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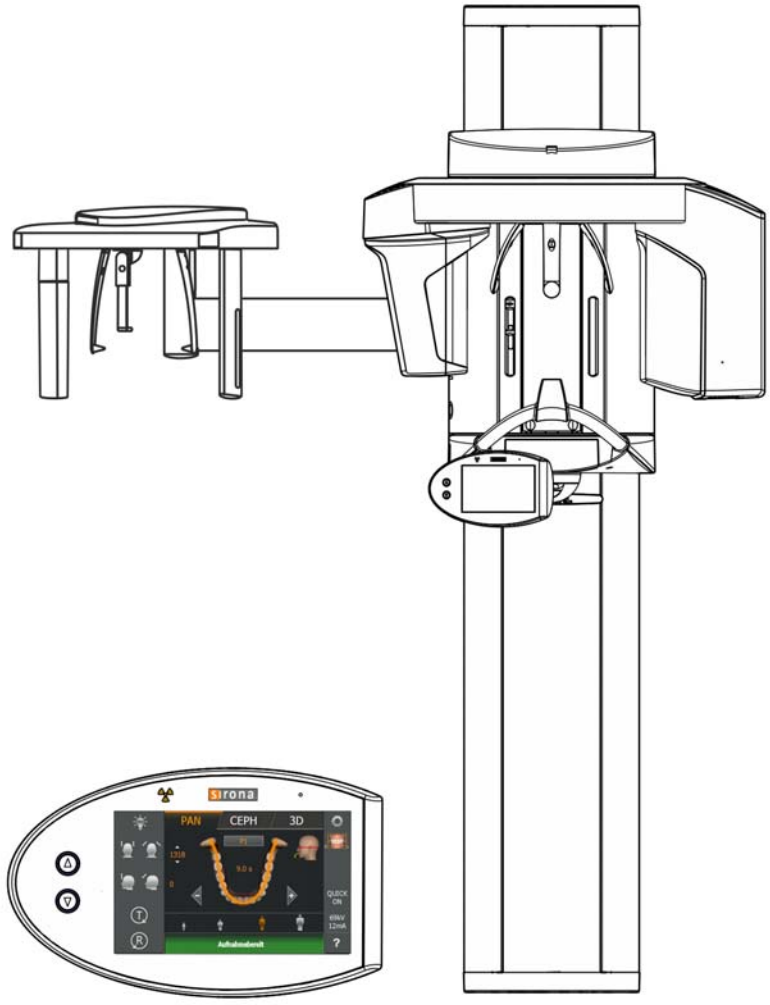
sirona
The Dental Company

ORTHOPHOS SL 2D / 3D

Constancy test (Sirona)

English



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1 Explanation

Explanation

The constancy test is used by the operator for regular quality inspections for the X-ray equipment. It closely adheres to the German standards of quality assurance for dental X-ray equipment.

- After the manufacturer or supplier has installed and carried out an acceptance test on the X-ray equipment, the operator must carry out the constancy test at least once a month.
- To take the constancy test exposures, please use the test phantoms which were supplied with the respective X-ray unit and have been used for the acceptance test already.
- The results must be documented in the forms "**2D test results**" and "**3D test results**".

The retention period is **2 years**. National laws may deviate from this.

"Test results" form

There are two ways to document test results.

- **Option 1**

  The test results are to be entered by hand on paper.

  This is located behind the corresponding "Constancy test" document.

- **Option 2**

  Have the test results entered by the constancy test program.

  This generates a PDF document, which then has to be printed out.

  For more information, refer to the section "Test results as a PDF document".

Layout

The constancy test is composed of the following parts:

- Monthly 2D (Panorama/Ceph) constancy test
- Monthly 3D (DVT) constancy test
- Annual 3D (DVT) constancy test

Instruments and test equipment

- Calibrated measuring instrument for determining the X-ray tube voltage (not for initial commissioning)
- Calibrated diagnostic dosimeter
- Test phantom.
- Geometric and distortion phantom.

DIN 6868 Part 15

- These instructions are written for 3D X-ray in accordance with DIN 6868 Part 15 “Image quality assurance in diagnostic X-ray departments, in the event of constancy tests on dental X-ray equipment for digital volume tomography".

Instruments and test equipment

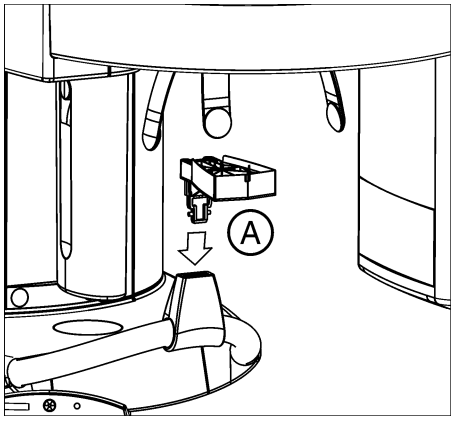
- Calibrated measuring instrument for determining the X-ray tube voltage (not for initial commissioning)
- Calibrated diagnostic dosimeter
- Needle phantom
- Test phantom for acceptance and constancy test

- 6 mm Al (only for equivalent dose measurement on digital panoramic units)
- **Only for cephalometric units (Ceph)**
  - Test phantom for constancy test
  - Special clamp for test phantom

2 2D constancy test (panoramic tomography and cephalometry)

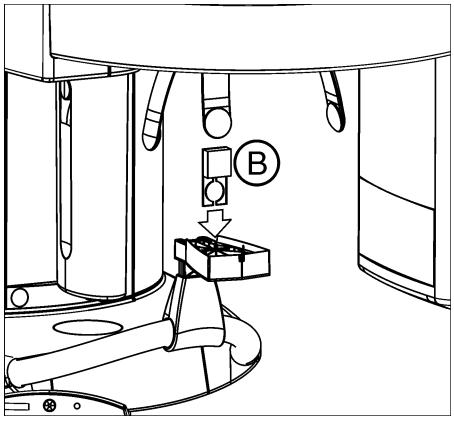
2.1 Panorama

2.1.1 Preparing the X-ray unit



✓ The panoramic sensor must be plugged into the sensor holder.

1. Plug the needle phantom (**A**) into the bite block holder.



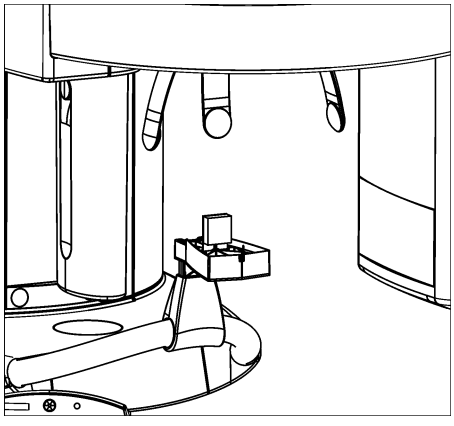
2. Plug the contrast element (**B**) into the slot on the needle phantom provided for that purpose.

NOTICE

The aluminum plate of the contrast element must be facing away from the column of the unit.

Do not attach any additional aluminum plate to the unit.

3. Press the **R key** (Return key).



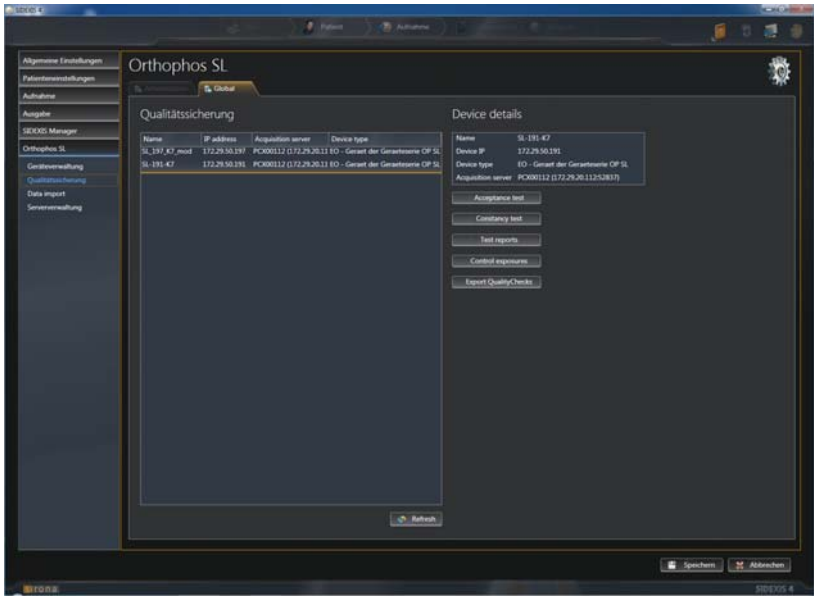
↳ The unit moves to its starting position.

↳ The X-ray unit is now ready.

2.1.2 Starting the constancy test program

Starting the test program

1. Start SIDEXIS 4.
2. On the top right of the system menu, confirm the button for the configuration menu.
3. Click the *"ORTHOPHOS SL"* button in the structure tree.



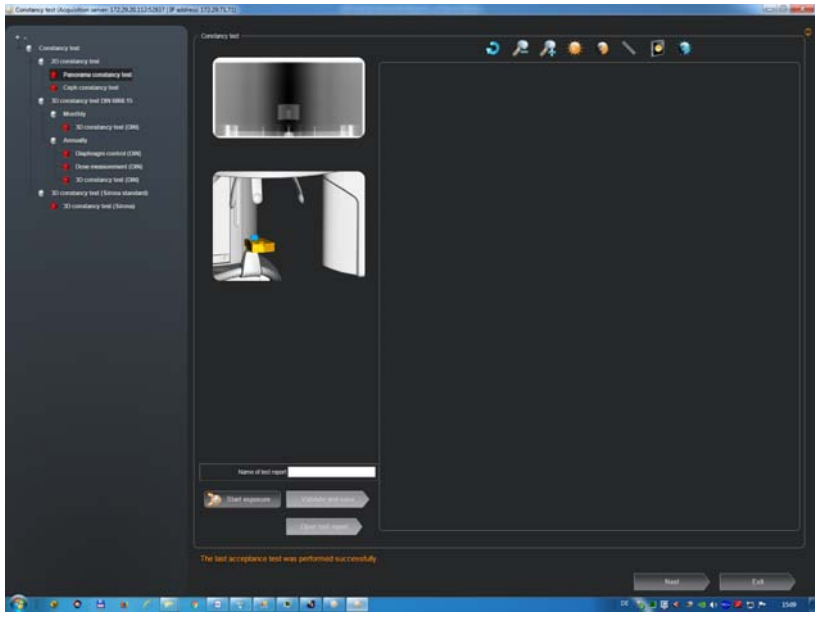
↳ The configuration menu opens.

4. Click on the *"Quality assurance"* button.
5. In the *"Global"* tab, select the appropriate X-ray unit.

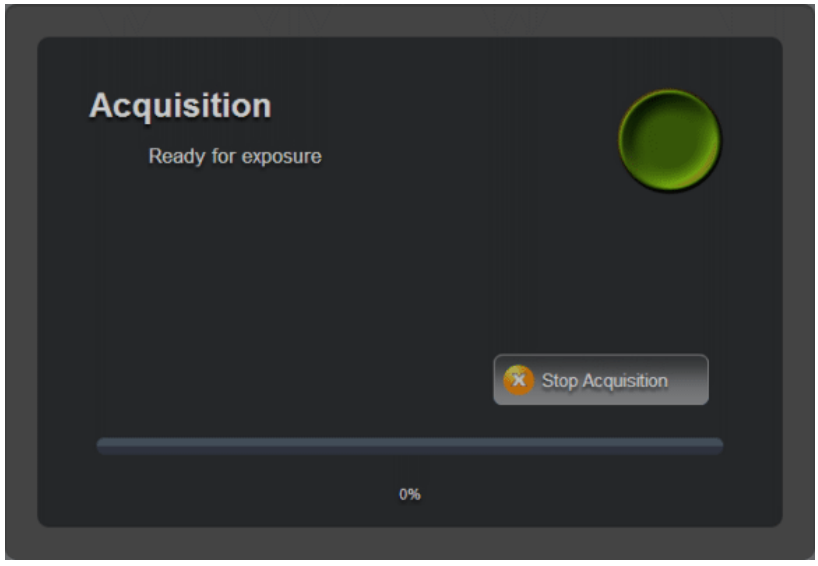
↳ The corresponding tests are automatically assigned to the selected X-ray unit.

Selecting the test type

1. Select the *"Constancy test"* button.
   ↳ The *"Constancy test"* dialog box appears.
2. In the *"Constancy test"* dialog box, select the option *"Panorama Constancy test "* in directory *"2D Constancy test"*.



3. Press the *"Start acquisition"* button.
   ↳ The temple supports close automatically.
4. Move the ORTHOPHOS SL 3D device into the starting position (press the **R** return key on the user interface).



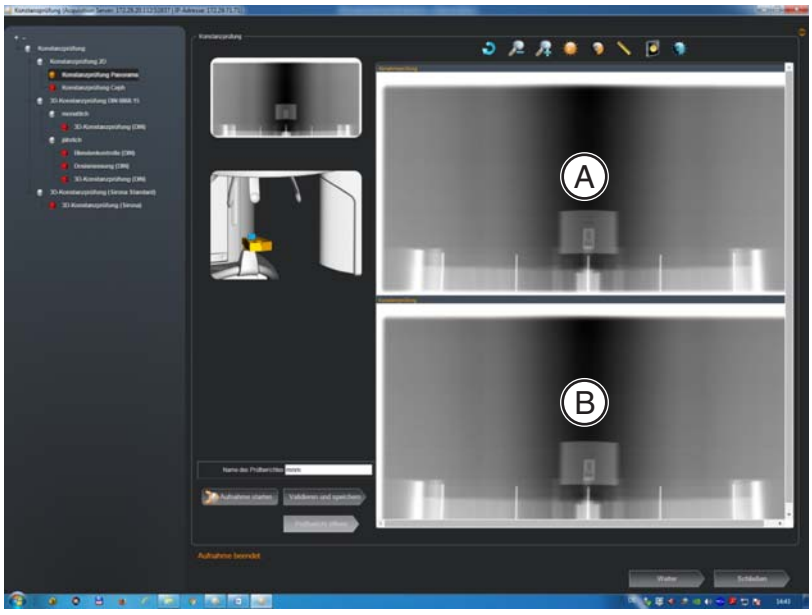
↳ The readiness for exposure window opens.

↳ The following exposure data is displayed on the Easypad:
Exposure values: 73 kV / 8 mA / 14.1s
Program: S11 / 3

2.1.3 Releasing the exposure

Exposure

➢ Release an exposure.
   ↳ The unit automatically performs a rotation.



- The **test phantom image** of the acceptance test (A) appears on the SIDEXIS screen as a reference.
- Beneath the **test phantom exposure** of the acceptance test, the recently acquired **test phantom exposure** of the constancy test appears (B).

NOTICE
As this is a low-contrast and high-contrast display with minimum dose (in the limit range), the noise component is dominant in the image. The image quality is correspondingly noisy!

Assigning names

➢ Enter a name for the constancy test exposure in the *"Name of report"* text box.

This means that the test result can be uniquely assigned.

IMPORTANT
No check is performed to ensure the test reports have the same name.

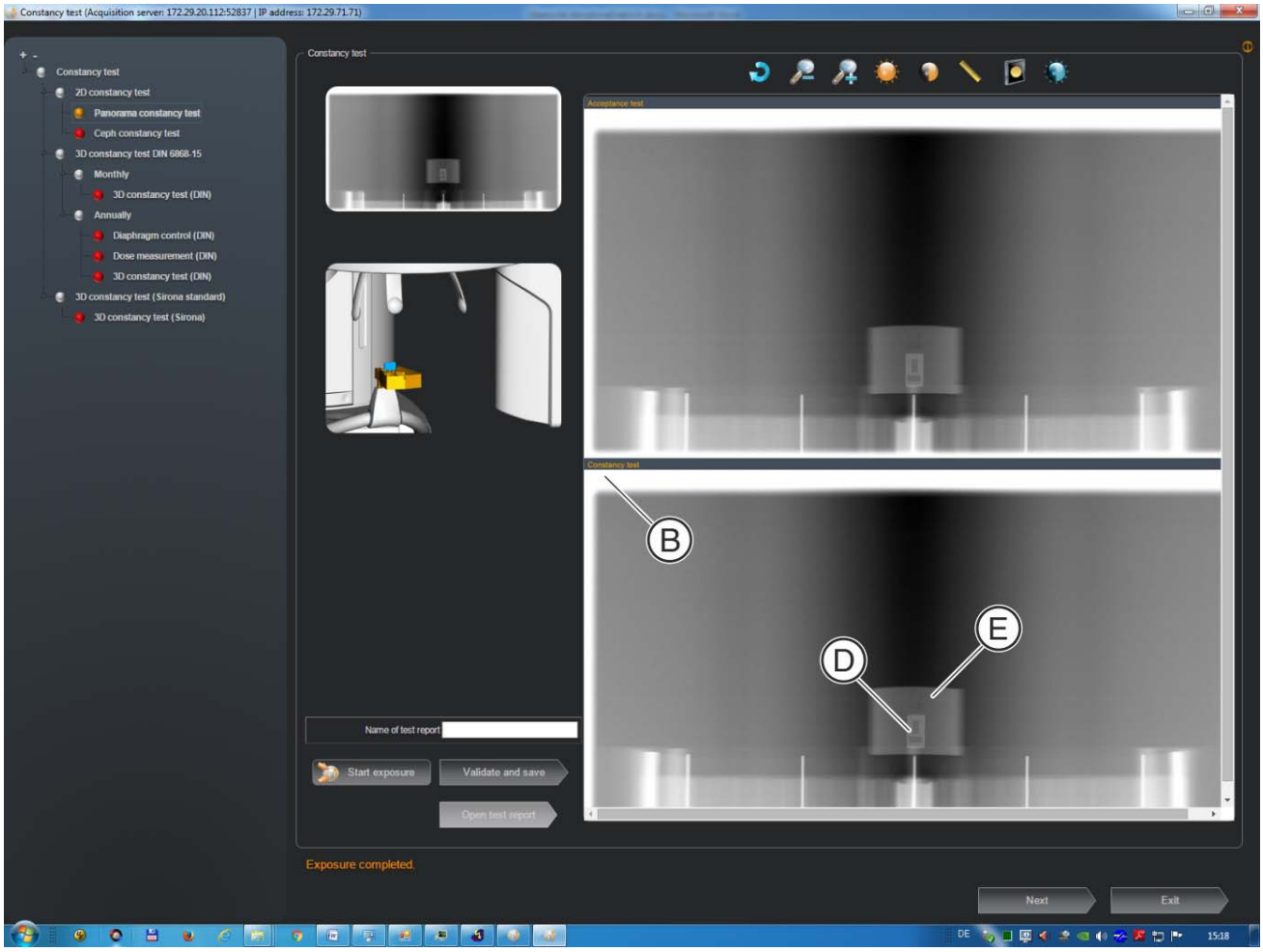
For example: “ORTHOPHOS_SL_2D”

Completion

➢ After completing the exposure, remove the contrast element and needle phantom.

2.1.4 Comparing the constancy test image to the acceptance test image

IMPORTANT
The reference image for the constancy test is always the acceptance test image.



➢ Compare the two exposures with each other.

↳ The two exposures must not differ significantly from each other.

➢ Compare the following criteria:

- **Useful beam (B)**

  An unexposed border surrounding the image must be visible on at least two opposite sides.

IMPORTANT
It is permissible for contrast elements to display these at a 1:1 ratio. Use the "Zoom in" button for this purpose.

- **Line pair resolution capacity (D)**

  Are the lines of the contrast element visible individually over the entire length (2.5 lp/mm)?

  (With any brightness and contrast setting).

- **Low contrast (E)**

  Are at least 2 of the 4 holes visible as contrast difference?

  (With any brightness and contrast setting).

- **Free from artifacts**

Visually inspect the image for interfering artifacts.

- Interfering artifacts include the following:
- Dust
- Phantom images
- Scratches
- Missing lines and pixels
- Mask errors
- Line pulling
- etc.

⚠ CAUTION

Potential loss of test exposure

If the constancy test is not saved before it is closed, the exposure will be lost.

➢ Save the constancy test before it is closed. See the section titled: “Storing the image [→ 17]“.

NOTICE

Procedure in case of a fault

If the tests show errors, please contact your service engineer immediately.

For further details, use tools in the menu bar. These display adjustments cannot be saved with the image, though. See the section “Image tools [→ 30]“.

2.1.5 How to handle invalid exposures

Explanation

You may repeat the test phantom exposure for the constancy test as often as required, e.g. if you have chosen wrong exposure data.

IMPORTANT

Invalid constancy tests containing errors cannot be deleted or overwritten.

2.1.6 Storing the image

➢ Press the *"Validate and save"* button.

↳ The test results are saved with the corresponding exposures.

⚠ 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 adjustments.

➢ Subsequently you must repeat the acceptance test.

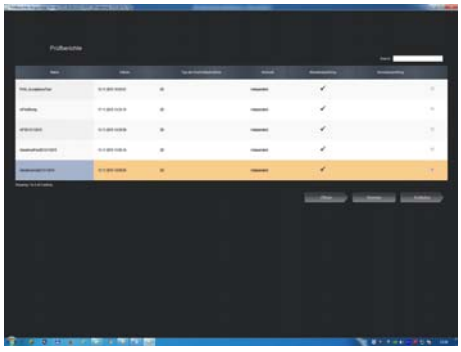
2.1.7 Calling and editing the constancy test test report (test results)

Version 1 / Activation via the *"Constancy test"* dialog box

1. Click the *"Open Report"* button in the *"Constancy test"* dialog box.
   ↳ The *"Report"* dialog box opens.
2. Click on the desired test report in the *"Report"* dialog box.
3. Click the *"Open"* button.
   ↳ The desired test report is opened.
4. Complete the test report.
5. Save the test report accordingly.

Version 2 / Activation via the configuration menu

1. Click on the *"Quality assurance"* button.
2. Click the *"Test Reports"* button on the *"Global"* tab.
   ↳ The *"Report"* dialog box opens.
3. Click on the desired test report in the *"Report"* dialog box.
4. **TIP:** Sort the test reports by clicking on the column headers.
5. Click the *"Open"* button.
   ↳ The desired test report is opened.
6. Complete the test report.
7. Save the test report accordingly.



Calling the exposure

It is possible to view the exposure again outside the test report.

➢ To do so, click on the arrow symbol shown on the top left-hand side.

↳ The corresponding exposure is opened.

Closing the exposure

Close the exposure by clicking on the corresponding arrow symbol.

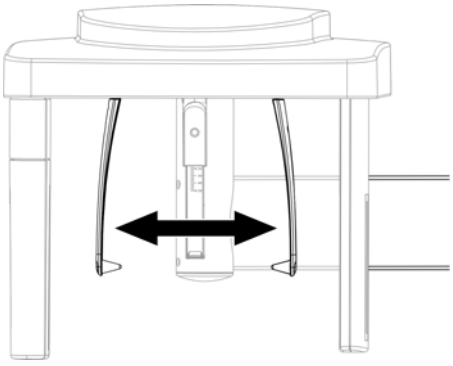
Image tools

➢ See the section: “Image tools [→ 30]”.

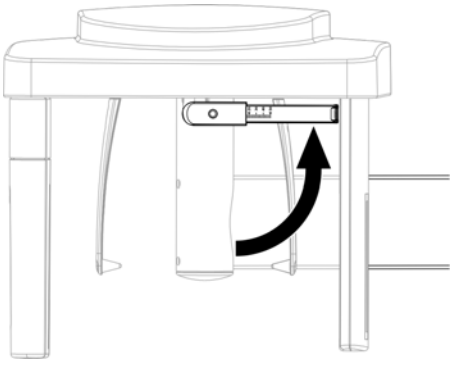
2.2 Cephalometry (ceph)

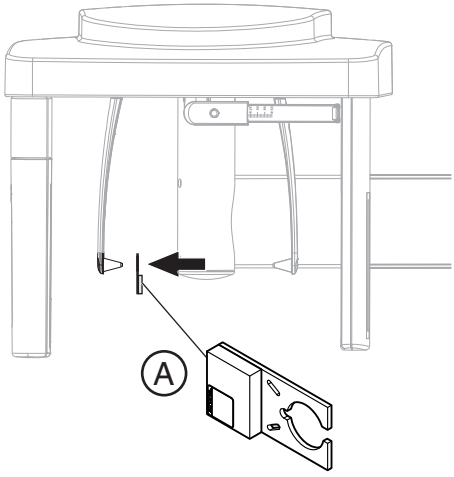
2.2.1 Preparing the X-ray unit

1. Remove the needle phantom from the bite block holder.
2. Push the image receptor you want to check into the CEPH holder until it snaps into place.
3. Open the ear plug holders completely.
4. Turn the ear plug holders so that one ear plug is directly in front of the image receptor.



5. Fold up the nose support.

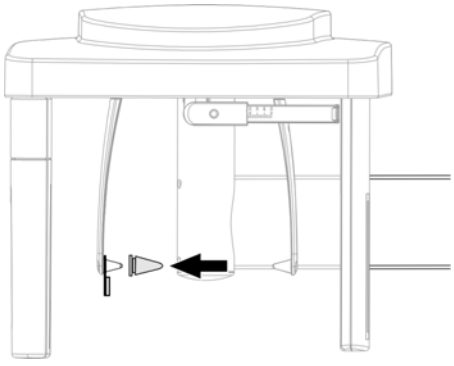




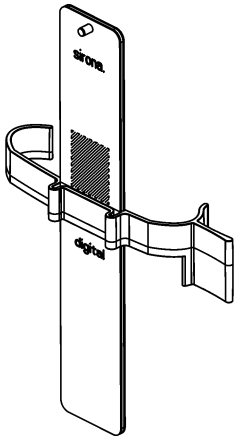
6. Fit the contrast element **(A)** with its hole onto the ear plug.

NOTICE

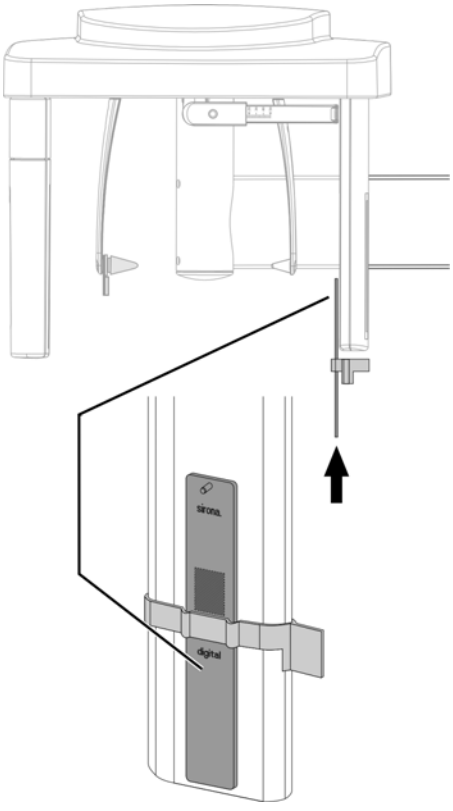
The aluminum plate of the contrast element must face the X-ray tube assembly.



7. Secure the contrast element using a hygienic cap.



8. Attach the ceph test phantom to the clip provided for that purpose.



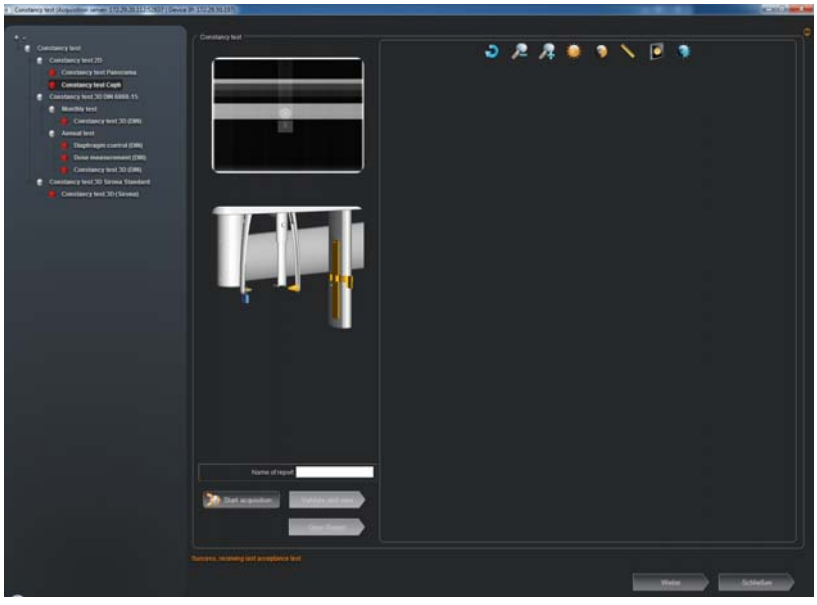
9. Push the ceph test phantom with the clip from **below** on to the secondary diaphragm of the ceph arm.

IMPORTANT
The clip must engage into the opening on the secondary diaphragm provided for that purpose.

2.2.2 Making the PC ready for an exposure

Selecting the test type

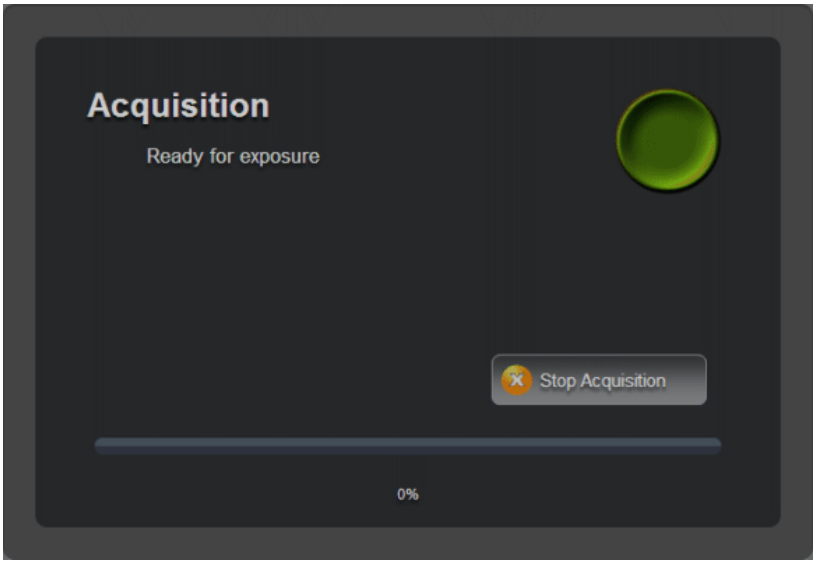
1. In the *"Constancy test"* dialog box, select the option *"Ceph Constancy test"* in directory *"2D Constancy test"*.



2. Press the *"Start acquisition"* button.

3. Move the ORTHOPHOS SL 3D device into the starting position (press the **R** return key on the user interface).

↳ The unit automatically moves to the right exposure position.



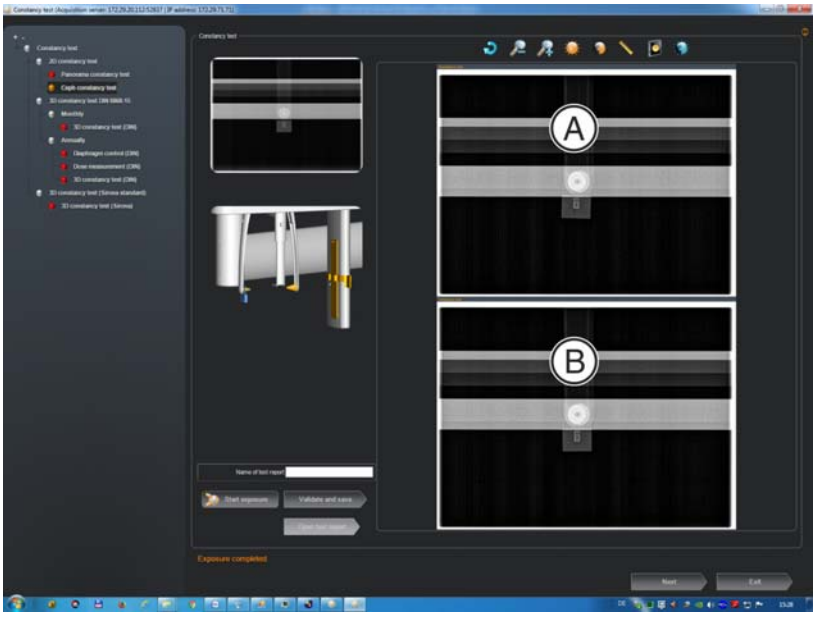
↳ The readiness for exposure window opens.

↳ The following exposure data is displayed on the Easypad:
- Exposure values: 80 kV / 14 mA / 14.9s
- Program: S11 / 4

2.2.3 Releasing the exposure

optical impression

1. Release an exposure.
   ↳ The unit automatically executes a scan sequence.



↳ The **test phantom image** of the acceptance test (A) appears on the SIDEXIS screen as a reference.

↳ Beneath the **test phantom exposure** of the acceptance test, the recently acquired **test phantom exposure** of the constancy test appears (B).

NOTICE

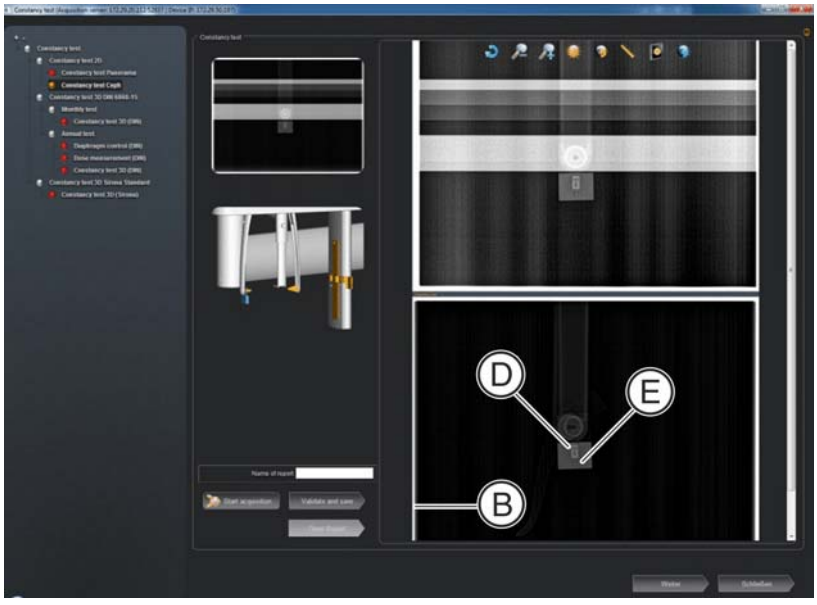
As this is a low-contrast and high-contrast display with minimum dose (in the limit range), the noise component is dominant in the image. The image quality is correspondingly noisy!

2. Remove the contrast element and the test phantom.

2.2.4 Comparing the constancy test image to the acceptance test image

IMPORTANT

The reference image for the constancy test is always the acceptance test image.



➢ Compare the two exposures with each other.

↳ The two exposures must not differ significantly from each other.

➢ Compare the following criteria:

- **Useful beam (B)**

  An unexposed border surrounding the image must be visible on at least two opposite sides.

IMPORTANT

It is permissible for contrast elements to display these at a 1:1 ratio. Use the "Zoom in" button for this purpose.

- **Line pair resolution capacity (D)**

Are the lines of the contrast element visible individually over the entire length (2.5 lp/mm)?

(With any brightness and contrast setting).

- **Low contrast (E)**

  Is at least 1 of the 4 holes visible as contrast difference?

  (With any brightness and contrast setting:)

- **Free from artifacts**

  Visually inspect the image for interfering artifacts.

  – Interfering artifacts include the following:
  – Dust
  – Phantom images
  – Scratches
  – Missing lines and pixels
  – Mask errors
  – Line pulling
  – etc.

NOTICE
Procedure in case of a fault If the tests show errors, please contact your service engineer immediately.

For further details, use tools in the menu bar. These display adjustments cannot be saved with the image, though. See the section “Image tools [→ 30]“.

2.2.5 How to handle invalid exposures

Explanation

You may repeat the test phantom exposure for the constancy test as often as required, e.g. if you have chosen wrong exposure data.

IMPORTANT
Invalid constancy tests containing errors cannot be deleted or overwritten.

2.2.6 Storing the image

➢ Press the *"Validate and save"* button.

↳ The test results are saved with the corresponding exposures.

⚠ 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 adjustments.

➢ Subsequently you must repeat the acceptance test.

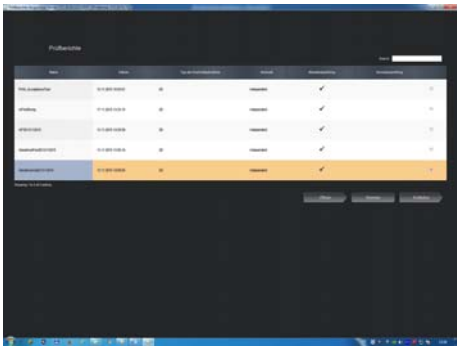
2.2.7 Calling and editing the constancy test test report (test results)

Version 1 / Activation via the *"Constancy test"* dialog box

1. Click the *"Open Report"* button in the *"Constancy test"* dialog box.
   ↳ The *"Report"* dialog box opens.
2. Click on the desired test report in the *"Report"* dialog box.
3. Click the *"Open"* button.
   ↳ The desired test report is opened.
4. Complete the test report.
5. Save the test report accordingly.

Version 2 / Activation via the configuration menu

1. Click on the *"Quality assurance"* button.
2. Click the *"Test Reports"* button on the *"Global"* tab.
   ↳ The *"Report"* dialog box opens.
3. Click on the desired test report in the *"Report"* dialog box.
4. **TIP:** Sort the test reports by clicking on the column headers.
5. Click the *"Open"* button.
   ↳ The desired test report is opened.
6. Complete the test report.
7. Save the test report accordingly.



Calling the exposure

It is possible to view the exposure again outside the test report.

➢ To do so, click on the arrow symbol shown on the top left-hand side.

↳ The corresponding exposure is opened.

Closing the exposure

Close the exposure by clicking on the corresponding arrow symbol.

Image tools

➢ See the section: “Image tools [→ 30]”.

3 3D constancy test (DVT)

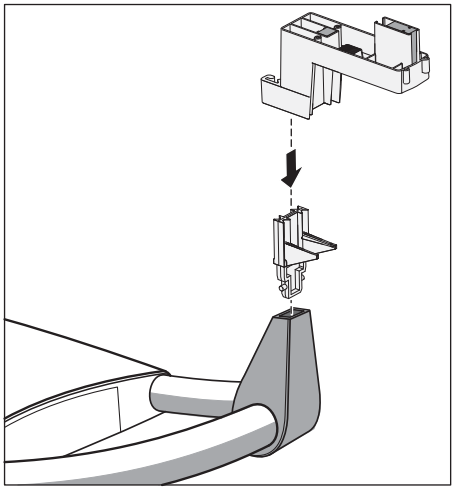
3.1 Preparing the X-ray device

NOTICE

Observe Operating Instructions!

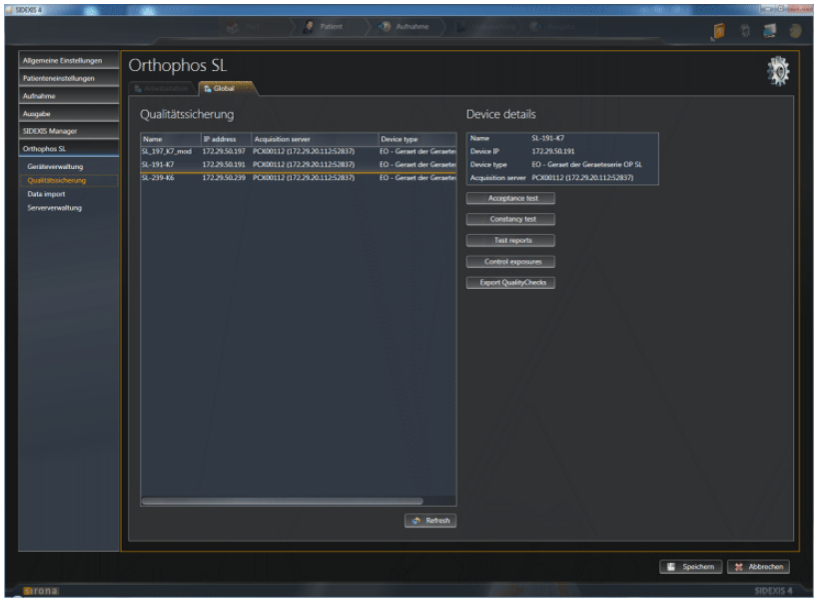
Make sure that no foreign particles are located in the beam path of the X-ray device and that the X-ray device is in its starting position.

1. Remove the bite block from the bite block holder.
2. Remove the forehead and temple supports.
3. Insert the test phantom in the bite block holder.



Selecting the test type

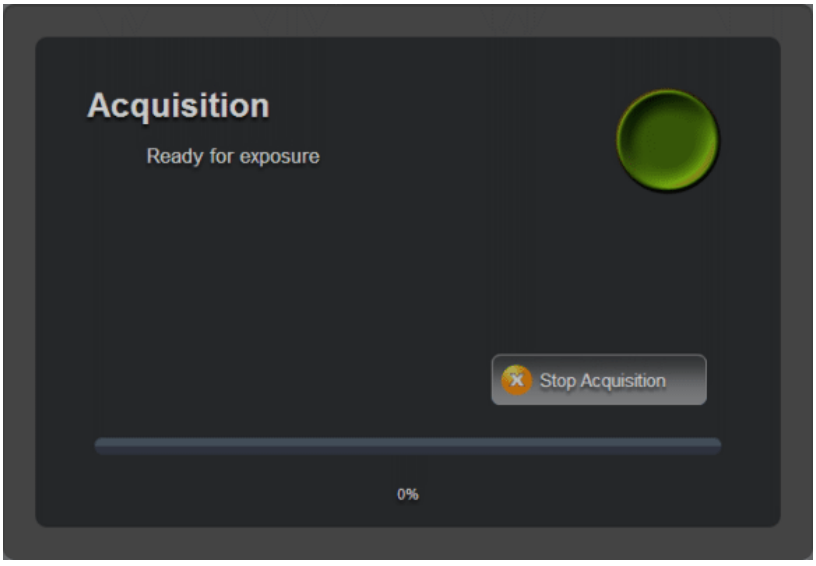
1. Select the *"Constancy test"* button.



↳ The *"Constancy test"* dialog box appears.

2. In the *"Constancy test"* dialog box, select the option *"Constancy test (Sirona)"* in directory *"Constancy test (Sirona Standard)"*.

3. Press the *"Start acquisition"* button.
4. Move the ORTHOPHOS SL 3D device into the starting position (press the **R** return key on the user interface).



↳ The readiness for exposure window opens.

↳ The following exposure data is displayed on the Easypad:
- Exposure values: 85 kV / 22mAs
-Program: S11 / 20

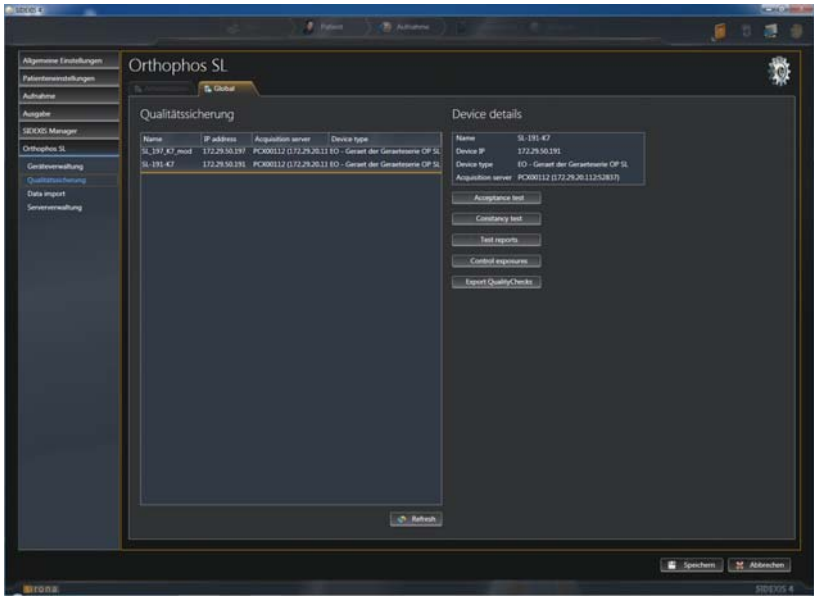
3.2 Selecting the reference image for the constancy test

NOTICE
Recording of the acceptance test always serves as the point of departure for the constancy test.

3.3 Enabling exposure readiness on the PC

Starting the test program

1. Start SIDEXIS 4.
2. On the top right of the system menu, confirm the button for the configuration menu.
3. Click the *"ORTHOPHOS SL"* button in the structure tree.



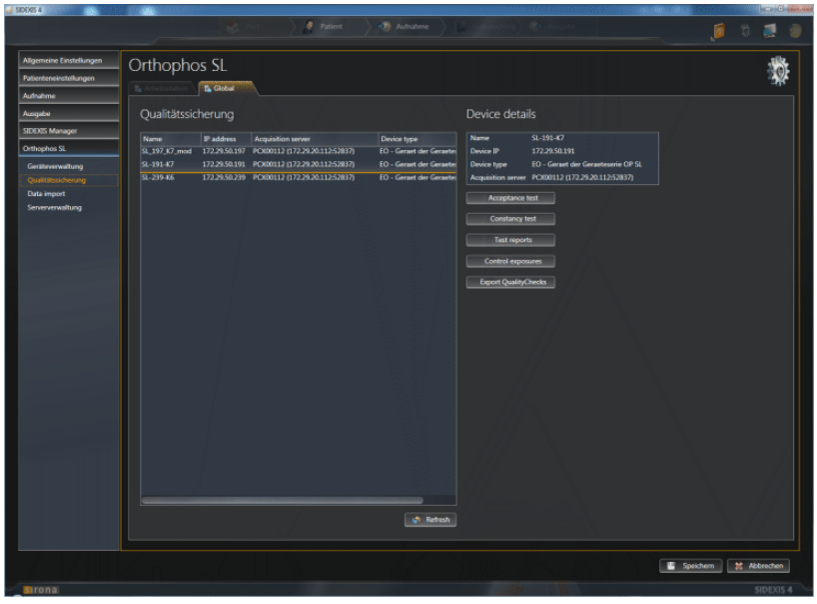
↳ The configuration menu opens.

4. Click on the *"Quality assurance"* button.
5. In the *"Global"* tab, select the appropriate X-ray unit.

↳ The corresponding tests are automatically assigned to the selected X-ray unit.

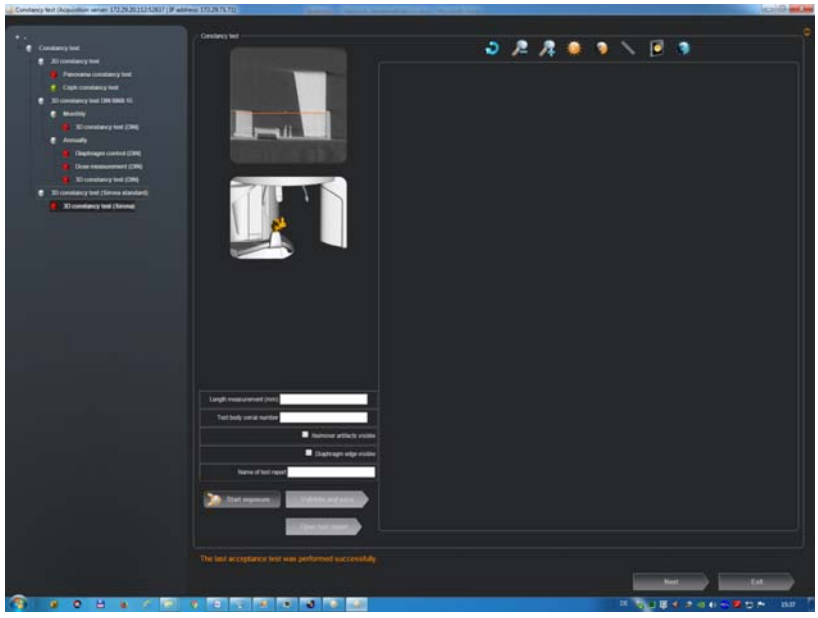
Selecting the test type

1. Select the *"Constancy test"* button.

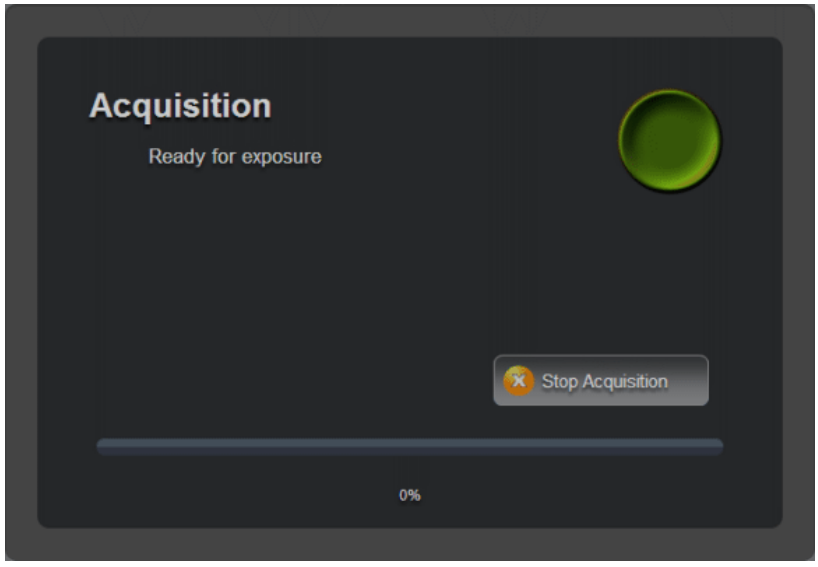


↳ The *"Constancy test"* dialog box appears.

2. In the *"Constancy test"* dialog box, select the option *"Constancy test (Sirona)"* in directory *"Constancy test (Sirona Standard)"*.



3. Press the *"Start acquisition"* button.
4. Move the ORTHOPHOS SL 3D device into the starting position (press the **R** return key on the user interface).



↳ The readiness for exposure window opens.

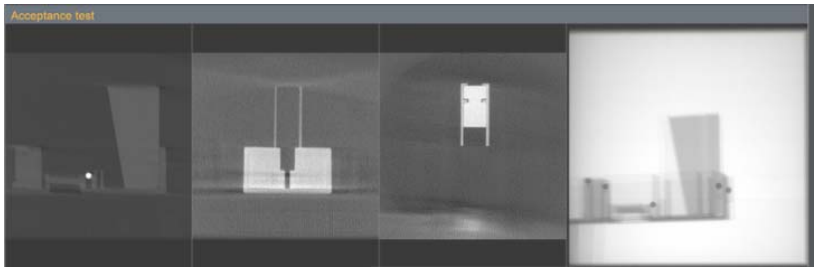
↳ The following exposure data is displayed on the Easypad:
- Exposure values: 85 kV / 22mAs
-Program: S11 / 20

3.4 Taking and evaluating exposures

3.4.1 Exposure

1. Move the X-ray unit to its starting position (Press Return key **R** on the user interface).
2. Release an exposure.

↳ The X-ray exposure of the 3D constancy test is displayed on the user interface.

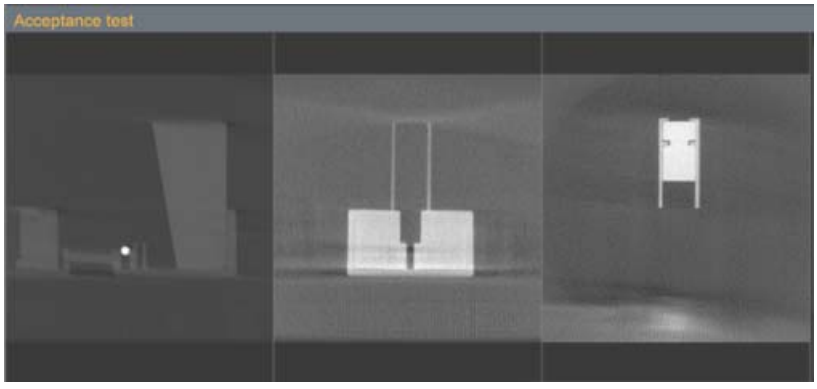


↳ On completion of the exposure, the program performs measurements. If these measurements check out OK, the results are displayed in the test field.

3. Enter the result of the gray level measurement (*"Result GW:"*) and the value of the *"Gray Val:"* field in the **TEST RESULTS 3D (DVT)** form.
4. Enter the result of the pixel noise measurement (*"Result SNR:"*) and the value of the *"SNR:"* field in the **TEST RESULTS 3D (DVT)** form.
5. Enter the result of the low contrast measurement (*"Low Contrast"*) in the **TEST RESULTS 3D (DVT)** form.
6. Enter the result of the modulation transfer function measurement (*"Result MTF:"*) in the **TEST RESULTS 3D (DVT)** form.

3.4.2 Visual check

Artifacts



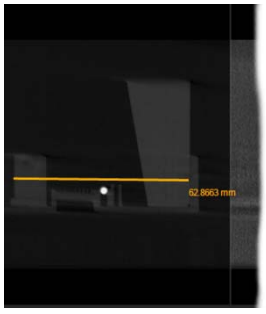
✓ The X-ray images of the 3D acceptance test and the 3D constancy test are open.

1. Compare the X-ray images of the 3D constancy test with those of the 3D acceptance test. No new or stronger artifacts should occur in the X-ray exposures of the constancy test in comparison to the acceptance test.
2. Acknowledge a positive result via the *"No/few artifacts visible"* check box and enter the result in the **3D TEST RESULTS (DVT)** form.

Length measurement

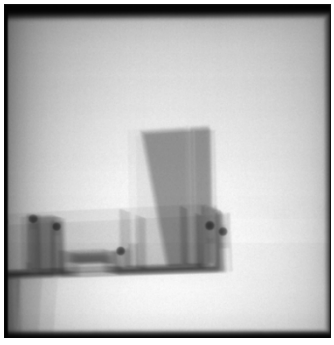
1. Use the “Zoom” image tool to enlarge the left section of the image.

2. Select the “Ruler” tool.



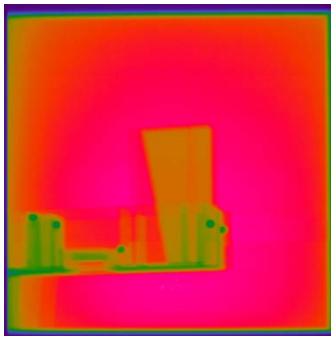
3. Determine the starting point of the length measurement with the mouse pointer.
4. While holding the left mouse button down, drag the mouse pointer to the end point of the length measurement.
5. The distance between the two points is automatically applied and displayed.
6. Enter the value measured in millimeters in the **TEST RESULTS 3D (DTV)** form.
7. Enter the serial number of the test phantom used in the *"Serial number test body"* text box.

Checking the diaphragm border



1. Check the preview image for the diaphragm border. A surrounding diaphragm border must be visible.

2. To improve the representation of the gray level decrease, the “False colors” image tool can be selected.



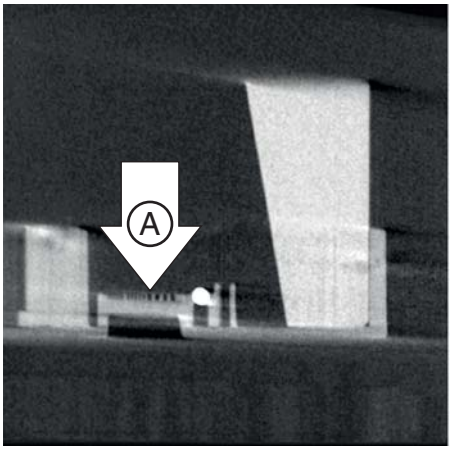
3. Acknowledge a positive result via the *"Rotating diaphragm edge visible"* check box and enter the result in the **TEST RESULTS 3D (DVT)** form.

3.4.3 Checking the high contrast resolution

Explanation

In addition to the electronic measurement value logging of the constancy test, the X-ray image must be checked visually.

Check



✓ The part to be examined (see illustration) is 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 3D (DVT)** form.

3.4.4 Saving the test report

Assigning names

➢ Enter a name for the acceptance test exposure in the *"Name of report"* text box.

The test report can therefore be uniquely assigned.

IMPORTANT
Do not use blank spaces!
Do not use blank spaces in the name!

For example: “KP_ORTHOPHOS_3D_03.2015”

The test report can therefore be accordingly found in the overview list.

Saving the test report

➢ Press the *"Validate and save"* button.

↳ The test report is saved with the corresponding exposures.

⚠ 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 adjustments.
➢ Subsequently you must repeat the acceptance test.

Completion

1. Quit the acceptance test dialog box by clicking the *"Exit"* button.
2. Remove the test phantom from the bite block holder.

3.4.5 Completing the test report

Explanation

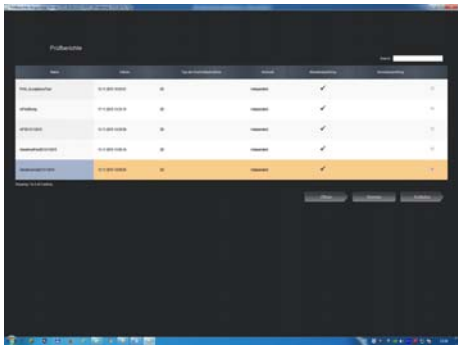
Following the measurements and testing, the test report must generally be completed again manually.

Either the printed test report or the test report that can be generated from SIDEXIS can be used to complete the test report.

Calling the test report that can be generated

1. In SIDEXIS 4, call the *"ORTHOPHOS SL"* configuration menu.
2. Click on the *"Quality assurance"* button.
3. Click the *"Test Reports"* button in the *"Global"* tab.
   ↳ The *"Report"* dialog window opens.
4. Click on the desired test report in the *"Report"* dialog box.
5. **TIP**: Sort the test reports by clicking on the column headings.
6. Click on the *"Open"* button.

↳ The desired test report opens.



Completing the test report

➢ Complete the test report:

- Complete the missing fields

Calling the exposure

It is possible to view the exposure again outside the test report.

➢ To do so, click on the arrow symbol shown on the top left-hand side.

↳ The corresponding exposure is opened.

Closing the exposure

Close the exposure by clicking on the corresponding arrow symbol.

Image tools

➢ See the section: “Image tools [→ 30]”.

Saving the test report

➢ Press the *"Validate and save"* button.

↳ The test report is saved with the corresponding exposures.

⚠ 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 adjustments.

➢ Subsequently you must repeat the acceptance test.

4 Exiting the constancy test program

NOTICE

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

NOTICE

Exiting SIDEXIS

Before exiting SIDEXIS, you must exit the constancy test program.

➢ Click the *"Save"* button in the *"Quality assurance"* configuration menu.

↳ Quality assurance is closed.

NOTICE

For constancy tests only: If the values required for the constancy test are not achieved, please contact a service engineer.

5 Appendix

5.1 Image tools

Explanation

The image tools can be used to optimize the view of the test points required for the quality test.

Only the view is changed in this case. The actual exposures remain unchanged.

Reset

All changes are reverted by pressing this button.

Zoom out

The size of the view is reduced in stages with this button.

Zoom in

The size of the view is enlarged in stages with this button.

Brightness

The brightness of the view is increased in stages with this button.

Contrast

The contrast of the view is increased in stages with this button.

Ruler

Distance can be measured with this tool.

Invert

Grayscale of the view is inverted by pressing this button.

False colors

By pressing this button, the grayscale of the view is represented with false colors.

We reserve the right to make any alterations which may be required due to technical improvements.

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Sirona Dental Systems GmbH

Fabrikstraße 31
D-64625 Bensheim
Germany
www.sirona.com

Contact in the USA:
Sirona Dental, Inc.
4835 Sirona Drive
Charlotte, NC 28273
USA

Order No **65 70 506 D3632**