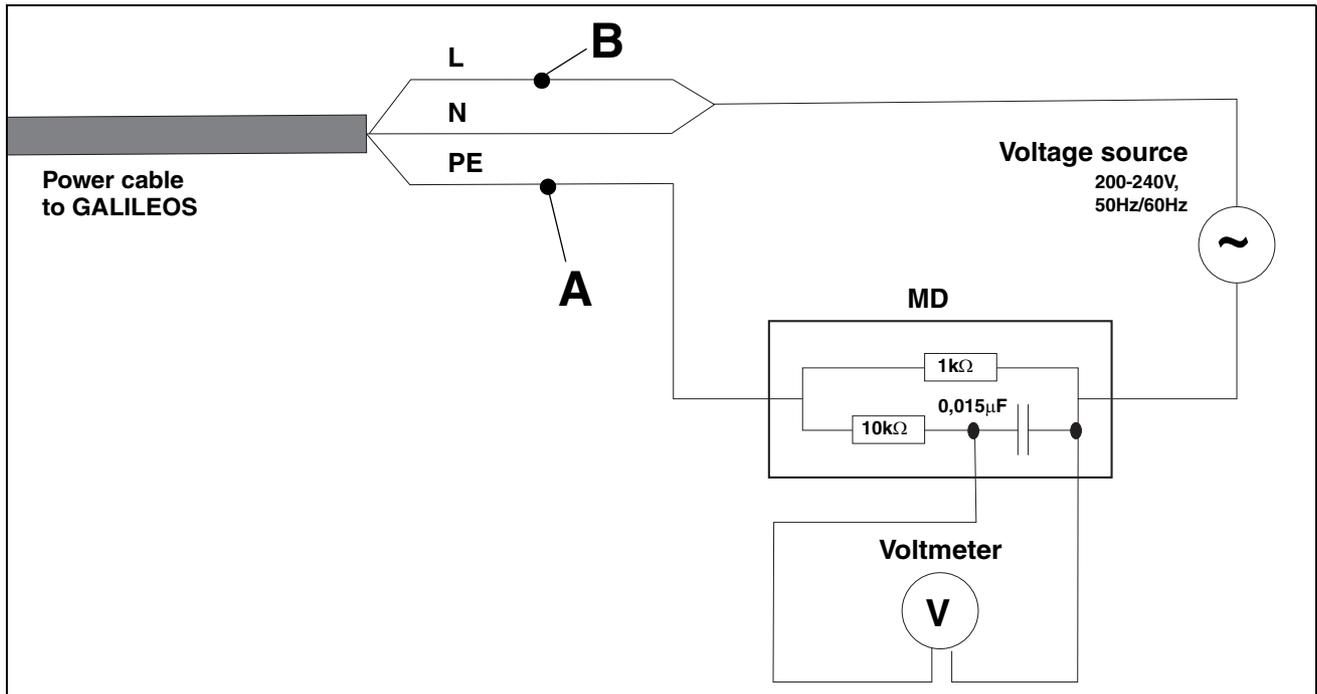
### **NOTE**

*A high-resistance measuring voltage source at line frequency and a measuring circuit compliant with the requirements of IEC 601 are required. Complete test units, e.g. the "Bender tester", fulfill these requirements.*

#### **If you have not done it already...**

- Switch **OFF** the line voltage at the main switch of the building installation.
- Disconnect the power cable and the second protective ground wire from the building installation.
- Remove the following cover parts (see section 1.11):
  - Profile cover (10)

Measuring setup for testing the device leakage current



- Check whether the power switch of the unit is turned **ON**.
- Connect a high-resistance measuring voltage source between the short-circuited power cable (**B**) and ground wire **A**.
- Measure the voltage drop across **MD**.

**i** **NOTE**

*The measured value must not exceed 5 mA.*

If the leakage current is not OK, perform troubleshooting according to section 3.6.

- Reconnect the unit to the building installation (see the GALILEOS Installation Instructions).



---

## Service Manual History D3437

<b>Version 1:</b>	Software version V03.03.01
<b>Version 2:</b>	General revision, supplements and corrections in chapter 4, Calibrating the unit
<b>Version 3:</b>	Software version V03.04.00/01, supplements and corrections in chapters 1 "General information" (software versions and cable L13) and 4 "Calibrating the unit" (mechanical adjustment and dosimetry menu), supplements and corrections in chapter 6 "Repair" (laying cables), supplement of sections 7.6 "Checking the grounding straps" and 7.7 "Checking the cable shields" in chapter 7 "Maintenance"
<b>Version 4:</b>	Software version V03.05.00, supplements and corrections in chapters 1 "General information" (software versions) and 4 "Calibrating the unit" (input of calibration phantom serial numbers), supplements and corrections in chapter 6 "Repair" (rotary knob), smaller corrections and supplements in complete manual.
<b>Version 5:</b>	Supplements and corrections in chapter 1 "General information" (dimensions changed due to shorter wall holder and cable due to discontinuation of board DX41) and chapters 2 and 3 (due to discontinuation of board DX41 and new board DX32). Furthermore, changes in chapter 6 (replacement of cables in the cable tracks and corrections due to design changes).
<b>Version 6:</b>	GALILEOS GAX5 added, software version V03.06.01
<b>Version 7:</b>	Head fixation device updated.

---

We reserve the right to make any alterations which may be required due to technical improvements.

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