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
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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 ±10%.

The internal line impedance must not exceed max. 0.8 Ω.

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.
### 1.2 Operation notes

| **Demo units** | 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). |
| **Software version** | 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). |
| **Wireless phone interference with medical electrical equipment** | To ensure safe operation of medical electrical equipment, the use of mobile wireless phones in practice or hospital environments is prohibited. |
| **Disposal** | 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. |
| **Error messages** | Error messages are displayed on the control panel. |
| **Help messages in case exposure readiness cannot be attained** | Help messages are displayed on the control panel. |
| **If you have to remove covers from the unit.** | Proceed according to section "1.11 Removing the covers". When removing covers, always remember that direct sunlight or bright room lighting can cause system malfunctions due to activated light barriers. Therefore: avoid direct sunlight and bright room lighting above the unit! Reattach the covers. When attaching the covers: be sure to screw the sheet metal cover back on. IMPORTANT: For reasons of electromagnetic compatibility, be sure to fasten all screws. |
| **Measurements** | Always 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. 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). 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). It is essential that you observe the radiation protection regulations applicable in your country prior to radiation release. The test rotations triggered by pressing the T key on the Easypad and then the release button are executed without radiation. |
1.2 Operation notes

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. Scroll through the list until the demo mode is displayed

2. 

3. S2

4. J6

5. **GALILEOS: Easypad touchscreen**

   

6. **GALILEOS: Info screen**

   

7. **GALILEOS GAX5: Multipad**

   

8. **GALILEOS GAX5: Info screen**

   

   Scroll through the list until the demo mode is displayed
1.3 Demo mode – Operation without radiation release

**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.

**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 Demo mode – Operation without radiation release

### 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.

ℹ️ 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

### 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*).

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### 1.5 List of software versions

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## 1.6 Software update

### 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

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**

### To open the SOFTWARE UPDATE menu

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.

### Entering the password

3. Enter the service password.

#### 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 service password).

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.
Tab 1  

1.6 Software update

Selecting an installation source

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.

   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

Selecting the update mode

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)
1.6 Software update

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

**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.

---

**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.*
1.6 Software update

Starting the update

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

**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**

**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.
1.6 Software update

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

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.
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 The most important modules and components

1.8.1 Slide

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

*) not available as individual repair part (see spare parts list)
1.8.2 Stand

- 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: Motor, Designation: M HA, Function: Linear movement of height adjustment

### Component Designation Function

<table>
<thead>
<tr>
<th>Component</th>
<th>Designation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boards</td>
<td>DX32*</td>
<td>Power supply board</td>
</tr>
<tr>
<td></td>
<td>DX41**</td>
<td>Interface board</td>
</tr>
<tr>
<td>Motor</td>
<td>M HA</td>
<td>Linear movement of height adjustment</td>
</tr>
</tbody>
</table>

* 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.

### Component Designation Function

<table>
<thead>
<tr>
<th>Component</th>
<th>Designation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boards</td>
<td>DX42</td>
<td>Display board for remote control</td>
</tr>
</tbody>
</table>
1.9 Cabling overview

1. Cabling overview

- DX1
- DX6
- DX11
- DX89
- DX32
- H1
- Power switch
- Line filter
- Wago terminal
1.9 Cabling overview

Tab 1

[Diagram showing cabling connections and components]
1.9 Cabling overview

GALILEOS cabling up to serial number 3199:
1.9 Cabling overview

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)
1.10 Illustrations of boards

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

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)

NOTE
Board DX71 is shown here only for enhanced clarity. The Multipad may be replaced only as a complete unit!
1.10 Illustrations of boards

Board DX89
1.10.2 Boards in the stand

Board DX32 up to unit serial number 3199

Board DX32 from unit serial number 3201
1.10 Illustrations of boards

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
1.11 Removing the covers
2 Messages
Contents

2.1 Help messages ................................................................. 2 – 4
2.2 System messages .......................................................... 2 – 5
2.3 Status displays ............................................................. 2 – 5
2.4 Error messages ............................................................. 2 – 5
   2.4.1 Ex yy zz ................................................................ 2 – 6
   2.4.2 Ex yy zz ................................................................ 2 – 7
   2.4.3 Ex yy zz ................................................................ 2 – 7
   2.4.4 General handling of error messages ....................... 2 – 7
2.5 List of error messages .................................................... 2 – 8
2.6 List of available service routines ................................. 2 – 40
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

**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:

<table>
<thead>
<tr>
<th>Help code</th>
<th>Description</th>
<th>Actions required</th>
</tr>
</thead>
<tbody>
<tr>
<td>H301</td>
<td>The rotating element on the unit is not set to its starting position.</td>
<td>Press the H key:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit moves to the starting position.</td>
</tr>
<tr>
<td>H320</td>
<td>The exposure parameters have not been acknowledged yet.</td>
<td>Press the R key:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The exposure parameters are confirmed.</td>
</tr>
<tr>
<td>H321</td>
<td>The X-ray room door contact is not detected.</td>
<td>Close the door or check door contact.</td>
</tr>
<tr>
<td>H323</td>
<td>The swivel arm is not in its end position.</td>
<td>Move the swivel arm to its end position (completely open or completely closed).</td>
</tr>
<tr>
<td>H324</td>
<td>The X-ray detector preparation is in progress.</td>
<td>Wait until the X-ray detector is ready. This can take up to 10 minutes.</td>
</tr>
<tr>
<td>H403</td>
<td>SIDEXIS is not ready for exposure.</td>
<td>Make SIDEXIS ready for exposure.</td>
</tr>
<tr>
<td>H420</td>
<td>The image could not be transferred to SIDEXIS.</td>
<td>Retrieve the exposure with NGAdmin plugin (see SIDEXIS Operator’s Manual).</td>
</tr>
</tbody>
</table>

**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

**NOTE**

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

<table>
<thead>
<tr>
<th>System code</th>
<th>Description</th>
<th>Actions required</th>
</tr>
</thead>
<tbody>
<tr>
<td>S100</td>
<td>System is being started.</td>
<td>• Wait, no action required. Message will be deleted automatically.</td>
</tr>
<tr>
<td>S110</td>
<td>Exposure is not possible.</td>
<td>• Quit readiness for exposure, switch unit OFF, wait for 1 minute, switch unit back ON and observe error messages displayed after switch-on.</td>
</tr>
<tr>
<td>S150</td>
<td>Sensor preparation in progress.</td>
<td>• Wait, no action required. The message will be deleted automatically (this may take up to 10 minutes)</td>
</tr>
</tbody>
</table>

2.3 Status displays

<table>
<thead>
<tr>
<th>Status displays</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Easypad (GALILEOS)</strong></td>
<td><strong>Multipad (GALILEOS GAX5)</strong></td>
</tr>
<tr>
<td>Ready for exposure</td>
<td>No special display; kV level and mAs are displayed</td>
</tr>
<tr>
<td>X R A Y</td>
<td>System is ready for exposure.</td>
</tr>
<tr>
<td>X R A Y Active!</td>
<td>Exposure in progress.</td>
</tr>
<tr>
<td>Please wait</td>
<td>Unit waiting for operational readiness.</td>
</tr>
<tr>
<td>Ready for exposure in XX seconds</td>
<td>The cooling time countdown is running.</td>
</tr>
</tbody>
</table>

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:

Ex yy zz

- **Error type**: “Troubleshooting” classification for the module, subsystem or logical function unit
- **Location**: Consecutive number with error identification

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

### 2.4.1 Ex yy zz

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

<table>
<thead>
<tr>
<th>x</th>
<th>Description</th>
<th>Error group</th>
<th>Actions required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System warning; system message</td>
<td>This error group includes all errors that indicate still acceptable tolerance variations, or messages about states which do not directly affect system operation.</td>
<td>• 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.</td>
</tr>
</tbody>
</table>
| 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. | • Acknowledge the error message.  
  • Repeat the procedure step after a certain waiting time.  
    - If the error message reappears, prolong the waiting time.  
    - If the error state persists: Identify the error by proceeding as described in section 2.5. |
| 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. | • Switch unit OFF and ON again. If the error occurs again, identify the error by proceeding as described in section 2.5. |
| 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. | • Acknowledge the error message and make sure that the movements of the unit are not obstructed.  
  • 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. |
| 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. | • Acknowledge the error message.  
  • Repeat the last procedure step or exposure. If the error occurs again: Identify the error by proceeding as described in section 2.5. |
| 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. | • Switch unit OFF and ON again. If the error occurs again, identify the error by proceeding as described in section 2.5.  
  
  **Note:**  
  Operation of the unit may be continued. |
| 7 | Unrecoverable system 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. | • Identify the error by proceeding as described in section 2.5. |
2.4 Error messages

2.4.2 Ex yy zz

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

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

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).
## List of error messages

### 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.

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| E6 06 01   | General error during module initialization | ● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed  
  ● If the error occurs frequently, replace the X-ray tube assembly | 1-12 |
| E6 06 02   | Invalid system data or uninitialized module storage data | ● Perform service routines S005.8  
  ● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed | 5-28  
  1-12 |
| E6 06 03   | Invalid commanding of control data, CAN bus error  
  **Note:**  
  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. | ● Checking the CAN bus  
  ● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed | 3-6  
  1-12 |
| E6 06 04   | Data transfer error or dialog error to module (master side) | ● Checking the CAN bus  
  ● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed | 3-6  
  1-12 |
| E6 06 05   | Data transfer error or dialog error to bootloader of module  
  **Note:**  
  Occurs only in connection with software update | ● Repeat software update  
  ● Checking the CAN bus  
  ● If the error occurs repeatedly or the module is no longer addressable, replace the tube assembly | 1-12  
  3-6  
  6-26 |
| E6 06 06   | Module failed in TTP* (detected on master side)  
  **Note:**  
  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. | ● Checking the CAN bus  
  ● 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.  
  ● If the error occurs repeatedly or the module is no longer addressable, replace the tube assembly | 3-6  
  1-12  
  6-26 |
### Tab 2

#### 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| E6 06 07   | TTP* timeout error (detected on slave side) | • Checking the CAN bus  
• Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).  
  - If 3.3 V are present, replace board DX11  
  - If 3.3 V are not present, replace board DX1  
  - Check cable L6, replace if necessary  
  - Check X-ray tube assembly replace if necessary | 3-6 |
| E6 06 08   | General fault detected locally on module (slave side). CAN controller being reinitialized. | • Checking the CAN bus  
• Check software versions via info screen or service routine S008.2, perform a software update if necessary  
• Please contact the Sirona Customer Service Center (CSO) to find out whether a bugfix by means of a software update is possible and perform such an update if necessary  
• Replace the X-ray tube assembly | 3-6 |
| E7 06 10   | Module is stuck in bootloader stage | • Check board DX6 (note LED states)  
If the board remains in the bootloader stage...  
• Repeat software update  
• Replace the X-ray tube assembly | 3-13 |
| E7 06 12   | Unit is not ready for operation | • Checking the CAN bus  
If this error occurs in combination with other errors  
• Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.  
Repeat procedure and observe causal error messages.  
• Replace the X-ray tube assembly | 3-6 |
| E6 06 13   | Error when writing to EEPROM  
Note: Stored data may be lost | • Acknowledge error and repeat procedure  
If the error occurs again...  
• Replace the X-ray tube assembly | 6-26 |
| E6 06 20   | Overtemperature of single tank/power pack | • Wait until the X-ray tube assembly has cooled down.  
• Check fan function using service routine S005.4; replace fan if necessary  
• Check temperature sensor in single tank using service routine S005.5; replace tube assembly if necessary | 6-26 |
| E2 06 20   | Overtemperature of single tank/power pack |  |  |

---

**Note:**
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

**Note:**
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.

**Note:**
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.

---

**General fault detected locally on module (slave side). CAN controller being reinitialized.**

**Note:**
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.

**Note:**
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.

---

**General fault detected locally on module (slave side). CAN controller being reinitialized.**

**Note:**
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.

---

**Module is stuck in bootloader stage**

**Note:**
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.

---

**Unit is not ready for operation**

**Note:**
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.

---

**Error when writing to EEPROM**

**Note:**
Stored data may be lost

---

**Overtemperature of single tank/power pack**
### 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| **E6 06 21** | Hardware signal of release button not detected | • Check cable L5 (fiber optic cable), replace if necessary  
• Replace board DX1  
• Replace the X-ray tube assembly | 3-19 |
| **E6 06 22** | Broken temperature sensor | • Replace the X-ray tube assembly | 6-26 |
| **E3 06 23** | Hardware signal of release button applied during power-on | • Check cable L5:  
– Switch unit OFF  
– Pull cable L5 off of tube assembly  
– Switch the unit ON  
– Perform optical check of L5:  
  - If light is visible: Replace board DX1  
  - If no light is visible, replace the tube assembly | 6-42 6-26 |
| **E5 06 30** | Total radiation time exceeded | If a CAN bus error had been reported before...  
• Checking the CAN bus  
• If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed | 3-6 1-12 |
| **E5 06 31** | Partial radiation time exceeded | If a CAN bus error had been reported before...  
• Checking the CAN bus  
• If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed | 3-6 1-12 |
| **E5 06 32** | Minimum preheating time not observed | If a CAN bus error had been reported before...  
• Checking the CAN bus  
• If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed | 3-6 1-12 |
| **E1 06 40** | Tolerance exceeded: Preheating (VH) - nom. | • Perform service routines S005.8  
• Replace the X-ray tube assembly | 5-28 |
| **E1 06 41** | Tolerance exceeded: kV - nom. | • Perform service routines S005.8  
• Replace the X-ray tube assembly | 5-28 6-30 |
| **E1 06 42** | Tolerance exceeded: mA - nom. | • Perform service routines S005.8  
• Replace the X-ray tube assembly | 5-28 |
| **E1 06 43** | Tolerance exceeded: Preheating (VH) - act. | • Perform service routines S005.8  
• Replace the X-ray tube assembly | 5-28 |
| **E1 06 44** | Tolerance exceeded: kV - act. | • Perform service routines S005.8  
• Replace the X-ray tube assembly | 5-28 |
| **E1 06 45** | Tolerance exceeded: mA - act. | • Perform service routines S005.8  
• Replace the X-ray tube assembly | 5-28 |

---

Tab 2
## 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 06 50</td>
<td>Undervoltage in intermediate circuit (400 V)</td>
<td>• Check fuse F201 on board DX6 (see wiring diagrams), replace if necessary&lt;br&gt;• Check cable L3 (tube assembly), replace if necessary&lt;br&gt;• Check electronic fuse on board DX32:&lt;br&gt;  – Switch unit OFF&lt;br&gt;  – Wait for at least 7 minutes (due to electronic fuse)&lt;br&gt;  – Switch unit back ON&lt;br&gt;  – Check functioning&lt;br&gt;  If the error occurs again...&lt;br&gt;  • Check board DX32, replace if necessary</td>
<td>3-19</td>
</tr>
<tr>
<td>E6 06 51</td>
<td>VHmax</td>
<td>• Perform service routines S005.8&lt;br&gt;• Replace the X-ray tube assembly</td>
<td>5-28</td>
</tr>
<tr>
<td>E6 06 52</td>
<td>MAmax</td>
<td>• Perform service routines S005.8&lt;br&gt;• Replace the X-ray tube assembly</td>
<td>5-28</td>
</tr>
<tr>
<td>E6 06 53</td>
<td>KVmax</td>
<td>• Perform service routines S005.8&lt;br&gt;• Replace the X-ray tube assembly</td>
<td>5-28</td>
</tr>
<tr>
<td>E6 06 54</td>
<td>Basic heating pulses not applied</td>
<td>• Replace the X-ray tube assembly</td>
<td>6-26</td>
</tr>
<tr>
<td>E6 06 55</td>
<td>Anode voltage too low</td>
<td>• Replace the X-ray tube assembly</td>
<td>6-26</td>
</tr>
<tr>
<td>E6 06 56</td>
<td>Error during auto-compensation</td>
<td>• 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.&lt;br&gt;• Let the tube assembly cool down for approx. 30 min and repeat this procedure.&lt;br&gt;  If the error occurs again...&lt;br&gt;  • Replace the X-ray tube assembly</td>
<td>1-12</td>
</tr>
<tr>
<td>E6 06 60</td>
<td>TDI** signal from board DX11 to board DX6 is disrupted</td>
<td>• Replace cable LT5&lt;br&gt;• Replace DX1&lt;br&gt;• Replace the X-ray tube assembly</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 06 65</td>
<td>Tube current or tube voltage is too high in standby mode</td>
<td>• Replace the X-ray tube assembly</td>
<td>6-26</td>
</tr>
<tr>
<td>E6 06 66</td>
<td>Impermissible tube type</td>
<td>• Check the tube type of the X-ray tube assembly via&lt;br&gt;  - the extended detail query or by using&lt;br&gt;  - service routine S005.1&lt;br&gt;  replace tube assembly if necessary</td>
<td>5-21</td>
</tr>
</tbody>
</table>
### 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| E6 06 67   | Light guide input TDI** is active when switching the unit on | ● Check TDI** signal:  
- Switch unit OFF  
- Disconnect cable L15 at board DX11  
- Switch the unit ON  
- Perform visual check at socket J5:  
  - If light is visible: Replace board DX11  
  - If no light is visible, replace the tube assembly | 6-42, 6-26 |
| E6 06 68   | Tube assembly output after exposure does not match the expected value | ● Replace the X-ray tube assembly | 6-26 |

**Board DX6**

*) **TTP = Time Trigger Protocol**  
**) **TDI = Signal to start synchronized readout sequence and to prepare the next exposure**
# 2.5 List of error messages

## Location 07: Easypad/Board DX7

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 07 01</td>
<td>General error during module initialization</td>
<td>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If the error occurs again...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace Easypad</td>
<td>3-13</td>
</tr>
<tr>
<td>E6 07 02</td>
<td>Invalid system data or uninitialized module storage data</td>
<td>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Acknowledge error and repeat procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If the error occurs again...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace Easypad</td>
<td>6-19</td>
</tr>
<tr>
<td>E6 07 03</td>
<td>Invalid commanding or control data</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Note: 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.</td>
<td>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</td>
<td>1-12</td>
</tr>
<tr>
<td>E6 07 04</td>
<td>Data transfer error or dialog error to module (master side)</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</td>
<td>1-12</td>
</tr>
<tr>
<td>E6 07 05</td>
<td>Data transfer error or dialog error to bootloader of module</td>
<td>● Repeat software update</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td>Note: Occurs only in connection with software update</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace Easypad</td>
<td>6-19</td>
</tr>
<tr>
<td>E6 07 06</td>
<td>Module failed in TTP* (detected on master side)</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Note: 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.</td>
<td>● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace Easypad</td>
<td>6-19</td>
</tr>
</tbody>
</table>
## 2.5 List of error messages

<table>
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<tr>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>E6 07 07</td>
<td>TTP* timeout error (detected on slave side)</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check power supply of board DX11; measuring point 3.3 V on board DX1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- If 3.3 V are present, replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- If 3.3 V are not present, replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td>Note: The module was temporarily not addressed by the master:</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Undervoltage on the master side</td>
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<tr>
<td></td>
<td>- Procedure error in the software</td>
<td></td>
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<tr>
<td></td>
<td>- Master (DX11) receives no return commanding from the module</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Note: This error may also occur in connection with other causal error</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>messages. Please also observe the causal error message! It appears only</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>after you acknowledge the first error message.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E6 07 08</td>
<td>General fault detected locally on module (slave side). CAN controller</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>being reinitialized.</td>
<td>• Check software versions via info screen or service routine S008.2,</td>
<td>5-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>perform a software update if necessary</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace Easypad</td>
<td>6-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the error is a software error known to the SIRONA Customer Service Center,</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a software update (bugfix) must be performed</td>
<td></td>
</tr>
<tr>
<td>E7 07 10</td>
<td>Module is stuck in bootloader stage</td>
<td>• Check the Easypad</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Note: The error can be displayed only on the remote control (DX42).</td>
<td>If the board remains in the bootloader stage...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repeat software update</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace Easypad</td>
<td>6-19</td>
</tr>
<tr>
<td>E7 07 12</td>
<td>Unit is not ready for operation</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Note: The error can be displayed only on the remote control (DX42).</td>
<td>This error is a sequential fault.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Unit restart:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch the unit OFF. Wait 1 minute.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch unit ON.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repeat procedure and observe causal error messages.</td>
<td></td>
</tr>
<tr>
<td>E6 07 20</td>
<td>Contact to DX11 interrupted during operation.</td>
<td>• Note error message on remote control (DX42) and check log memory (via extended</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>details)</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Checking the CAN bus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check cable L9, replace if necessary</td>
<td></td>
</tr>
</tbody>
</table>
### 2.5 List of error messages

<table>
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</thead>
<tbody>
<tr>
<td>E7 07 21</td>
<td>No CAN bus connection. DX11 does not start. <strong>Note:</strong> Occurs after power-on in the start screen.</td>
<td>● Start the detail query via Sixabcon  If DX11 responds...  ● Check signal path to DX7, repair or replace cable/connector if necessary  ● Replace DX1  If DX11 does not respond...  ● Replace DX11</td>
<td>6-42</td>
</tr>
<tr>
<td>E3 07 30</td>
<td>Height adjustment keys actuated during power-on</td>
<td>● Unit restart:  Switch the unit OFF. Wait for 1 minute.  Switch unit ON, making sure that the Easypad is not actuated during boot-up.</td>
<td>6-19</td>
</tr>
<tr>
<td>E3 07 33</td>
<td>Light localizer key actuated during power-on</td>
<td></td>
<td>5-60</td>
</tr>
<tr>
<td>E3 07 34</td>
<td>Test key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 07 35</td>
<td>Return key actuated during power-on</td>
<td>● Replace Easypad</td>
<td></td>
</tr>
<tr>
<td>E3 07 36</td>
<td>Touchscreen actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E6 07 40</td>
<td>No valid language set found</td>
<td>● Check selected language set using service routine S017.5, correct if necessary</td>
<td>1-12</td>
</tr>
</tbody>
</table>

**NOTE**

Check whether selected language set is already installed, perform software update if necessary.

● If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed

*) TTP = Time Trigger Protocol
### 2.5 List of error messages

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</tr>
</thead>
<tbody>
<tr>
<td>E6 71 01</td>
<td>General error during module initialization</td>
<td>• 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. If the error occurs again...</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check board DX71 or replace Multipad</td>
<td></td>
</tr>
<tr>
<td>E6 71 02</td>
<td>Invalid system data or uninitialized module storage data</td>
<td>• 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. If the error occurs again...</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Acknowledge error and repeat procedure</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 71 03</td>
<td>Invalid commanding or control data</td>
<td>• Checking the CAN bus</td>
<td>6-19</td>
</tr>
<tr>
<td></td>
<td>Note: 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.</td>
<td>• 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.</td>
<td></td>
</tr>
<tr>
<td>E6 71 04</td>
<td>Data transfer error or dialog error to module (master side)</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
<td>6-12</td>
</tr>
<tr>
<td>E6 71 05</td>
<td>Data transfer error or dialog error to bootloader of module</td>
<td>• Repeat software update</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td>Note: Occurs only in connection with software update</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check board DX71 or replace Multipad</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 71 06</td>
<td>Module failed in TTP* (detected on master side)</td>
<td>• Checking the CAN bus</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
<td>1-12</td>
</tr>
<tr>
<td>Error code</td>
<td>Description</td>
<td>Actions required</td>
<td>see page</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>E6 71 07</td>
<td>TTP* timeout error (detected on slave side)</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If 3.3 V are present, replace board DX11</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If 3.3 V are not present, replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 71 08</td>
<td>General fault detected locally on module (slave side). CAN controller being reinitialized.</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check software versions via info screen or service routine S008.2, perform a software update if necessary</td>
<td>5-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check board DX71 or replace Multipad</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● 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.</td>
<td>3-13</td>
</tr>
<tr>
<td>E7 71 10</td>
<td>Module is stuck in bootloader stage</td>
<td>● Check board DX71</td>
<td>3-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the board remains in the bootloader stage...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Repeat software update</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check board DX71 or replace Multipad</td>
<td>6-42</td>
</tr>
<tr>
<td>E7 71 12</td>
<td>Unit is not ready for operation</td>
<td>● Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This error is a sequential fault.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Unit restart:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch the unit OFF. Wait 1 minute. Switch unit ON.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Repeat procedure and observe causal error messages.</td>
<td></td>
</tr>
<tr>
<td>E6 71 20</td>
<td>Contact to DX11 interrupted during operation.</td>
<td>● Note error message on remote control (DX42) and check log memory (via extended details)</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Checking the CAN bus</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check cable L9, replace if necessary</td>
<td>6-66</td>
</tr>
</tbody>
</table>
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<tbody>
<tr>
<td>E7 71 21</td>
<td>No CAN bus connection. DX11 does not start.</td>
<td>• Start the detail query via Sixabcon</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check signal path to DX71, repair or replace cable/connector if necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Occurs after power-on in the start screen.</td>
<td>• Replace DX1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If DX11 does not respond...</td>
<td></td>
</tr>
<tr>
<td>E3 71 30</td>
<td>Height adjustment keys actuated during power-on</td>
<td>• Unit restart: Switch the unit OFF. Wait for 1 minute.</td>
<td>6-42</td>
</tr>
<tr>
<td>E3 71 33</td>
<td>Light localizer key actuated during power-on</td>
<td>• Switch unit ON, making sure that the Multipad is not actuated during boot-up.</td>
<td></td>
</tr>
<tr>
<td>E3 71 34</td>
<td>Test key actuated during power-on</td>
<td>• Replace board DX71 or Multipad</td>
<td>6-42</td>
</tr>
<tr>
<td>E3 71 35</td>
<td>Return key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 71 36</td>
<td>Service key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 71 37</td>
<td>Memory key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 71 38</td>
<td>Program selection key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 71 39</td>
<td>Radiation time key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 71 40</td>
<td>kV/mA key actuated during power-on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3 71 41</td>
<td>Patient symbol key actuated during power-on</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*) TTP = Time Trigger Protocol
## Location 10: System hardware

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| E7 10 01   | EEPROM cannot be written. | • Acknowledge error and repeat procedure  
If the error occurs again...  
• Replace board DX11 | 6-42 |
| E7 10 02   | FPGA* of DX1 is not addressable. | • Replace board DX1 | 6-42 |
| E1 10 03   | The flash file system must be formatted.  
**Note:** Occurs after replacement of board DX11. | • Acknowledge error | | |
| E1 10 04   | Flash file system formatting in progress. | • Wait until the message automatically disappears (approx. 2 - 3 min.) | | |
| E1 10 05   | Flash file system is not ready for operation. | • Execute service routine S009.4 and format flash file system. | 5-39 |
| E7 10 06   | Incompatible DX1-FPGA* version for current operating mode | • Check the hardware version of DX1 for compatibility  
replace board DX1 if necessary | 6-42 |
| E1 10 07   | The unit is not ready for operation.  
**Note:** Following longer periods of disuse (>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. | • Acknowledge the error and wait until the "Sensor being prepared" message goes out.  
If this error is displayed without attainment of exposure readiness...  
• check cables:  
  – Cable L13 between board DX11 and board DX89  
  – Cable L29 between the camera head and board DX89 (in the X-ray detector)  
  – Cable L27 (in the X-ray detector)  
  and replace any defective cables  
• Replace board DX89  
• Replace board DX1  
• Replace X-ray detector  
• Replace board DX11 | 6-19 6-42 6-42 6-42 6-42
### 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 10 20</td>
<td>Board DX11 does not have valid data via the X-ray detector.</td>
<td>• Perform service routine S009.7 (copy data from DX89 to board DX11)</td>
<td>5-44</td>
</tr>
<tr>
<td>E1 10 21</td>
<td>Board DX11 does not have valid data via board DX89.</td>
<td>• Perform service routine S009.7 (copy data from DX89 to board DX11)</td>
<td>5-44</td>
</tr>
<tr>
<td>E1 10 22</td>
<td>X-ray detector was replaced and must be registered in the system.</td>
<td>• Perform service routine S009.7 (copy data from DX89 to board DX11)</td>
<td>5-44</td>
</tr>
<tr>
<td>E1 10 23</td>
<td>Board DX89 does not have valid data via the X-ray detector.</td>
<td>• Perform a system calibration</td>
<td></td>
</tr>
<tr>
<td>E1 10 24</td>
<td>The X-ray detector has been replaced. Board DX89 does not have valid data via the X-ray detector.</td>
<td>• Perform service routine S009.7 (copy data from DX89 to board DX89)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace X-ray detector</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** This error message should not occur in the application.

| E1 10 25   | Board DX89 was replaced and must be registered in the system.                | • Perform service routine S009.7 (copy data from DX89 to board DX11)               | 6-31     |
| E1 10 26   | The X-ray detector has not been initialized. Board DX89 does not have valid data via the X-ray detector. | • Replace X-ray detector                                                      | 6-31     |

**i NOTE**

Please report this event to the Customer Service Center to help us improve the product.

| E1 10 27   | Board DX89 was replaced and must be registered in the system.                | • Perform service routine S009.7 (copy data from DX89 to board DX11)               | 6-31     |
| E1 10 28   | The X-ray detector has not been initialized. Board DX89 does not have valid data via the X-ray detector. | • Replace X-ray detector                                                      | 6-31     |

**i NOTE**

Please report this event to the Customer Service Center to help us improve the product.

*) FPGA = Field Programmable Gate Array
## 2.5 List of error messages

### Location 11: Power PC, board DX11

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<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
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</tr>
</thead>
</table>
| E6 11 01   | Program sequence error                     | - If the error is a software error known to the SIRONA Customer Service Center, a software update (bugfix) must be performed  
- Acknowledge error and repeat procedure  
If the error occurs again...  
- Perform a system calibration  
- Replace board DX11 | 1-12 |
| E6 11 02   | Watchdog error                             | - Acknowledge error and repeat procedure  
If the error occurs again...  
- Replace board DX11 | 6-42 |
| E6 11 03   | Operating system/resource error            | - Acknowledge error and repeat procedure  
If the error occurs again...  
- Replace board DX11 | 6-42 |
| E7 11 04   | Implausible data in EEPROM                 | - Check the device configuration via service routines S017 and S018 and reconfigure if necessary  
If the system configuration is OK...  
- perform the individual system settings again  
(e.g. programming of the patient symbol keys; entry position etc.) (see operating instructions) | 5-53, 5-73 |
| E6 11 05   | RAM allocation failed                      | - Replace board DX11 | 6-42 |
| E6 11 07   | Unknown or invalid definition of system class  
**Note:** Occurs during first power-on after replacement of board DX6 or DX11. | - Perform actions required according to Chapter "Measures following replacement of boards". | 6-42 |
| E7 11 08   | The attached control panel does not match the system. | - Replacing the control panel | 6-19 |
| E6 11 09   | Internal error in program flow of board DX11 | - Acknowledge error  
If the error occurs again...  
- Perform a software update (bug fix) | 1-12 |
| E7 11 11   | Wrong device configuration                 | - Check the device configuration via service routine S017.2 and reconfigure if necessary | 5-54 |
| E7 11 12   | Internal error in data management of board DX11 | If the error occurs after a module has been replaced...  
- Query the "Extended Details" via SIXABCON and coordinate all further action with the SIRONA Customer Service Center.  
If no module has been replaced...  
- switch the unit off, wait for 1 minute and then switch it back on.  
- Check software versions via info screen or service routine S008.2, perform a software update if necessary  
If the error occurs again...  
- Perform a software update (bug fix) | 1-12 |
## 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E7 11 14</td>
<td>The remote control does not match the system.</td>
<td>● Replace remote control</td>
<td></td>
</tr>
<tr>
<td>E7 11 15</td>
<td>An X-ray tube assembly which does not match the unit was installed.</td>
<td>● Install a matching X-ray tube assembly.</td>
<td>6-26</td>
</tr>
</tbody>
</table>
| E1 11 19   | No image data available | ● Check TDI** signal/cable L13  
Replace cable L13 if necessary  
● Replace board DX89  
● Replace board DX1 | 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 | ● Perform a system calibration  
If the error occurs again and no modules were replaced ...  
● Replace board DX11  
If the error occurs again and modules were replaced ...  
● This error is a sequential fault: watch for additional causal error messages and take the respective action. | 4-3  
5-35 |
| E2 11 22   | The default iris table is write-protected | ● Check the compatibility of the SIDEXIS and system software,  
perform a software update if necessary | 1-10  
1-12 |
| E1 11 23   | No matching iris diaphragm setting is available for the current program parameters | ● Check the compatibility of the SIDEXIS and system software,  
perform a software update if necessary | 1-10  
1-12 |
| E1 11 88   | The unit is set to the demo mode Note: Occurs when the unit is switched on. | If the user mode is expressly required...  
● Switch the demo mode OFF | 1-6     |

** WARNING **

* Radiation can be released after the demo mode is switched off! *

**) TDI = Signal to start synchronized readout sequence and to prepare the next exposure
### Location 12: CAN bus

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 12 01</td>
<td>CAN controller init error on DX1</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td>E6 12 02</td>
<td>CAN malfunction (cannot be assigned to module)</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
</tbody>
</table>

### Location 13: Stand, peripherals

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E4 13 04</td>
<td>Error when positioning actuator 1</td>
<td>• Restart the unit.</td>
<td>6-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the swivel arm connection on board DX1.</td>
<td></td>
</tr>
<tr>
<td>E4 13 21</td>
<td>Ring motor has not reached home position</td>
<td>• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</td>
<td>6-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check light barrier V1_3 (X804), replace if necessary</td>
<td>3-17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td>E4 13 22</td>
<td>Ring motor has not left home position</td>
<td>• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</td>
<td>6-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check light barrier V1_3 (X804), replace if necessary</td>
<td>3-17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td>E5 13 23</td>
<td>Malfunction of ring motor during operation</td>
<td>• Acknowledge error</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX1</td>
<td></td>
</tr>
<tr>
<td>E4 13 24</td>
<td>Ring motor; position counter error</td>
<td>• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary</td>
<td>6-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check light barrier V1_3 (X804), replace if necessary</td>
<td>3-17</td>
</tr>
<tr>
<td>E6 13 27</td>
<td>Ring motor is not ready for operation</td>
<td>This error is a sequential fault.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Unit restart:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Switch the unit OFF. Wait 1 minute. Switch unit ON.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repeat procedure and observe causal error messages.</td>
<td></td>
</tr>
</tbody>
</table>
## 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
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</tr>
</thead>
</table>
| E6 13 28   | Error when activating ring motor | ● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.  
              ● Repeat procedure and observe causal error messages  
              ● 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. | 1-12 |
| E4 13 29   | Inaccurate start position at the start of exposure | ● Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary  
              ● Check light barrier V1_3 (X804), replace if necessary | 6-15  
|            |             |                  | 3-17    |
| E4 13 30   | No height adjustment motor pulses | ● Check cable L16 (X402), replace if necessary  
              ● Check board DX1, replace if necessary  
              ● Check filter between HA motor and L16 (acc. to circuit diagram on filter) (current and voltage). replace if necessary  
              ● Check height adjustment motor incl. pulse generator, replace if necessary  
              ● Replace board DX1 | 3-19  
|            |             |                  | 3-13  
|            |             |                  | 6-42    |
| E5 13 31   | Unit has traveled to upper limit switch | ● Check max. travel height with service routine S018.2, adjust if necessary  
              ● Run HA motor in the other direction with the UP/DOWN keys and reference (value approx. 1500)  
              ● Check light barriers V1_4 replace if necessary  
              ● Check HA motor for overtravel, replace DX1 if necessary  
              If the error occurs again...  
              ● check the limit switch or wiring, correct or replace the limit switch if necessary | 5-73  
|            |             |                  | 3-17  
|            |             |                  | 6-42    |
### 2.5 List of error messages

<table>
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</table>
| **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)  
● Check light barriers V1_4, replace if necessary  
● Check HA motor for overtravel, replace DX1 if necessary  
If the error occurs again...  
● check the limit switch or wiring, correct or replace the limit switch if necessary | 5-73 |
| **E5 13 33** | Height adjustment motor position counter too small for current position | ● Run HA motor in the other direction with the UP/DOWN keys and reference (value approx. 1500)  
● Check max. travel height using service routine S018.2, adjust if necessary  
● Check light barriers V1_4, replace if necessary | 5-73 |
| **E5 13 34** | Height adjustment motor position counter too large for current position | ● 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 |
| **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  
● 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  
● 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. |
<table>
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<th>Error code</th>
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</thead>
<tbody>
<tr>
<td>E6 13 39</td>
<td>Error when activating height adjustment motor</td>
<td>● Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON and check functioning.</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● 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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td>E3 13 40</td>
<td>Release signal applied during power-on.</td>
<td>● 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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the error occurs again...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check the X-ray signal path</td>
<td>3-20, 3-27</td>
</tr>
<tr>
<td>E3 13 41</td>
<td>Release signal not applied on DX1</td>
<td>● Check signal path for interruption according to wiring diagrams, replace component if necessary</td>
<td>5-62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Deactivate remote control with service routine S017.6; connect release button directly to DX41 (instead of cable L17) and check for proper functioning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check release button</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the release button is functioning...</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check cable L17, replace if necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the release button is not functioning...</td>
<td>3-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check board DX41, replace if necessary</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 13 42</td>
<td>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.</td>
<td>● Check the X-ray signal path</td>
<td>3-20, 3-27</td>
</tr>
<tr>
<td>E5 13 43</td>
<td>The door was opened during the exposure.</td>
<td>● Check the X-ray signal path</td>
<td>3-20, 3-27</td>
</tr>
<tr>
<td>E5 13 44</td>
<td>Swivel arm was opened during the exposure</td>
<td>● Close swivel arm</td>
<td>3-17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check light barrier V1_2, replace light barrier if necessary</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check cable L29, replace if necessary</td>
<td></td>
</tr>
</tbody>
</table>
### List of error messages

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<tr>
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<th>Actions required</th>
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</tr>
</thead>
</table>
| **E5 13 73** | Malfunction of height adjustment during operation | • Acknowledge error  
• Unit restart:  
  Switch the unit OFF. Wait 1 minute.  
  Switch unit ON and check functioning.  
• 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.  
If the error occurs repeatedly...  
• Replace board DX1 | 1-12 |
| **E5 13 83** | Error while generating pulse for sensor | • Unit restart:  
  Switch the unit OFF. Wait 1 minute.  
  Switch unit ON and check functioning.  
• 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.  
If the error occurs repeatedly...  
• Replace board DX1 | 1-12 |
| **E6 13 87** | Error when activating pulse generation | • Unit restart:  
  Switch the unit OFF. Wait 1 minute.  
  Switch unit ON and check functioning.  
• 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. | 1-12 |

*) FPGA = Field Programmable Gate Array

### Location 14: Digital extension, SIDEXIS

<table>
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<th>Error code</th>
<th>Description</th>
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</tr>
</thead>
</table>
| **E5 14 01** | Cancellation caused by SIDEXIS | • Check the compatibility of the software versions of SIDEXIS and the unit (S008.2) and perform a software update if necessary.  
• Check and, if necessary, replace network components (PC network card, Cat5 cable, hub/switch/router, media converter, L25/26)  
• Perform network diagnosis in coordination with the SIRONA Customer Service Center | 5-35 |
| **E7 14 02** | Interface version not compatible with SIDEXIS. | • Check software versions of unit (S008.2) and SIDEXIS XG and perform software update if necessary | 5-35 |
| **E6 14 03** | Inappropriate or incorrect data input from SIDEXIS | • Send Xab.ini to the SIRONA Customer Service Center (CSC) (check the binning setting) and coordinate with CSC. | 1-12 |
## 2.5 List of error messages

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<thead>
<tr>
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</tr>
</thead>
</table>
| E5 14 04   | The network connection was interrupted. **Note:** This error often occurs when SIDEXIS is selected and the unit is not yet ready for selection. | • Repeat procedure  
• If the error occurs again...  
• Switch unit OFF and ON again and repeat the process.  
• Check the compatibility of the software versions of SIDEXIS and the unit and perform a software update if necessary.  
• Check and, if necessary, replace network components (PC network card, Cat5 cable, hub/switch/router, media converter, L25/26).  
• Perform network diagnosis in coordination with the SIRONA Customer Service Center. |         |
| E6 14 05   | Service of DHCP server is not available. | • Have network configuration of dental practice checked by the administrator in charge.  
• Ensure proper functioning of the DHCP server. |         |
| E6 14 06   | The bootline of board DX11 had to be preassigned with default values. | • Reconfiguration of network data via SIXABCon.exe required. |         |
| E6 14 10   | Clock signals for sensor image transfer not received on board DX1/DX11. | • Check cable L13 for crushing and kinking as well as plug-in connections.  
• Replace cable if necessary.  
• Check board DX89, replace if necessary.  
• Check board DX1, replace if necessary. | 3-19  
3-13  
6-42  
6-42 |
| E6 14 12   | Faulty detection of sensor image transfer data signals on board DX1/DX11; repeated. | • Check cable L13 for crushing and kinking as well as plug-in connections.  
• Replace cable if necessary.  
• Check board DX89, replace if necessary.  
• Check board DX1, replace if necessary. | 3-19  
3-13  
6-42  
6-42 |
### Location 15: Configuration, update

<table>
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<th>Error code</th>
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<th>Actions required</th>
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</thead>
</table>
| E7 15 01   | Wrong memory modules. | If a DRAM memory module is plugged into board DX11...  
- Replace memory module or DX11  
If no DRAM memory module is plugged into board DX11...  
- Replace DX11 | 6-42 |
| E7 15 03   | Wrong software constellation of modules. | - Check software versions of unit (info screen or service routine S008.2) and of SIDEXIS XG and Perform or repeat software update or downgrade if necessary | 5-35 |
| E6 15 04   | Product activation keys invalid or not available. **Note:** 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. | - Enter the release key | see GBA* |
| E6 15 05   | Unit serial number invalid or not available. **Note:** 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. | - Execute service routine S008.3 and confirm or enter the unit serial number at the unit. | 5-37 |
| E6 15 10   | Update file for module is unreadable | - Obtain current update file from the SIRONA CSC or the SIRONA home page and perform software update | 1-12 |

* GBA = Operating instructions
## 2.5 List of error messages

### Location 41: Media interface card

<table>
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<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
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</thead>
</table>
| E6 41 01   | General module initialization error | • 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.  
• Replace board DX41 | 1-12 |
| E6 41 02   | Invalid system data or uninitialized module storage data | • 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.  
• Acknowledge error and repeat procedure  
If the error occurs again...  
• Replace board DX41 | 1-12 |
| E6 41 03   | Invalid commanding or control data  
**Note:** 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. | • Checking the CAN bus  
• 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. | 3-6  
1-12 |
| E6 41 04   | Data transfer error or dialog error to module (master side) | • Checking the CAN bus  
• 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. | 3-6  
1-12 |
| E6 41 05   | Data transfer error or dialog error to bootloader of module  
**Note:** Occurs only in connection with software update | • Repeat software update  
• Checking the CAN bus  
• Replace board DX41 | 1-12  
3-6  
6-42 |
| E6 41 06   | Module failed in TTP* (detected on master side)  
**Note:** 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. | • Checking the CAN bus  
• Replace board DX41  
• 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. | 3-6  
6-42  
1-12 |
<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
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</tr>
</thead>
<tbody>
<tr>
<td>E6 41 07</td>
<td>TTP* timeout error (detected on slave side)</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Note: The module was temporarily not addressed by the master:</td>
<td>• Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td>- Undervoltage on the master side</td>
<td>- If 3.3 V are present, replace board DX11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Procedure error in the software</td>
<td>- If 3.3 V are not present, replace board DX1</td>
<td></td>
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<tr>
<td></td>
<td>- Master (DX11) receives no return commanding from the module</td>
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<tr>
<td></td>
<td>Note: This error may also occur in connection with other causal error messages. Please also observe</td>
<td></td>
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<tr>
<td></td>
<td>the causal error message! It appears only after you acknowledge the first error message.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E6 41 08</td>
<td>General fault detected locally on module (slave side). CAN controller being reinitialized.</td>
<td>• Checking the CAN bus</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check software versions via info screen or service routine S008.2, perform a software update if necessary</td>
<td>5-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX11</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Please contact the Sirona Customer Service Center (CSC) to find out whether a bugfix by means of a</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>software update is possible and perform such an update if necessary.</td>
<td></td>
</tr>
<tr>
<td>E6 41 09</td>
<td>DX41 sends a signal although it is not included in the configuration</td>
<td>• Check the configuration via service routine S017.9 and reconfigure if necessary</td>
<td>5-66</td>
</tr>
<tr>
<td>E7 41 10</td>
<td>Module is stuck in bootloader stage</td>
<td>• Check operating status of board (note LED states)</td>
<td>3-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the board remains in the bootloader stage...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repeat software update</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX41</td>
<td>6-42</td>
</tr>
<tr>
<td>E7 41 12</td>
<td>Unit is not ready for operation</td>
<td>This error is a sequential fault.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check unit configuration (with or without DX41) via service routine S017.9, configure correctly if</td>
<td>5-66</td>
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<tr>
<td></td>
<td></td>
<td>necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the error occurs again...</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Repeat procedure and observe causal error messages.</td>
<td></td>
</tr>
</tbody>
</table>
### 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3 41 20</td>
<td>Release signal applied during power-on</td>
<td>● 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. If the error occurs again... &lt;br&gt; ● Check signal path for short circuit according to wiring diagrams (see section &quot;Error analysis of X-RAY control signal path: up to unit serial number 3199 (with board DX41)&quot;). replace component if necessary</td>
<td>3-20</td>
</tr>
<tr>
<td>E6 41 21</td>
<td>CAN bus connection to board DX41 interrupted. &lt;br&gt;Board DX41 cannot address board DX42 via the separate CAN bus connection.</td>
<td>● Check cable L17, replace if necessary &lt;br&gt; ● Check board DX42, replace if necessary &lt;br&gt; ● Check board DX41, replace if necessary</td>
<td>3-19</td>
</tr>
<tr>
<td>E6 41 23</td>
<td>Hardware fault at controller input on board DX41. &lt;br&gt;Board DX41 detects a wrong signal level of the hardware signal for radiation release.</td>
<td>● See section &quot;Error analysis of X-RAY control signal path: from unit serial number 3201 (without board DX41)&quot;</td>
<td>3-23</td>
</tr>
<tr>
<td>E6 41 24</td>
<td>Short circuit in radiation release signal path between board DX42 and board DX41 (cable L17). &lt;br&gt;The release signal was detected on boards DX11 and DX41 but not on board DX42.</td>
<td>● See section &quot;Error analysis of X-RAY control signal path: up to unit serial number 3199 (with board DX41)&quot;</td>
<td>3-20</td>
</tr>
<tr>
<td>E6 41 25</td>
<td>X-Ray hardware signal present, software signal not present</td>
<td>● Check cable L17, replace if necessary &lt;br&gt; ● Check board DX42, replace if necessary &lt;br&gt; ● Check board DX41, replace if necessary</td>
<td>3-19</td>
</tr>
</tbody>
</table>

*) TTP = Time Trigger Protocol
<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| E6 42 01   | General module initialization error  
  **Note:** Error generated during module self-test | • Check unit configuration (with or without DX41) via service routine S017.9, configure correctly if necessary  
  • 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.  
  • Replace board DX42 | 5-66  
  1-12 |
| E6 42 02   | Invalid system data or uninitialized module storage data | • 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.  
  • Acknowledge error and repeat procedure  
  If the error occurs again...  
  • Replace board DX42 | 1-12  
  6-42 |
| E6 42 03   | Invalid commanding or control data  
  **Note:** 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. | • Check software version of DX42 (in comparison to overall software version) via service routine S008.2, perform a software update if necessary  
  • Checking the CAN bus  
  • Check the signal path from board DX1 to board DX42, replace module DX42 if necessary  
  • 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. | 5-35  
  1-12  
  3-6  
  6-42  
  1-12 |
| E6 42 04   | Data transfer error or dialog error to module (master side) | • Checking the CAN bus  
  • 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. | 3-6  
  1-12 |
| E6 42 05   | Data transfer error or dialog error to bootloader of module  
  **Note:** Occurs only in connection with software update | • Repeat software update  
  • Checking the CAN bus  
  • Replace board DX42 | 1-12  
  3-6  
  6-42 |
| E6 42 06   | Module failed in TTP* (detected on master side) | • Checking the CAN bus  
  • Check the signal path from board DX1 to board DX42, replace module DX42 if necessary  
  • 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. | 3-6  
  6-42  
  1-12 |
## 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 42 07</td>
<td>TTP* timeout error (detected on slave side)&lt;br&gt;&lt;b&gt;Note:&lt;/b&gt; The module was temporarily not addressed by the master:&lt;br&gt;- Undervoltage on the master side&lt;br&gt;- Procedure error in the software&lt;br&gt;- Master (DX11) receives no return commanding from the module&lt;br&gt;&lt;b&gt;Note:&lt;/b&gt; 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.</td>
<td>● Checking the CAN bus&lt;br&gt;● Check power supply (3.3 V) of board DX11, replace board DX1 or DX11 if necessary&lt;br&gt;● Check the signal path from board DX1 to board DX42, replace module DX42 if necessary</td>
<td>3-6 6-42</td>
</tr>
<tr>
<td>E6 42 08</td>
<td>General fault detected locally on module (slave side). CAN controller being reinitialized.&lt;br&gt;&lt;b&gt;Note:&lt;/b&gt; Occurs if software of boards is incompatible.</td>
<td>● Check software versions via info screen or service routine S008.2, perform a software update if necessary&lt;br&gt;● Checking the CAN bus&lt;br&gt;● Replace board DX42&lt;br&gt;● 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.</td>
<td>5-35 1-12 6-42 1-12</td>
</tr>
<tr>
<td>E7 42 10</td>
<td>Module is stuck in bootloader stage&lt;br&gt;&lt;b&gt;Comment:&lt;/b&gt; display on control panel only.</td>
<td>● Check board DX42 (note LED states)&lt;br&gt;If the board remains in the bootloader stage...&lt;br&gt;● Repeat software update&lt;br&gt;● Replace remote control, see installation instructions</td>
<td>3-13 1-12</td>
</tr>
<tr>
<td>E7 42 12</td>
<td>Unit is not ready for operation&lt;br&gt;&lt;b&gt;This error is a sequential fault.&lt;/b&gt;</td>
<td>● Unit restart:&lt;br&gt;Switch the unit OFF. Wait 1 minute.&lt;br&gt;Switch unit ON.&lt;br&gt;● Check unit configuration (with or without DX41) via service routine S017.9, configure correctly if necessary&lt;br&gt;● Repeat procedure and observe causal error messages.&lt;br&gt;● Check the signal path from board DX1 to board DX42, replace module DX42 if necessary</td>
<td>5-66 5-66 6-42</td>
</tr>
</tbody>
</table>
## 2.5 List of error messages

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
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</table>
| E6 42 20   | Contact to DX11 interrupted during operation | • Check signal path via DX41 or cable, replace module if necessary  
• Check connection of remote control, see installation instructions  
• Checking the CAN bus  
• Check cable L17, replace if necessary  
• Check board DX42, replace if necessary  
• Check board DX41, replace if necessary | 3-6  
3-19  
3-13  
6-42  
6-42 |

**Comment:** display on remote control only.

**NOTE**

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)

| E7 42 21   | No CAN bus connection. DX11 does not start.  
**Note:** Occurs after power-on in the start screen. Error message displays on remote control only. | • Check configuration (with or without DX41) via service routine S017.9, configure correctly if necessary  
• Check the signal path from board DX1 to board DX42, replace module if necessary  
• Checking the CAN bus  
• Check remote control via service routine 17.6, configure if necessary  
• Start the detail query via Sixabcon  
If DX11 responds...  
• Check the signal path to DX42, repair or replace cable/connector if necessary  
• Replace DX1  
If DX11 does not respond...  
• Replace DX11 if this error persists | 5-66  
5-66  
3-6  
5-62  
6-42  
6-42 |

| E3 42 30   | R key actuated during power-on | • 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.  
If the error occurs again...  
• Replace remote control, see installation instructions |  |

| 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. | • 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)” | 3-20, 3-23 |
### Location 89: X-ray detector

<table>
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<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
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</thead>
</table>
| E6 89 01   | General error during module initialization | • 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.  
• Check the X-ray detector, replace if necessary | 1-12 |
| E6 89 02   | Invalid system data or uninitialized module storage data | • 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.  
• Acknowledge error and repeat procedure  
If the error occurs again...  
• Check the X-ray detector, replace if necessary | 6-31  
1-12 |
| E6 89 03   | Invalid commanding or control data  
**Note:** 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. | • Checking the CAN bus  
• 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. | 3-6  
1-12 |
| E6 89 04   | Data transfer error or dialog error to module (master side) | • Checking the CAN bus  
• 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. | 3-6  
1-12 |
| E6 89 05   | Data transfer error or dialog error to bootloader of module  
**Note:** Occurs only in connection with software update | • Repeat software update  
• Checking the CAN bus  
• Check the X-ray detector, replace if necessary | 1-12  
3-6  
6-31 |
| E6 89 06   | Module failed in TTP* (detected on master side) | • Checking the CAN bus  
• Check the X-ray detector, replace if necessary  
• 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. | 3-6  
6-31  
1-12 |
## 2.5 List of error messages

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<th>Error code</th>
<th>Description</th>
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</table>
| E6 89 07   | TTP* timeout error (detected on slave side) | ● Checking the CAN bus  
- Check cable L13, replace if necessary  
- Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).  
  - If 3.3 V are present, replace board DX11  
  - If 3.3 V are not present, replace board DX1 | 3-6 3-19 6-42 |
| E6 89 08   | General fault detected locally on module (slave side). CAN controller being reinitialized. | ● Checking the CAN bus  
- Check software versions via info screen or service routine S008.2, perform a software update if necessary  
- Check board DX89, replace if necessary  
- 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. | 3-6 3-19 5-35 1-12 3-13 6-42 1-12 |
| E7 89 10   | Module is stuck in bootloader stage | Check if board DX89 is in the bootloader (observe LED status)...  
- Perform a software update  
- Check board DX89, replace if necessary | 3-6-42 1-12 3-13 |
| E7 89 12   | Unit 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. | 3-6-42 |
| E5 89 13   | Error when writing to EEPROM  
**Note:** Stored data may be lost | ● Acknowledge error and repeat procedure  
- Perform a software update  
If the error occurs again...  
- Check log memory (via extended details)  
- Check the X-ray detector, replace if necessary | 1-12 |
| E6 89 20   | Faulty voltage supply of DX89 | ● Check cable L13, replace if necessary | 3-19 |
| E6 89 21   | File system error | ● Check board DX89, replace if necessary | 3-13 6-42 |
### 2.5 List of error messages

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<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
</table>
| **E5 89 22** | The power supply of the X-ray detector does not respond or is the wrong version. | - Check board DX89, replace board DX89, if applicable  
- Check the X-ray detector, replace if necessary | 3-13  
6-42 |
| **E5 89 23** | Camera head in the X-ray detector does not respond or wrong version. | - Check board DX89, replace board DX89 if necessary  
- Replace X-ray detector | 3-13  
6-42 |
| **E7 89 25** | Image memory error. | - Unit restart: Switch the unit OFF. Wait 1 minute. Switch the unit ON and watch for additional error messages during initialization.  
- Perform a software update  
- Check the attachment of the memory modules on board DX89, replace board DX89 if necessary. | 1-12  
6-42 |
| **E7 89 26** | Total exposure time was exceeded | - Check cable L13 (CAN bus), replace if necessary | 3-19 |
| **E7 89 27** | At least 10 image segments are defective | - Check cable L13 (CAN bus), replace if necessary  
If the error occurs again...  
- Check board DX89, replace if necessary  
- Replace X-ray detector | 3-19  
3-13  
6-42  
6-31 |
| **E7 89 28** | FPGA* on board DX89 is defective or does not respond | - Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.  
If the error occurs again...  
- Perform a software update  
- Replace board DX89 | 1-12  
6-42 |
| **E7 89 29** | Memory test error during system boot-up | - Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.  
- Check the attachment of the memory modules on board DX89, replace board DX89 if necessary. | 6-42 |
| **E7 89 30** | Flash memory component does not respond | - Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON.  
If the error occurs again...  
- Replace board DX89 | 6-42 |
| **E6 89 32** | TDI** impulses are missing during exposure | - Check cable L13, replace if necessary  
- Check board DX89, replace if necessary  
- Check board DX1, replace if necessary | 3-19  
3-13  
6-42 |
<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 89 33</td>
<td>Board DX89 has detected an image signal at the wrong point of time.</td>
<td>• Check cable L13, replace if necessary</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check board DX89, replace if necessary</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check board DX1, replace if necessary</td>
<td>3-13</td>
</tr>
<tr>
<td>E1 89 34</td>
<td>X-ray detector voltages inaccurate</td>
<td>• Check cable L27, (DX89/power supply), replace cable if necessary</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the X-ray detector, replace if necessary</td>
<td>6-31</td>
</tr>
<tr>
<td>E2 89 35</td>
<td>Error in iris diaphragm positioning</td>
<td>• Unit restart: Switch the unit OFF. Wait 1 minute. Switch unit ON. If the error occurs again...</td>
<td>6-31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the X-ray detector, replace if necessary</td>
<td>6-13</td>
</tr>
<tr>
<td>E7 89 37</td>
<td>Video intensification outside tolerance</td>
<td>• Check board DX89, replace if necessary</td>
<td>3-13</td>
</tr>
<tr>
<td>E2 89 38</td>
<td>Faulty image signal during exposure</td>
<td>• Check cable L13, replace cable if necessary</td>
<td>3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check board DX89, replace if necessary</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check board DX1, replace if necessary</td>
<td></td>
</tr>
<tr>
<td>E1 89 39</td>
<td>Error during X-ray detector preparation</td>
<td>• Repeat procedure If the error occurs again...</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace X-ray detector</td>
<td>6-31</td>
</tr>
</tbody>
</table>

*) 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

<table>
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<tr>
<th>Routine</th>
<th>Description</th>
<th>Required...</th>
<th>see page</th>
</tr>
</thead>
</table>
| S002    | Radiation without rotary movement: Max. radiation time selectable  
**Test step 5:** Long-term exposure with fixed radiation intervals from any position | • for system test, final testing, tube voltage measurement, reproducibility measurement, equivalent dose measurement | 5-17 |
| S005    | General X-ray tube assembly service  
**Test step 1:** Read/select X-ray tube assembly and tube type  
**Test step 4:** Fan test  
**Test step 5:** Temperature sensor test  
**Test step 8:** automatic adjustment of pulse preheating | • after error messages or component replacement | 5-20 |
| S007    | Error logging memory  
**Test step 1:** Display error logging memory  
**Test step 2:** Clear error logging memory | • after error messages | 5-30 |
| S008    | Update service  
**Test step 2:** Display of module software version statuses  
**Test step 3:** Input/confirmation of unit serial number | • for checking the configuration | 5-35 |
| S009    | Flash file system  
**Test step 4:** Format flash file system  
**Test step 5:** Test flash file system  
**Test step 7:** Trigger save/restore function of DX89 data | • after error messages | 5-39 |
| S011    | Dosimetry  
**Test step 9:** Current measurement (unpulsed)  
**Test step 12:** Dosimetry (pulsed) | • after error messages | 5-47 |
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<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Required…</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S012</td>
<td>CAN bus service</td>
<td>• on suspicion of unstable CAN bus&lt;br&gt;• in case of accumulated error messages EX yy 12; Ex yy 06, Ex yy 07, Ex yy 03&lt;br&gt;• not suitable as an accompanying measure e.g. &quot;check connector of CAN bus&quot; and &quot;check bus terminations&quot;</td>
<td>5-51</td>
</tr>
<tr>
<td></td>
<td><strong>Test step 1:</strong> Presence display of modules</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S017</td>
<td>Configuration service</td>
<td>• for changing the configuration&lt;br&gt;• for installation and removal of remote control&lt;br&gt;• When changing the DX11 board.&lt;br&gt;• in case of component replacement or software updates&lt;br&gt;• At the customer's request: Switching the welcome screen on and off&lt;br&gt;• At the customer's request or compliant to legal regulations: Configure the appearance of the welcome screen.&lt;br&gt;• At the customer's request: Switch the acoustic signal for the end of exposure ON or OFF.</td>
<td>5-53</td>
</tr>
<tr>
<td></td>
<td><strong>Test step 2:</strong> Configure hardware version</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 3:</strong> Enter the country group code</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 4:</strong> Select language index within language set</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 5:</strong> Select language set index within language set</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 6:</strong> Activate/deactivate remote control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 7:</strong> Configuring a swivel arm switching plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 9:</strong> Activate/deactivate operation with board DX41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 13:</strong> Activate/deactivate welcome screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 14:</strong> Activate/deactivate text in the welcome screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 15:</strong> Activating/deactivating the acoustic signal for the end of exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S018</td>
<td>Set travel height</td>
<td>• if room height is lower than 2.27 m&lt;br&gt;(2.30 m with floor stand)&lt;br&gt;• Check of the sensor system for the height adjustment (upper and lower limit switches, correction switch, pulse counter)</td>
<td>5-73</td>
</tr>
<tr>
<td></td>
<td><strong>Test step 2:</strong> Limit maximum travel height</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 3:</strong> Undo limit of maximum travel height setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test step 4:</strong> Test of the height adjustment sensor system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 2.6 List of available service routines

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Required...</th>
<th>see page</th>
</tr>
</thead>
</table>
| S037    | Network service, PC service      | • for problems with exposure readiness  
|         | **Test step 1:** Display network data | • for changing the network configuration | 5-79     |
|         | **Test step 2:** Delete network addresses or set them to factory defaults | |          |
|         | **Test step 3:** Configure boot mode | |          |
|         | **Test step 4:** Configure network data | |          |
3 Troubleshooting

GALILEOS
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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).

<table>
<thead>
<tr>
<th>Timestamp</th>
<th>Category</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-03-06, 19:57:40</td>
<td>[Message]</td>
<td>Logbook started</td>
</tr>
<tr>
<td>2006-03-07, 08:57:05</td>
<td>[Message]</td>
<td>Logbook started</td>
</tr>
<tr>
<td>2006-03-07, 08:58:30</td>
<td>[Message]</td>
<td>Recording started - Value: 104</td>
</tr>
<tr>
<td>2006-03-07, 08:58:49</td>
<td>[Message]</td>
<td>Recording stopped</td>
</tr>
<tr>
<td>2006-03-07, 09:03:26</td>
<td>[Message]</td>
<td>Recording started - Value: 104</td>
</tr>
<tr>
<td>2006-03-07, 09:03:45</td>
<td>[Message]</td>
<td>Recording started</td>
</tr>
<tr>
<td>2006-03-07, 09:05:16</td>
<td>[Message]</td>
<td>Recording started - Value: 104</td>
</tr>
<tr>
<td>2006-03-07, 09:05:35</td>
<td>[Message]</td>
<td>Recording stopped</td>
</tr>
<tr>
<td>2006-03-07, 09:07:35</td>
<td>[Message]</td>
<td>Recording cancelled</td>
</tr>
<tr>
<td>2006-03-07, 09:52:58</td>
<td>[Message]</td>
<td>Recording stopped</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>System time</th>
<th>Entry type</th>
<th>Entry data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Error]</td>
<td>Error event</td>
</tr>
<tr>
<td></td>
<td>[Error Sidexis]</td>
<td>Network error event</td>
</tr>
<tr>
<td></td>
<td>[Stringname]</td>
<td>Free status texts</td>
</tr>
<tr>
<td></td>
<td>[Stringsegment]</td>
<td>Additional data (string names)</td>
</tr>
<tr>
<td></td>
<td>[RTC Date/Time Change]</td>
<td>Date and time for a Sidexis PC</td>
</tr>
<tr>
<td></td>
<td>[PC Date/Time]</td>
<td>Set date and time for DX11</td>
</tr>
</tbody>
</table>
### 3.1 Error logging memory

<table>
<thead>
<tr>
<th>Entry data [Message]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording started</td>
<td>Beginning of a recording</td>
</tr>
<tr>
<td>Value: 9000</td>
<td>Sequence ID of recording</td>
</tr>
<tr>
<td>Recording stopped</td>
<td>End of a recording</td>
</tr>
<tr>
<td>Recording cancelled</td>
<td>Recording cancellation</td>
</tr>
<tr>
<td>Logbook started</td>
<td>Corresponds to switch-on of unit</td>
</tr>
<tr>
<td>Image state switched to Released</td>
<td>Recording has been delivered to and confirmed by SIDEXIS</td>
</tr>
</tbody>
</table>

Other entry data which document the occurrence of a rescue event include:

- Image state switched to Rescue
- Rescue request Sidexis Error
- Rescue request Sidexis TrackEpilogue
- Rescue request Sidexis Timeout

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.

<table>
<thead>
<tr>
<th>Entry data [Error]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 07 06</td>
<td>Error code</td>
</tr>
<tr>
<td>ERR_DX7_TTP_LOST</td>
<td>Cleartext display of error</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry data [Error Sidexis]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SidErr: ERR_SOCKET_ERROR</td>
<td>Detail of network error (for Sirona only)</td>
</tr>
<tr>
<td>SockErr:</td>
<td>Detail of network error (for Sirona only)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry data [Stringname]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Act</td>
<td>Activation transaction</td>
</tr>
<tr>
<td>Key Ok</td>
<td>Activation transaction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry data [Stringsegment]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7YFWDFUV-</td>
<td>e.g. activation or confirmation code (for activation transaction)</td>
</tr>
<tr>
<td>E4MMRJBW</td>
<td>e.g. counter (ID counter reading)</td>
</tr>
<tr>
<td>061-00133</td>
<td>e.g. counter (ID counter reading)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry data [RTC Date/Time Change]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tried to change to YYYY-MM-DD, HH:MM:SS</td>
<td>e.g. Tried to change to: 2006-Nov-30, 11:32:13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry data [RTC Date/Time]</th>
<th>Description</th>
</tr>
</thead>
</table>
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 Checking the CAN bus

Measure the ohmic resistance between the CAN H and CAN L measuring pins of connector X310 on board DX1.

- < 50 Ω
  - For units with a serial number of up to 3199: Check jumpers on board DX42 (if present) for correct setting, see Section 6.11.6. Are the jumpers plugged in correctly?
    - Yes
    - No
      - Plug in jumpers correctly.

- 120/0 Ω
  - Fault in the electric CAN bus connection

- 60 Ω
  - Continue on page 3-8

For units with a serial number of 3201 or higher: Check cable L117 and manual release A2 (without remote control). Are cable L117 and manual release A2 properly connected?

- No
  - Plug in L117/manual release A2 (for units with a serial number higher than 3201) properly or replace if necessary.
  - Yes
  - Check jumpers for correct position on board DX1, see section 3.2.2.
    - Are the jumpers plugged in correctly?
      - Yes
      - No
        - Plug in jumpers correctly.

- No
  - Cabling fault in the connectors or modules

Check CAN plug connections from board DX1 to the connected modules!

- No
  - Connect plugs.
  - Yes
  - Continue on page 3-8
3.2 Checking the CAN bus

Tab 3

Fault in cabling or in modules

Find defective component or faulty cable by process of elimination.

Is a substitute cable available?

Cyclical test with bypassing of components

Bypass the individual bus outputs to the modules in succession and measure the ohmic resistance on board DX1 at connector X310 between measuring pins CAN H and CAN L in each case.

Was a bus resistance of 60 Ω measured in any particular constellation?

Replace the defective cable in the corresponding signal path.

Yes

Cyclical test with "wandering" replacement

Make the connection with the replacement cable for each module in succession and measure the ohmic resistance on board DX1 at connector X310 between measuring pins CAN H and CAN L in each case.

Was a bus resistance of 60 Ω measured in any particular constellation?

Replace board DX1.

No

Replace the defective cable in the corresponding signal path.
3.2 Checking the CAN bus

Check optical CAN bus connection L6 to board DX6.

- Can the fault be traced to this connection?

No

Unstable CAN bus or sporadic faults

Check connection quality of CAN bus with service routine S12.1.

Are all modules detected?

No

Defective connection quality

Check individual signal paths and connectors.

- Are the signal paths and connectors OK?

No

Replace the corresponding connectors, cables or modules.

Yes

Fault on optical CAN bus connection

Replace optical label L6.

Yes

Contact the SIRONA Customer Service Center (CSC).

No
### 3.2 Checking the CAN bus

#### 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:

<table>
<thead>
<tr>
<th>V700</th>
<th>V701</th>
<th>Operating status of CAN bus</th>
<th>Error correction measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow flashing</td>
<td>Slow flashing</td>
<td>CAN bus OK</td>
<td>- Check cabling&lt;br&gt;- Check CAN jumper (see section 3.2.2)</td>
</tr>
<tr>
<td>Fast flashing</td>
<td>Off</td>
<td>CAN error, no communication with board DX7, i.e. no display of error messages</td>
<td>- Disconnect CAN cables successively (set jumper to inner position!) until the CAN bus functions again (V700 and V701 flash slowly)&lt;br&gt;- Replace defective module</td>
</tr>
<tr>
<td>Fast flashing</td>
<td>Fast flashing</td>
<td>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.</td>
<td>- Disconnect CAN cables successively (set jumper to inner position!) until the CAN bus functions again (V700 and V701 flash slowly)&lt;br&gt;- Replace defective module</td>
</tr>
<tr>
<td>Off</td>
<td>Fast flashing</td>
<td>CAN error, CAN bus TTP* disturbed by defective, constantly transmitting board (bus-heavy)</td>
<td>- Disconnect CAN cables successively (set jumper to inner position!) until the CAN bus functions again (V700 and V701 flash slowly)&lt;br&gt;- Replace defective module</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>System did not power up (DX11)</td>
<td>- Switch unit OFF and ON again and wait until end of power-up time</td>
</tr>
</tbody>
</table>

*) TTP = Time Trigger Protocol
3.2 Checking the CAN bus

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

<table>
<thead>
<tr>
<th>Socket, e.g. X500</th>
<th>Socket, e.g. X309</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper outside</td>
<td>Jumper inside</td>
</tr>
<tr>
<td>Module connected, i.e. connector plugged in</td>
<td>Module not connected, i.e. connector not plugged in</td>
</tr>
</tbody>
</table>

Diagram showing the jumper positions and connections.
3.2 Checking the CAN bus

From unit serial number 3201

**Socket, e.g. X500**
- Jumper outside: Module connected, i.e. connector plugged in
- Jumper inside: Module not connected, i.e. connector not plugged in

**Socket, e.g. X309**

---

Diagram:

- **DX1**
  - Optional connection
  - **X503 SUB_D**
  - **X500 SUB_D**
  - **DX89 X-ray detector**
  - **Jumper**
  - **X309 RJ45**
  - Optional connection
  - **X307 SUB_D**
  - Optional connection
  - **X306 RJ45**
  - Optional connection
  - **X303 RJ45**
  - **DX7/DX71 Display**
  - **DX11 PowerPC**
  - **X103 SUB_D**
  - **DX42 Remote control**
  - **A2**
3.3 Checking the boards

Check operating status of board.

Visual inspection:
- Is the board intact?
- Do the LEDs indicate normal operation?
  (see table below)

Measure voltages:
- Are the voltage levels in order?

Yes  ↘

Locate board (DX1 or other connected board) or component (e.g. cable) causing fault/error; replace component if necessary

No  ↘

Insert replacement board and check system function.
- Is the unit functioning properly?

Yes  ↘

Replace board or module, see chapter 6

No  ↘

Board is OK!
Continue troubleshooting according to error list (see section 2.5)
### Important LEDs on the boards (see also wiring diagrams)

<table>
<thead>
<tr>
<th>Board</th>
<th>LEDs</th>
<th>Normal operation</th>
<th>Malfunction</th>
<th>Bootloader</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX1</td>
<td>V100</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V101</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V108</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V110</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V610</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td>DX6</td>
<td>V1</td>
<td>flashing at 1 Hz</td>
<td>not lit</td>
<td>flashing at 2 Hz</td>
</tr>
<tr>
<td></td>
<td>V203</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td>DX7</td>
<td>V100</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V101</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V102</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td>DX71</td>
<td>V101</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V103</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V107</td>
<td>flashing at 1 Hz</td>
<td>not lit</td>
<td>flashing at 2 Hz</td>
</tr>
<tr>
<td>DX32</td>
<td>V132</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V133</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td>DX41</td>
<td>V103</td>
<td>flashing at 1 Hz</td>
<td>not lit</td>
<td>flashing at 2 Hz</td>
</tr>
<tr>
<td></td>
<td>V202</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V204</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td>DX42</td>
<td>V101</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V103</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td>DX89</td>
<td>V201</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V202</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V203</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V204</td>
<td>flashing at 1 Hz</td>
<td>not lit</td>
<td>flashing at 2 Hz</td>
</tr>
<tr>
<td></td>
<td>V205</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V207</td>
<td>lit</td>
<td>not lit</td>
<td></td>
</tr>
</tbody>
</table>
3.3 Checking the boards

3.3.1 Checking board DX32

Check operating status of board.

**Visual inspection:**
- Is the board intact?

Yes → If board DX32 is visibly damaged, replace it; see section 6.11.

No →

Up to unit serial number 3199:
- Are LEDs V132 and V133 on board DX32 lit?

Yes → Board DX32 is OK.

No →

From unit serial number 3201:
- Are LEDs V111 and V112 on board DX32 lit?

Yes →

Check automatic circuit breakers F101 and F102 on board DX32.
- Have the circuit breakers tripped?

Yes → Press automatic circuit breakers and test unit function.
- Is the unit functioning properly?

Yes → The fault is corrected!

No →

Check cable L4:
- Is the cable OK?

Yes → Replace cable L4, see section 6.12.

No →

Measure voltages on DX1:
- AA107/AA108 = 28 V ± 10 %
- AA109/AA108 = 40 V ± 10 %
- Are the voltage levels in order and the LEDs lit?

Yes → Board DX32 is OK.

No →

Check fuses on board DX32:
- Switch the unit OFF.
  Wait 7 minutes (el. discharge)
- Check fuses F100 and F103 (only up to unit serial no. 3199)
  replace if necessary
- Switch unit ON and check function
  Is the unit functioning properly?

Yes →

No → Replace board DX32, see section 6.11.
3.4 Checking the motors

Check operating status of motors.

**Visual inspection:**
- Is the motor intact?
- Are the plug connections OK?

Yes

Temporarily install replacement motor and check unit function.
- Is the unit functioning properly?

No → Replace the motor and/or fix the plug connections.

Yes → Motor is OK! Continue troubleshooting according to error list (see section 2.5).

No → Replace motor (see chapter 6).
3.5 Checking the light barriers

Is the plug connection between the light barrier and the board OK?

Yes

Check signal change on pin 3 of light barrier connector:

Pin | Signal
---|---
1 | GND
2 | 3.3V or 5V
3 | Signal
4 | GND

Actuate light barrier manually and check signal change on pin 3 of light barrier connector:

Note:
When inspecting the light barrier, note that its functioning may be affected by ambient light conditions.

Yes

Is a replacement light barrier available?

Yes

Temporarily install replacement light barrier and check system function.

- Is the unit functioning properly?

Yes

Replace light barrier.

No

Clean connector; if connector is defective, put it in order or replace defective component, see section 6.

No

Replace light barrier.

Is the unit functioning properly?

No

Actuate light barrier manually and check signal change on pin 3 of light barrier connector:

Pin | Signal
---|---
1 | GND
2 | 3.3V or 5V
3 | Signal
4 | GND

Note:
When inspecting the light barrier, note that its functioning may be affected by ambient light conditions.

Are the signals OK?

No

Replace light barrier.

Yes

Replace light barrier.

Light barrier is OK! Continue troubleshooting according to error list (see section 2.5).
3.6 Device leakage current too high

Pull tube assembly cable L3 off of connector X3 on board DX6 and perform measurement of leakage current according to section 7.9.
- Is the leakage current OK?

**Yes**
- Replace tube assembly, see section 6.6

**No**
- Check the cable shields and check the cables for visible signs of damage.
  - Are the cable shields and cables OK?

**No**
- Replace board DX32, see section 6-8

**Yes**
- Put the cable shields in order and/or replace any defective cables.
3.7 Checking the cables

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.

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

Is the cable plug connection OK?

No

Clean connector; if connector is defective, put it in order; replace cable if necessary.

For shielded cables:
Is the cable shield connection OK?

No

Put shield in order, replace cable if necessary.

Yes

If a replacement cable is available, temporarily connect it and check system function.
- Is the unit functioning properly?

No

Locate module causing fault and replace component, see section 6

Yes

Replace cables.

* 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.

Door contact open?

Yes

Short circuit in the coiled cable of the release button or on the membrane keyboard of the remote control:

- Replace release button with coiled cable
- Replace remote control

No

Hardware error on display board DX42:

- Replace remote control

Was the release button actuated during switch ON?

Yes

Switch the unit OFF and then ON again. Make sure that the release button is not actuated during switch-ON.

Do the error messages recur?

No

Yes

Short circuit in the coiled cable of the release button or on the membrane keyboard of the remote control:

- Replace release button with coiled cable
3.8 Error analysis of X-RAY control signal path

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

Door contact open?

- Yes
  - Close door contact
  - Switch unit OFF and ON again
  - Does the error message recur?

- No

Short circuit in signal path between boards DX41 and DX42 during switch-ON:
- Replace cable L17
- Replace remote control
- Replace board DX41 (see section 6.11)

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

Short circuit in signal path between boards DX41 and DX42 during switch-ON:
- Replace cable L17
- Replace remote control
- Replace board DX41 (see section 6.11)

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

Was the door opened during the exposure?

- Yes
  - Acknowledge error message with R key
  - Close door contact
  - Repeat the exposure

- No

- Check door contact, repair if necessary
- Replace cable L17
- Replace remote control
- Replace board DX41 (see section 6.11)


3.8 Error analysis of X-RAY control signal path

H321 is triggered at start of exposure.

**Door contact open?**

- Yes →
  - Close door contact
  - Start exposure again
  - Is the error message displayed again?

  - Yes →
    - Check door contact, repair if necessary
    - Replace cable L17

  - No →

**Error messages without installed remote control**

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

**Was the release button actuated during switch ON?**

- Yes →
  - Switch the unit OFF and then ON again.
  - Make sure that the release button is not actuated during switch-ON.
  - Do the error messages recur?

  - Yes →
    - Short circuit in coiled cable of release button:
      - Replace release button with coiled cable
      - Replace board DX41 (see section 6.11)

  - No →

- No →
### Error analysis of X-RAY control signal path

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

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3 41 20</td>
<td>Faulty detection of release signal by DX41 processor when the unit is switched ON.</td>
<td>• Replace board DX41</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 41 23</td>
<td>Faulty detection of release signal by DX41 processor during operation of the unit.</td>
<td>• Replace board DX41</td>
<td>6-42</td>
</tr>
<tr>
<td>E6 41 25</td>
<td>The DX41 detects no release signal when the exposure is started.</td>
<td>• Replace board DX41</td>
<td>6-42</td>
</tr>
<tr>
<td>E3 13 40</td>
<td>Short circuit in signal path between boards DX11 and DX41 during switch-ON.</td>
<td>• Replace cable L7</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX41</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX11</td>
<td></td>
</tr>
<tr>
<td>E6 13 41</td>
<td>Release signal missing on board DX11 at start of exposure.</td>
<td>• Replace cable L7</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX41</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX11</td>
<td></td>
</tr>
<tr>
<td>E3 13 42</td>
<td>Short circuit in signal path between boards DX11 and DX41 during operation of the unit.</td>
<td>• Replace cable L7</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX41</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace board DX11</td>
<td></td>
</tr>
</tbody>
</table>
3.8 Error analysis of X-RAY control signal path

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.

E6 13 43 occurs once during operation of the unit.

Was release button A2 actuated during switch-ON?

- Yes
  - Switch the unit OFF and then ON again.
  - Make sure that release button A2 is not actuated during switch-ON.
  - Do the error messages recur?

- No
  - Short circuit in coiled cable of release button A2 or on membrane keyboard of remote control:
    - Replace coiled cable
    - Replace membrane keyboard of remote control
    - Replace display board DX42 of remote control (see section 6.11.3)

- Yes
  - Hardware fault on display board DX42 or short circuit in coiled cable of release button A2 or on membrane keyboard of remote control:
    - Replace release button A2
    - Replace remote control (see section 6.11.3)

Was the door opened during the exposure?

- Yes
  - • Acknowledge error message with R key
  - • Close door contact
  - • Repeat the exposure

- No
  - • Check door contact, repair if necessary
  - • Replace cable L117, (see section 6.12)
  - • Replace remote control (see section 6.11.3)
### 3.8 Error analysis of X-RAY control signal path

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

| Door contact open? | · Close door contact  
|                    | · Start exposure again  
| Is the error message displayed again? |

- **No**
  - · Check door contact, repair if necessary  
  - · Replace cable L117, (see section 6.12)

**Error messages without installed remote control**

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

| Was the release button actuated during switch ON? | Switch the unit OFF and then ON again. Make sure that the release button is not actuated during switch-ON.  
|                                                   | Do the error messages recur? |

- **No**
  - Short circuit in coiled cable of release button:  
    · Replace release button A2  
  - Short circuit in cable L108:  
    · Replace cable L108, (see section 6.12)
### Error analysis of X-RAY control signal path

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

<table>
<thead>
<tr>
<th>Error code</th>
<th>Description</th>
<th>Actions required</th>
<th>see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3 1340</td>
<td>Short circuit in signal path between release button A2 and board DX11 during switch-ON.</td>
<td>● Replace cable L117 or L108</td>
<td>6-68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX11</td>
<td></td>
</tr>
<tr>
<td>E6 1341</td>
<td>Release signal missing on board DX11 at start of exposure.</td>
<td>● Replace cable L117 or L108</td>
<td>6-68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX11</td>
<td></td>
</tr>
<tr>
<td>E3 1342</td>
<td>Short circuit in signal path between release button A2 and board DX11 during unit operation.</td>
<td>● Replace cable L117 or L108</td>
<td>6-68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX1</td>
<td>6-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace board DX11</td>
<td></td>
</tr>
</tbody>
</table>
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 Fault diagnosis of the X-ray detector and on board DX89

3.9.1 LEDs on board DX89

Pay special attention to the "PLL_FPGA", "PLL_CCD", "Gettering OK" and "Image memory test OK" diodes.
3.9 Fault diagnosis of the X-ray detector and on board DX89

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.

**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

**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.

**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."
3.9 Fault diagnosis of the X-ray detector and on board DX89

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

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.

<table>
<thead>
<tr>
<th>Supply voltage [V]</th>
<th>Light emitting diode</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>V101</td>
</tr>
<tr>
<td>24</td>
<td>V109</td>
</tr>
<tr>
<td>5</td>
<td>V108</td>
</tr>
<tr>
<td>3.3</td>
<td>V107</td>
</tr>
</tbody>
</table>

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
## Contents

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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.

ℹ️ 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.

ℹ️ 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).
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.)

**NOTE**

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

**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 Important information concerning calibration

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:

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

**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. 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:

\[
\frac{B2 + B3}{2} = \text{ideal distance}
\]

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

4.2.1 Adjust center point of ring (if necessary)

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.

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

**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

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

**NOTE**

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

**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
### 4.3 Unit calibration via SIDEXIS

#### For GALILEOS

![Image of GALILEOS control panel]

**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.

#### For GALILEOS GAX5

![Image of GALILEOS GAX5 control panel]
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.
4.3 Unit calibration via SIDEXIS

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.

<table>
<thead>
<tr>
<th>Green and checked</th>
<th>Valid data record; <strong>calibration is in progress.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>No calibration required!</strong></td>
</tr>
<tr>
<td>Green</td>
<td>Calibration data record present; <strong>calibration has not been performed, calibration may not be sufficient.</strong></td>
</tr>
<tr>
<td>Red</td>
<td>Invalid data record or no record present</td>
</tr>
<tr>
<td></td>
<td><strong>Calibration required!</strong></td>
</tr>
</tbody>
</table>

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.
4.3 Unit calibration via SIDEXIS

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 ± 5 pixels (measure with SIDEXIS scale)

**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).
4.3 Unit calibration via SIDEXIS

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.

**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

**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 ± 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.
4.3 Unit calibration via SIDEXIS

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).

**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.

**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

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

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

2. **Selecting the BEAM FIELD menu**
   - Go to the BEAM FIELD sub-menu.
4.3 Unit calibration via SIDEXIS

Enabling exposure readiness

3. 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

4. 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**

   **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 adjust-
   ment 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

5. 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).

   **NOTE**
   Leave the distortion phantom on the unit for the next calibration step.
4.3 Unit calibration via SIDEXIS

4.3.5 Dosimetry

**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

1. Go to the DOSE submenu.

Connecting the sensor and Mult-O-Meter

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

3. 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.

4. 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.

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

5. 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

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.
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.

**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).

4. **Saving the values**
   - 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

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.

   **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

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

1. Go to the SHADING submenu.

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.
4.3 Unit calibration via SIDEXIS

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.

   **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

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.
4.3 Unit calibration via SIDEXIS

Clipping on the distortion phantom

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

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 **S010.12** 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 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.

**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.
4.3 Unit calibration via SIDEXIS

**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

Selecting the GEOMETRY menu

1. Go to the GEOMETRY submenu.

Entering the serial number of the geometric phantom.

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

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

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.

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.
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

6. 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 Unit calibration via SIDEXIS

4.3.11 Service menu

![Service menu screenshot]

Menu: Service

**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.
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.

---

**Starting image transfer**

WAIT!
UNTIL UNIT IS IN STARTING POSITION

**CCD test image**

The CCD test image is displayed.
4.4 Checking/calibrating the touchscreen (for GALILEOS only)

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

**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.

see next page
4.4 Checking/calibrating the touchscreen (for GALILEOS only)

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

  **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.
4.5 Reference images for the 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.

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 Reference images for the constancy test

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)

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.

![Acceptance test 2D dialog box]

2. Click the IMAGE ACQUISITION button.

   The exposure readiness dialog box opens.

![Exposure readiness dialog box]

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).

   **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.
4.5 Reference images for the constancy test

3D X-ray image (with test phantom)

Exposure

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).
   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.
4.5 Reference images for the constancy test

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.
4.5 Reference images for the constancy test

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

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 Reference images for the constancy test

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:

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

Test date: ________________________________

Initials: ________________________________

- Check the passed test results.
- Enter the measured values.
- Enter the date of the constancy test and acknowledge with your initials.
5 Service routines
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<th>Page</th>
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<td>&quot;S002: Test step 5&quot;</td>
<td>Long-term exposure with fixed radiation intervals from any position</td>
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<td>5-20</td>
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<td>&quot;S005: Test step 1&quot;</td>
<td>Read/select tube type</td>
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<td>Fan test</td>
<td>5-25</td>
</tr>
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<td>5-27</td>
</tr>
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<td>&quot;S005: Test step 8&quot;</td>
<td>Automatic adjustment of pulse preheating</td>
<td>5-28</td>
</tr>
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<td>S007</td>
<td>&quot;Error logging memory&quot;</td>
<td>5-30</td>
</tr>
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<td>&quot;S007: Test step 1&quot;</td>
<td>Display error logging memory</td>
<td>5-30</td>
</tr>
<tr>
<td>&quot;S007: Test step 2&quot;</td>
<td>Clearing error logging memory</td>
<td>5-33</td>
</tr>
<tr>
<td>S008</td>
<td>&quot;Update service&quot;</td>
<td>5-35</td>
</tr>
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<td>&quot;S008: Test step 2&quot;</td>
<td>Display of module software version statuses</td>
<td>5-35</td>
</tr>
<tr>
<td>&quot;S008: Test step 3&quot;</td>
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<td>5-37</td>
</tr>
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<td>&quot;Flash file system&quot;</td>
<td>5-39</td>
</tr>
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<td>&quot;S009: Test step 4&quot;</td>
<td>Formatting flash file system</td>
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</tr>
<tr>
<td>&quot;S009: Test step 5&quot;</td>
<td>Test flash file system</td>
<td>5-42</td>
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<tr>
<td>&quot;S009: Test step 7&quot;</td>
<td>Trigger save/restore function of DX89 data</td>
<td>5-44</td>
</tr>
<tr>
<td>S011</td>
<td>&quot;Dosimetry (without ring movement)&quot;</td>
<td>5-47</td>
</tr>
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<td>&quot;S011: Test step 9&quot;</td>
<td>Current measurement (unpulsed)</td>
<td>5-47</td>
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<td>&quot;S011: Test step 12&quot;</td>
<td>Dosimetry (pulsed)</td>
<td>5-49</td>
</tr>
<tr>
<td>S012</td>
<td>&quot;CAN bus service&quot;</td>
<td>5-51</td>
</tr>
<tr>
<td>&quot;S012: Test step 1&quot;</td>
<td>Presence display of modules</td>
<td>5-51</td>
</tr>
<tr>
<td>S017</td>
<td>&quot;Configuration service&quot;</td>
<td>5-53</td>
</tr>
<tr>
<td>&quot;S017: Test step 2&quot;</td>
<td>Configuring the hardware version</td>
<td>5-54</td>
</tr>
<tr>
<td>&quot;S017: Test step 3&quot;</td>
<td>Enter country group code</td>
<td>5-56</td>
</tr>
<tr>
<td>&quot;S017: Test step 4 (not for GALILEOS GAX5)*&quot;</td>
<td>Select the language index within a language set</td>
<td>5-58</td>
</tr>
<tr>
<td>&quot;S017: Test step 5&quot;</td>
<td>Select the language set index within a language set</td>
<td>5-60</td>
</tr>
<tr>
<td>&quot;S017: Test step 6&quot;</td>
<td>Activate the remote control display</td>
<td>5-62</td>
</tr>
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<td>&quot;S017: Test step 7&quot;</td>
<td>Configuring the switching plate for the swivel arm</td>
<td>5-64</td>
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<td>&quot;S017: Test step 9&quot;</td>
<td>Activate/deactivate operation with board DX41</td>
<td>5-66</td>
</tr>
<tr>
<td>&quot;S017: Test step 13 (not for GALILEOS GAX5)*&quot;</td>
<td>Enabling/disabling the welcome screen</td>
<td>5-68</td>
</tr>
<tr>
<td>&quot;S017: Test step 14 (not for GALILEOS GAX5)*&quot;</td>
<td>Enabling/disabling certain lines of the welcome screen</td>
<td>5-69</td>
</tr>
<tr>
<td>&quot;S017: Test step 15&quot;</td>
<td>Activating/deactivating the acoustic signal for end of exposure</td>
<td>5-71</td>
</tr>
<tr>
<td>S018</td>
<td>&quot;Service for height adjustment&quot;</td>
<td>5-73</td>
</tr>
<tr>
<td>&quot;S018: Test step 2&quot;</td>
<td>Set the maximum travel height</td>
<td>5-73</td>
</tr>
<tr>
<td>&quot;S018: Test step 3&quot;</td>
<td>Undo the maximum travel height setting</td>
<td>5-76</td>
</tr>
<tr>
<td>&quot;S018: Test step 4&quot;</td>
<td>Check of the height adjustment sensor system</td>
<td>5-77</td>
</tr>
</tbody>
</table>
### Tab 5

<table>
<thead>
<tr>
<th>S037</th>
<th>&quot;Network service&quot;</th>
<th>5-79</th>
</tr>
</thead>
<tbody>
<tr>
<td>“S037: Test step 1”</td>
<td>Displaying the network data</td>
<td>5-80</td>
</tr>
<tr>
<td>“S037: Test step 2”</td>
<td>Delete network addresses or set them to factory defaults</td>
<td>5-82</td>
</tr>
<tr>
<td>“S037: Test step 3”</td>
<td>Configure boot mode</td>
<td>5-85</td>
</tr>
<tr>
<td>“S037: Test step 4”</td>
<td>Configure network data</td>
<td>5-87</td>
</tr>
</tbody>
</table>
5.1 Selecting the Service menu

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.

**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.
5.1 Selecting the Service menu

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

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

4. Access the Service menu:
   – Press and hold down the Service key until the patient symbol keys light up (approx. 2 s).

5. 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.

To quit the Service menu and return to the main menu, press the double arrow key .
## 5.1 Selecting the Service menu

### 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:

<table>
<thead>
<tr>
<th>Display</th>
<th>Title bar:</th>
<th>X RAY Radiation can be released</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X RAY Active!</td>
<td>Caution, radiation is active!</td>
</tr>
</tbody>
</table>

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

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

   **NOTE**
   The service mode is signaled by a slow flashing of the Power LED à.

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).
5.1 Selecting the Service menu

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:

**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.

**Display**

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

**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
- Double arrow key: Return to the Main menu
5.2 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.

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

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
5.2 Selecting a service routine

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.

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 Selecting a service routine

5.2.1 Service routines with security access

**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: Easypad touchscreen**

![Diagram of Easypad touchscreen]

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

**GALILEOS GAX5: Multipad**

![Diagram of 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**

![Diagram of Easypad touchscreen]

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

The X-Ray radiation indicator â lights up briefly.
After approx. 2 sec., the green LED ç in the upper part of the Easypad lights up. This LED remains permanently lit as long as the unit is ON.

For GALILEOS GAX5

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 ç lights up. This LED remains permanently lit as long as the unit is ON.
5.3 Service routines with SIDEXIS

2. Press the \textit{R} key to move the unit back to the starting position.

\textbf{GALILEOS: Easypad touchscreen} \hspace{1cm} \textbf{GALILEOS GAX5: Multipad}

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

\textit{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).

3. Select the constancy test in SIDEXIS XG:
\textbf{EXTRAS \underline{\textit{\textbf{\textsuperscript{†}}}} CONSTANCY TEST}
The typical Sidexis user interface is started. Constancy test is already preset.

4. Start the exposure mode:
Click \textit{3D}
The dialog box for selecting the X-ray device appears on the screen.

5. Select/confirm the X-ray unit:
Select the desired \textit{X-RAY DEVICE} and click \textbf{OK}.
The dialog box for selecting the test type appears on the screen.

\textit{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.

   **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.

   **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.

   **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.

<table>
<thead>
<tr>
<th>Function S002</th>
<th>X-ray beam test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test step 5</td>
<td>Long-term exposure with fixed radiation intervals from any position</td>
</tr>
</tbody>
</table>

- 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.

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

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 🎯.

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 🎯.

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.

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).
5.4 Service routine S002

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.

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

- 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**

1. S005
2. 1
3. 

**GALILEOS GAX5: Multipad**

1. S005
2. 1
3. 

Prog. kV mAs
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.

**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.
S005.1: Read/select the X-ray tube assembly type (if invalid)

5.5 Service routine S005

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

**CAUTION**

For the operation with the GALILEOS volume tomography unit, only CB tube D151 R (indicator number 03) is permissible.
5.5 Service routine S005

Selecting the tube type

3. 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.

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

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).
5.5 Service routine S005

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.

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

Check the fan for running noise.

NOTE

When you quit the service routine the fan is automatically switched off again.
5.5 Service routine S005

**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

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.

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

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

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  

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  

An inactive progress indicator in selection field 1 and the message FFFF in selection field 2 signal that the system is ready for adjustment.
5.5 Service routine S005

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

---

**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.

---

**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**.

---

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

<table>
<thead>
<tr>
<th>Function S007</th>
<th>Error logging memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test step 1</td>
<td>Display the error list from the logging memory of board DX11</td>
</tr>
<tr>
<td>Test step 2</td>
<td>Clear the error logging memory on board DX11</td>
</tr>
</tbody>
</table>

**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.

### 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.

### 5.6.1 S007: Test step 1

#### GALILEOS: Easypad touchscreen

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

#### GALILEOS GAX5: Multipad

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

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.
S007.1: Display the error list from the logging memory of board DX11

5.6 Service routine S007

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 preset (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.
Tab 5

5.6 Service routine S007

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.

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.

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.

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.
5.6 Service routine S007

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.

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

<table>
<thead>
<tr>
<th>Function S008</th>
<th>Checking the software versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test step 2</td>
<td>Query the software versions of the modules</td>
</tr>
<tr>
<td>Test step 3</td>
<td>Input/confirmation/query of unit serial number</td>
</tr>
</tbody>
</table>

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

Selecting service routine S008

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

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**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S008</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S008</td>
<td>2</td>
</tr>
</tbody>
</table>

**GALILEOS: Easypad touchscreen**

**GALILEOS GAX5: Multipad**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S008</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S008</td>
<td>2</td>
</tr>
</tbody>
</table>
5.7 Service routine S008

**GALILEOS: Easypad touchscreen**

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

<table>
<thead>
<tr>
<th>Module</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX11</td>
<td>V02.45.00</td>
</tr>
<tr>
<td>DX41</td>
<td>V02.30.00</td>
</tr>
<tr>
<td>DX42</td>
<td>V02.45.00</td>
</tr>
<tr>
<td>DX6</td>
<td>V02.88.00</td>
</tr>
<tr>
<td>DX89</td>
<td>V01.10.06</td>
</tr>
<tr>
<td>DX89_F1</td>
<td>V01.13.01</td>
</tr>
<tr>
<td>DX7</td>
<td>V02.57.00</td>
</tr>
<tr>
<td>DX7 lang_0</td>
<td>V02.18.00</td>
</tr>
</tbody>
</table>

**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**.

![Diagram showing selection process](image)

GALILEOS: Easypad touchscreen

```
   1
   2
   3
```

**S008**

3

**Confirm serial number**

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

![Diagram showing confirmed serial number](image)

GALILEOS: Easypad touchscreen

```
   1
   2
   3
```

000000123

3

GALILEOS GAX5: Multipad

```
   1
   2
   3
```

000000123

You can interrupt this procedure with the **Service key**.

The unit serial number will then not be confirmed.
### 5.7 Service routine S008

**S008.3: Input/confirmation/query of unit serial number**

**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

<table>
<thead>
<tr>
<th>Function S009</th>
<th>Flash file system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test step 4</td>
<td>Formating flash file system</td>
</tr>
<tr>
<td>Test step 5</td>
<td>Test flash file system</td>
</tr>
<tr>
<td>Test step 7</td>
<td>Trigger save/restore function of DX89 data</td>
</tr>
</tbody>
</table>

**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.

**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**

![Diagram](image-url)
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.

Formatting 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.
5.8 Service routine S009

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

**GALILEOS: Easypad touchscreen**

![S009.4: Formating flash file system](image)

**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.

Test flash file system

2. To test 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.

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

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).
5.8 Service routine S009

**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 Service routine S009

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.

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.

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

GALILEOS: Easypad touchscreen

GALILEOS GAX5: Multipad

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

NOTE

Only one useful transfer direction is offered. If both locations contain valid data, "---" is displayed.
5.8 Service routine S009

Tab 5

**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 DX89; 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

**NOTE**

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

**Saving or triggering a restore**

3. 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.

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

**Quitting the service routine**

For **GALILEOS:**

Pressing the Service key or the double arrow key returns you to the service routine selection menu.
5.8 Service routine S009

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.

<table>
<thead>
<tr>
<th>Function S011</th>
<th>Dosimetry (without ring movement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test step 9</td>
<td>4 s long-term radiation with 85 kV/7 mA (for current measurement)</td>
</tr>
<tr>
<td>Test step 12</td>
<td>Dosimetry with pulses</td>
</tr>
</tbody>
</table>

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

Selecting service routine S005

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

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.  

5.9.1 S011: Test step 9
5.9 Service routine S011

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

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

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

Releasing radiation

3. Release radiation by pressing the release button.

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).
5.9 Service routine S011

5.9.1 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.

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.
5.9 Service routine S011

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.

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

<table>
<thead>
<tr>
<th>Function S012</th>
<th>CAN bus service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test step 1</td>
<td>Presence display of modules</td>
</tr>
</tbody>
</table>

**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.

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**
5.10 Service routine S012

Tab 5

Checking the module

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

![GALILEOS: Easypad touchscreen](image1)

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](image2)

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

<table>
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<td>Security access</td>
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</table>

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

Selecting service routine S017

1. Use the arrow keys to select service routine S017.
5.11 Service routine S017

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.

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.

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.
Tab 5

5.11 Service routine S017

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.

**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

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

   - 00 = worldwide
   - 01 = Asia
   - 02 = USA

**GALILEOS: Easypad touchscreen**

After the country group code is selected the Memory key (GALILEOS) or the LED above the Memory key (GALILEOS GAX5) lights up.

2. 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.

**NOTE**
The setting is permanently saved.
5.11 Service routine S017

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

**GALILEOS: Easypad touchscreen**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>00</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE
The setting is permanently saved.

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.

**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

1. 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.
2. To save the selected language set index, first press the Memory key (R key lights up) and then the R key.

**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).

**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

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

   - 00 = Remote control disabled
   - 01 = Remote control enabled

   **GALILEOS: Easypad touchscreen**

   ![Easypad touchscreen diagram]

   **GALILEOS GAX5: Multipad**

   ![Multipad diagram]

   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 \(R\).

**NOTE**
The setting is permanently saved.

### Quitting the service routine

**For GALILEOS:**

Pressing the Service key \(S\) or the double arrow key \(S\) returns you to the service routine selection menu.

To quit the Service menu and return to the main menu, press the double arrow key \(S\).

**For GALILEOS GAX5:**

Pressing the up arrow key \(S\) 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 \(S\) 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.

**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

After the switching plate is selected the Memory key (GALILEOS) or the LED above the Memory key (GALILEOS GAX5) lights up.
5.11 Service routine S017

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 .

**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.
5.11.7 **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.

**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**

```
   1  2  3
   00
```

**GALILEOS GAX5: Multipad**

```
   1  2  3
   00
```

**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**

---

**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.

**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

1. 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**

![Diagram showing selection field 1 with options 00 and 01]

After the code is selected, the **Memory button** lights up.

2. To save your selection, first press the **Memory key** (the R key lights up) and then press the **R key**.

**GALILEOS: Easypad touchscreen**

![Diagram showing selection field 1 with options 00 and 01]

The welcome screen is enabled or disabled.

**NOTE**  
After the welcome screen is disabled all parameters of the service routine S017.14 are reset back to the factory setting.
5.11 Service routine S017

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 \( \text{Service key} \) 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

1. 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**

![](image)

The activation status code is displayed in selection field 2.

- 0 = disabled
- 1 = enabled
2. Select the desired status using the arrow keys of selection field 2.

**GALILEOS: Easypad touchscreen**

![Diagram of selection field 2 with options 1 and 1.](image)

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**

![Diagram of selection field 2 with options 1 and 1.](image)

**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.

**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**

1. 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**

1
2
3

**GALILEOS GAX5: Multipad**

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

2. 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**
5.11 Service routine S017

S017.15: Activating/deactivating the acoustic signal for end of exposure

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

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<tr>
<td>Test step 3</td>
<td>Undoing the maximum travel height setting</td>
</tr>
<tr>
<td>Test step 4</td>
<td>Check of the height adjustment sensor system</td>
</tr>
</tbody>
</table>

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

Selecting service routine S018

1. Use the arrow keys to select service routine S018.

![Diagram of GALILEOS: Easypad touchscreen and 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.

**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.

![Diagram showing selection field 2]

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.

Saving the maximum travel height

3. To save 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.

![Diagram showing selection field 1]

GALILEOS: Easypad touchscreen
GALILEOS GAX5: Multipad
5.12 Service routine S018

Tab 5

Setting the mechanical limit stop on the unit

4. Loosen nut A and slide mechanical limit stop B for the limit switch toward the limit switch until it switches. Retighten nut A.

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

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>S018</td>
<td></td>
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<tr>
<td>2</td>
<td></td>
<td>3</td>
</tr>
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GALILEOS GAX5: Multipad

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<tbody>
<tr>
<td>1</td>
<td>S018</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

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.

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

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<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
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<td>S18</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3</td>
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</table>

GALILEOS GAX5: Multipad

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<tr>
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<tbody>
<tr>
<td>1</td>
<td><em>1342_MM</em></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

GALILEOS: Easypad touchscreen

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<tr>
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<td>3</td>
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</table>

GALILEOS GAX5: Multipad

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<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td><em>1342_MM</em></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
S018.4: Check of the height adjustment sensor system

Tab 5 5.12 Service routine S018

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 .

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.
5.12 Service routine S018

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

<table>
<thead>
<tr>
<th>Function S037</th>
<th>Test step 1</th>
<th>Test step 2</th>
<th>Test step 3</th>
<th>Test step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Displaying the network data</td>
<td>Delete network addresses or set them to factory defaults</td>
<td>Configure boot mode</td>
<td>Configure network data</td>
</tr>
</tbody>
</table>

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

Selecting service routine S037

1. Use the arrow keys to select service routine S037.
5.13 Service routine S037

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.

**The IP address of the unit is displayed.**

**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.

**NOTE**
If all network data is set to DEFAULT, the system is in the UDP boot mode.
<table>
<thead>
<tr>
<th>Tab 5</th>
<th>5.13 Service routine S037</th>
</tr>
</thead>
</table>

**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

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 🖥️ .

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 🖥️ .

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.
5.13 Service routine S037

Tab 5

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.

   NOTE
   The network address can only be reset to the default value only in the fixed address boot mode (no DHCP).

   Switch the unit off and then on again.
5.13 Service routine S037

### 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.

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.

After selecting test step 3, the current boot mode of the unit is displayed in selection field 1.
5.13 Service routine S037

Selecting the boot mode

3. Use the arrow keys of selection field 1 to select the desired boot mode, i.e. DHCP or fixed address (STATIC).

---

Saving the boot mode

4. 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 .

---

NOTE
If the system is reset to the STATIC mode, the network addresses will be reset to the factory setting.

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.
5.13.4 **S037: Test step 4**

**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**.

### 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**.
5.13 Service routine S037

The IP address of the unit is displayed in selection field 1.

### GALILEOS: Easypad touchscreen

<table>
<thead>
<tr>
<th>1</th>
<th>192.168.15.240</th>
<th>S037</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>DEFAULT</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GALILEOS GAX5: Multipad

<table>
<thead>
<tr>
<th>1</th>
<th>X192.168.15.240</th>
<th>4</th>
</tr>
</thead>
</table>

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

3. 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

The currently selected **patient symbol key** (GALILEOS) or the LED above the selected **patient symbol key** (GALILEOS GAX5) lights up.
5.13 Service routine S037

5.13.4: Configure network data

Selecting the network data

4. To change the selected parameter, first press the \text{T key}.

\text{GALILEOS: Easypad touchscreen}

\begin{verbatim}
\begin{tabular}{|l|c|}
\hline
1 & 192.168.15.240 \text{ DEFAULT} \tabularnewline
2 & \text{ S37} \tabularnewline
3 & \text{ \(a\)} \tabularnewline
\hline
\end{tabular}
\end{verbatim}

\text{GALILEOS GAX5: Multipad}

\begin{verbatim}
\begin{tabular}{|c|c|c|}
\hline
1 & \text{ Prog.} & \text{ \text{mAs}} \tabularnewline
2 & \text{ \text{KV}} \tabularnewline
3 & \text{ \text{DIG:}} \tabularnewline
\hline
\end{tabular}
\end{verbatim}

Selecting the octet

5. Select the desired octet 1 - 4 using the patient symbol key a - d:

\begin{itemize}
\item a: Octet B1
\item b: Octet B2
\item c: Octet B3
\item d: Octet B4
\end{itemize}

Example:

\begin{verbatim}
1 2 3 (Digit 1 - 3 of octet)
\end{verbatim}

\begin{verbatim}
192.168.015.178
\end{verbatim}

\begin{verbatim}
B1 B2 B3 B4 (Octets 1 - 4)
\end{verbatim}

\text{GALILEOS: Easypad touchscreen}

\begin{verbatim}
\begin{tabular}{|l|c|}
\hline
1 & \text{ Digit No. 3} \tabularnewline
2 & \text{ S37} \tabularnewline
3 & \text{ \(a\)} \tabularnewline
\hline
\end{tabular}
\end{verbatim}

\text{GALILEOS GAX5: Multipad}

\begin{verbatim}
\begin{tabular}{|c|c|c|}
\hline
1 & \text{ Prog.} & \text{ \text{mAs}} \tabularnewline
2 & \text{ \text{KV}} \tabularnewline
3 & \text{ ...DIG: 3...2...} \tabularnewline
\hline
\end{tabular}
\end{verbatim}

The currently selected \text{patient symbol key} (GALILEOS) or the LED above the selected \text{patient symbol key} (GALILEOS GAX5) lights up.
5.13 Service routine S037

Selecting the digit

6. Select the desired digit within the octet using the arrow keys of selection field 1 (see 5.).

**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

![Diagram of selection field 1 with digit 8]

Changing the value under the digit

7. 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

![Diagram of selection field 2 with digit 9]
Saving the changes

8. To save the change, first press the Memory key \( \text{(R key (GALILEOS) or LED above R key (GALILEOS GAX5) lights up)} \) and then the R key \( \text{(GALILEOS GAX5)}. \)

9. Switch the unit off and then on again.

Quitting the service routine

For GALILEOS:

Pressing the Service key \( \text{(GALILEOS)} \) or the double arrow key \( \text{(GALILEOS GAX5).} \)

To quit the Service menu and return to the main menu, press the double arrow key \( \text{(GALILEOS GAX5).} \)

For GALILEOS GAX5:

Pressing the up arrow key \( \text{(GALILEOS GAX5).} \)

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 \( \text{(GALILEOS GAX5).} \) above selection field 3.
S037.4: Configure network data

5.13 Service routine S037

Tab 5
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

- Switch the unit ON.

Moving the unit up and removing the profile covers

- 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)

**NOTE**

*Tip:* When unscrewing the upper profile cover, press it toward the top of the unit and let it slide down after detaching it.

**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.
3. 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.

4. Move the slide downward using the UP/DOWN keys on the Easypad.

- Switch the unit OFF and de-energize it.

### NOTE

If the height adjustment motor is inoperative, you can also move the slide manually (see page 6-5).
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.

**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.
- Detach cable L2 from the cable tie and from terminal X100 and pull it out of connection box F toward the bottom.
- Pull connector X1 off of board DX32.
- Loosen the four screws G and remove the connection box including board DX32.
6.1.3 Replacing the height adjustment motor/spindle

1. 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.

   **NOTE**
   
   *Tip:* First pull spindle L downward along the motor, and then diagonally upward and out of the unit.

2. 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.

3. Inserting the dampers

   2. Loosen the three screws M. Remove the motor while carefully pulling the motor cable out of the stand.

   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:

**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.

**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.

**NOTE**

Don't forget to install the upper limit stop in the marked position after replacing the height adjustment motor.

**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

Plug in and lay the ground conductor as illustrated.
6.1 Replacing the height adjustment motor (M1_4)/spindle

Fastening cable L2 to DX32

Use a cable tie to fasten cable L2 to the lower strain relief (left photo) and then to the upper one (right photo).

Connecting cable L2 to DX32

Connect cable.

Plug in ground wire
6.1 Replacing the height adjustment motor (M1_4)/spindle

Motor cable and cable L3

Cable L3

Motor cable
Laying the motor cables

- Green mark must lie in recess.
- Lay cable in cable harness and secure its position with cable clamps.
- Plug connector X402 into DX1.
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.
6.2 Replacing the ring motor (M1_3)

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.

**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.

**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.

**NOTE**
Don’t forget to reattach all cable ties and clamps.

Attaching the covers

- Reattach the covers.

**NOTE:** What to do after replacement?

- Check the function of the ring motor.
- Perform the complete system calibration procedure (see chapter 4).
6.2 Replacing the ring motor (M1_3)

6.2.1 Laying cables when replacing the ring motor

- Plug connector into DX1.
- Run cable parallel to cable L3 and fasten with clips.
- Connector X813
- Connector X804
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.
4. Pull the rotary knob off.

NOTE
If notch B is not visible, you can simply pull off the rotary knob.

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.

   - Pull cables L9 and L10 off of connectors X102 (L9) and X103(L10) on board DX7 (Easypad) or DX71 (Multipad).

Installing the new user interface

   - 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.
6.4 Replacing the Easypad (GALILEOS) or Multipad (GALILEOS GAX5)

**NOTE**
For GALILEOS (Easypad) only: Cable L10 (green cable) must be equipped with ferrite core B, unless this has already been done.

**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 Replacing the Easypad (GALILEOS) or Multipad (GALILEOS GAX5)

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.
6.5 Replacing the fixed diaphragm

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.

![Image of ID label]

**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.
### 6.5 Replacing the fixed diaphragm

#### 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.

![ID label image]

**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!

### 1.

#### Removing the covers
- Remove the covers (see also section 1.11):
  - Tube assembly, front
  - Tube assembly, rear

### 2.

#### 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).
6.6 Replacing the X-ray tube assembly

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.

**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.

**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.

**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

- Unplug/plug in cable L15.
- Unplug/plug in ground cable
- Unplug/plug in cable L3.
- Unplug/plug in cable L15.
6.7 Replacing the fan (tube assembly)

1. Removing the covers
   - Remove the covers (see section 1.11):
     - Tube assembly cover, front

2. 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.

   ![Connector X2](image)

   - Install the new fan in the reverse order of removal.

**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

1. Removing the covers
   - Remove the covers (see section 1.11):
     - X-ray detector cover

2. 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.

   * The clamps on your unit may differ from the ones shown in the drawing depending on its hardware version.
3. Loosen screw G and disconnect the grounding cable H.

**CAUTION**

* 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.

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!).

---

* 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.
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. 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. 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.

* The clamps on your unit may differ from the ones shown in the drawing depending on its hardware version.
11.-13.

**CAUTION**

Make sure that cable L13 runs correctly through groove O on the X-ray detector.

11. Re-attach cover plate A.
6.8 Replacing X-ray detector

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.

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.
6.9 Replace receptacle element for head fixation device (for GALILEOS with head fixation device)

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.

   **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 light localizer E is exposed.
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.
6.11 Replacing circuit boards

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

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

#### 1. Removing the covers

- Remove the covers (see section 1.11):
  - X-ray detector cover

#### 2. 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.

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<td>System software version V03.03.01 or higher</td>
<td>No further action is required.</td>
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<td>GALILEOS GAX5</td>
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<td>Replacing a DX11</td>
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<tr>
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<td>NOTE: 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.</td>
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• System software version V03.03.01 or higher  
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• Inserting a new X-ray tube assembly  
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| DX71 (Multipad) | • Inserting a new Multipad incl. DX71  
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| DX32 (Stand) | • Inserting a new DX32  
• System software version V03.03.01 or higher | • No further action is required. | 1-12 |
| DX41* (Stand) | • Inserting a new DX41  
• Only for GALILEOS up to serial number 3200 | • Switch the unit ON.  
• Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6. | 1-12 |

**NOTE**
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.
### 6.11 Replacing circuit boards

<table>
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<th>Constellation</th>
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| DX42  | (Remote control) | • Inserting a new DX42  
• Inserting a new DX42  
• GALILEOS  
• System software version V03.03.01 or higher  
• Switch the unit ON.  
• Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6.  
• Up to unit serial number 3199: Set jumper X109 and X110 to “Configuration with DX41” (inside jumper) (see also Section 6.11.6). | 1-12 |
| DX89  | (X-ray detector) | • Inserting a new DX89  
• Inserting a new DX89  
• GALILEOS  
• System software version V03.03.01 or higher  
• Switch the unit ON.  
• Perform a software update of the unit to version V03.03.01 or higher as described in section 1.6.  
• Restore the configuration data for board DX89 with the aid of service routine S009.7 (see page 5-44). | 1-12 |

* 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.
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.

**NOTE**
Do not acknowledge any error messages at this point.

2. Install the current SIDEXIS software version (V2.0 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 V03.03.01 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.

**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 (R).

11. Quit the service routine via the double arrow key (R).

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 (R).
   Error message E6 15 04 (undefined activation data) is displayed.

14. Acknowledge the error message with the R key (R).

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).

   **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).

   **NOTE**
   The DX41 board must be configured via the service routine S017.9.
   On units with a serial number ≥ 1080, the switching plate configuration of the swivel arm must be checked and/or set via the service routine S017.7.

   **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.
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.
6.11 Replacing circuit boards

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.

5. Acknowledge the error message with the R key.
Error message E6 15 04 (undefined activation data) is displayed.

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.
6.11 Replacing circuit boards

10. Switch the unit OFF.
    Wait approx. 1 minute. Then switch the unit ON again.

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).

NOTE
The DX41 board must be configured via the service routine S017.9. On units with a serial number ≥ 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.
6.11 Replacing circuit boards

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.

**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).

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).
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 LED above the Memory key \(\circ\) lights up.

**NOTE**
Acknowledge any additional error messages with the R key \(\circ\).

10. Confirm the "GALILEOS GAXS" system class (04):
To do this, first press the Memory button \(\circ\) (LED above the R key lights up) and then the R key \(\circ\).

11. Quit the service routine via the Top arrow key \(\downarrow\) above selection field 3.

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 \(\circ\).
Error message E6 15 04 (undefined activation data) is displayed.

14. Acknowledge the error message with the R key \(\circ\).

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).

**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).

**NOTE**
The DX41 board must be configured via the service routine S017.9. On units with a serial number ≥ 1080, the switching plate configuration of the swivel arm must be checked and/or set via the service routine S017.7.

**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.
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.

5. **Acknowledge the error message with the R key.**

   Error message **E6 15 04** (undefined activation data) is displayed.

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.
6.11 Replacing circuit boards

**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).

**NOTE**

The DX41 board must be configured via the service routine S017.9. On units with a serial number ≥ 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.
6.11 Replacing circuit boards

6.11.5 Replacing an X-ray tube assembly incl. DX6

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.
   **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).

**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).

**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).

16. Acknowledge the error message with the R key E1 11 20.

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.
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.

E6 15 05

2. Acknowledge the error message with the R key.
   Error message E6 15 04 (undefined activation data) is displayed.

E6 15 04

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.

E1 11 20

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 Replacing circuit boards

Case G: New tube assembly
GALILEOS GAX5
system software version
V03.06.01 or higher

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.
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.

**E6 15 05**

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).

**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).

**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).

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

**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).

**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 Replacing circuit boards

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!

**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 Replacing cables

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)

ℹ️ 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).
6.12 Replacing cables

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.

Detaching old cables from the cable track

4. If cable L7 is defective:
   Unscrew cable L7 from the interface board and remove the shielding.

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).
6.12 Replacing cables

### 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.

---

**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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7.1 Calibrating the unit

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.
7.1 Calibrating the unit
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

**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.
7.2 Checking the height adjustment

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
7.6 Checking the grounding straps

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

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
7.8 Checking the protective ground wires

Check whether the ground wire resistance complies with the specifications

<table>
<thead>
<tr>
<th>A and</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GNYE wire</td>
<td>2. Protective ground wire</td>
<td>Housing DX32</td>
<td>Tube assembly housing</td>
</tr>
<tr>
<td></td>
<td>0.1Ω</td>
<td>0.1Ω</td>
<td>0.2Ω</td>
<td>0.2Ω</td>
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</tbody>
</table>

- 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 \( R = \frac{U}{I} \)

Measuring point A: Central ground wire
7.8 Checking the protective ground wires

Measuring points B and C: GNYE power connection and 2nd ground wire

Diagram: Power cable from PE to GALILEOS, Power cable from Galileos to 2nd Protective ground wire, Power cable from B and C to GALILEOS, Second Protective ground wire from C.
Measuring points D and E: Board cage DX32 and tube assembly

**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)
7.9 Checking the device leakage current

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**.

**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).
7.9 Checking the device leakage current
Service Manual History D3437

<table>
<thead>
<tr>
<th>Version</th>
<th>Details</th>
</tr>
</thead>
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<tr>
<td>Version 1:</td>
<td>Software version V03.03.01</td>
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<tr>
<td>Version 2:</td>
<td>General revision, supplements and corrections in chapter 4, Calibrating the unit</td>
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<tr>
<td>Version 3:</td>
<td>Software version V03.04.00/01, supplements and corrections in chapters 1 &quot;General information&quot; (software versions and cable L13) and 4 &quot;Calibrating the unit&quot; (mechanical adjustment and dosimetry menu), supplements and corrections in chapter 6 &quot;Repair&quot; (laying cables), supplement of sections 7.6 &quot;Checking the grounding straps&quot; and 7.7 &quot;Checking the cable shields&quot; in chapter 7 &quot;Maintenance&quot;</td>
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<td>Version 4:</td>
<td>Software version V03.05.00, supplements and corrections in chapters 1 &quot;General information&quot; (software versions) and 4 &quot;Calibrating the unit&quot; (input of calibration phantom serial numbers), supplements and corrections in chapter 6 &quot;Repair&quot; (rotary knob), smaller corrections and supplements in complete manual.</td>
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<tr>
<td>Version 5:</td>
<td>Supplements and corrections in chapter 1 &quot;General information&quot; (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).</td>
</tr>
<tr>
<td>Version 6:</td>
<td>GALILEOS GAX5 added, software version V03.06.01</td>
</tr>
<tr>
<td>Version 7:</td>
<td>Head fixation device updated.</td>
</tr>
</tbody>
</table>
We reserve the right to make any alterations which may be required due to technical improvements.