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MAMMOMAT Revelation

Operator Manual – Tomosynthesis (Option)

VC10 or higher

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VC10 or higher

Legend



Indicates a hint

Is used to provide information on how to avoid operating errors or information emphasizing important details



Indicates the solution of a problem

Is used to provide troubleshooting information or answers to frequently asked questions



Indicates a list item



Indicates a prerequisite

Is used for a condition that has to be fulfilled before starting a particular operation



Indicates a one-step operation

1

2

3

Indicates steps within operating sequences

Italic

Is used for references and for table or figure titles



Is used to identify a link to related information as well as previous or next steps

Bold

Is used to identify window titles, menu items, function names, buttons, and keys, for example, the Save button

Blue

Is used to emphasize **particularly** important sections of the text

UI text

Is used for on-screen output of the system including code-related elements or commands

User text

Is used to identify inputs you need to provide

Menu > Menu Item

Is used for the navigation to a certain submenu entry

 CAUTION

CAUTION

Used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or material damage.

CAUTION consists of the following elements:

- Information about the nature of a hazardous situation
- Consequences of not avoiding a hazardous situation
- Methods of avoiding a hazardous situation

 WARNING

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

WARNING consists of the following elements:

- Information about the nature of a hazardous situation
- Consequences of not avoiding a hazardous situation
- Methods of avoiding a hazardous situation

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1 System overview



Please be aware that this Operator Manual Tomosynthesis is just one option.

Only the complete manual is valid:

- Operator Manual - MAMMOMAT Revelation system
- Quality control manual
- Safety Hints - *syngo* VI10A
- Tomosynthesis Option

1.1 Intended use for Canada

The MAMMOMAT Revelation system with the option Tomosynthesis is indicated for acquisition of 2D as well as 3D digital mammography to be used in screening and diagnosis.

The screening examination may consist of a 2D FFDM image set with or without the 3D image set. The views included in the image set will be determined by the screening protocol and/or the requirements of the diagnostic indication.

1.2 System description

MAMMOMAT Revelation is supporting the Tomosynthesis Option.

With tomosynthesis, three-dimensional information can be obtained by taking exposures from different angles. This significantly reduces the tissue overlap problem which limits diagnosis in conventional mammography. Tomosynthesis is displayed and controlled at the workstation.

In tomosynthesis, the X-ray tube rotates in a defined angular range. During the acquisition, several X-rays are taken from different directions. Each of these single exposures is taken with a very low dose. Due to the different acquisition directions, the set of 2-dimensional X-ray images contains the 3D information of the object, allowing the volume of the breast to be reconstructed by appropriate software algorithms and visualized in the form of slice images.

During tomosynthesis acquisition, the swivel arm of the MAMMOMAT Revelation covers an angular range from +25° to -25° while 25 views are acquired.

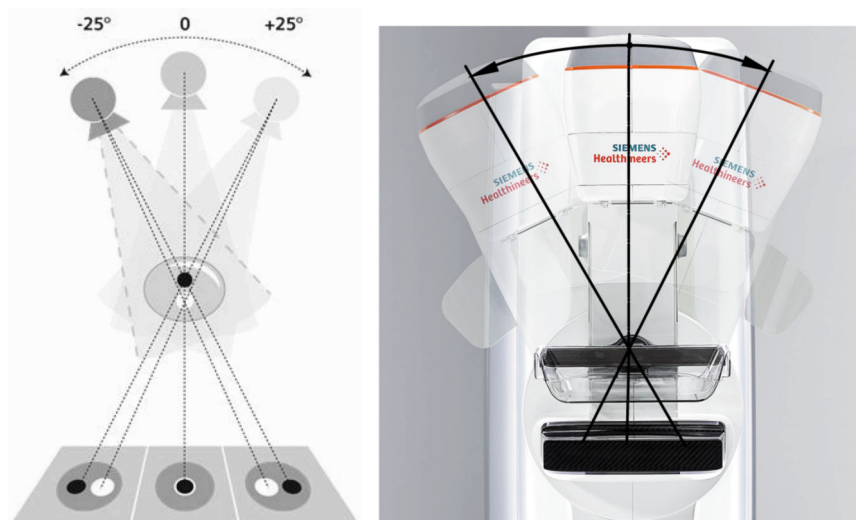


Inform the patient in detail about the examination procedure, in particular about the time required and the automatic movement of the swivel arm.



- (1) Face shield
- (2) Compression plate

1.2.1 Acquisition principle

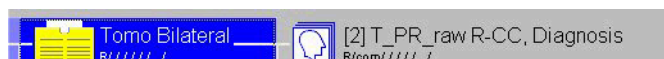


1.2.2 Tomo scan

Generated data set of a definite view, consisting of raw projections and/or processed projections and/or the slices or combinations of these.

1.2.3 Raw projections

Single image taken during the tomo scan. 25 projections are acquired during the sweep of 50° , every other degree one projection. The projections are saved as DICOM MG objects.



1.2.4 Processed projections

If the processing of projections is activated, projections acquired during a tomo scan are processed with 2D image processing for better visualization. Per default the processing is deactivated. These images are saved as DICOM MG for presentation.

When using **2D + Tomo** the first image of the stored projections series is the 2D image.

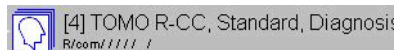


1.2.5 First view

First exposure during tomo scan where the swivel arm is at an angle of 0°. When using **2D + Tomo** the first image is the 2D image.

1.2.6 Slices

Stack of images parallel to the detector surface reconstructed from projections with the purpose of display at the workstation monitor.



1.2.7 Insight 2D (Option)

2D image generated from a corresponding tomosynthesis data set. Specific image processing may have modified the appearance of anatomical structures compared to reconstructed slices and projection images.



Insight 2D images are marked with a fixed label "IN 2D".

1.2.8 Insight 3D (Option)

3D image generated from a corresponding tomosynthesis data set. Specific image processing may have modified the appearance of anatomical structures compared to reconstructed slices and projection images.



Insight 3D images are marked with a fixed label "IN 3D".

 **CAUTION**

Insight 2D or Insight 3D images are derived from tomosynthesis acquisition data. Image processing may have modified the appearance of anatomical structures compared to FFDM.

Risk of incorrect diagnosis!

- ◆ Insight 2D or Insight 3D images should only be reviewed together with tomosynthesis slices.

1.2.9 Empire technology (Option)

Unique, multiple algorithms, providing superior image quality in both contrast and detail.

1.2.10 Bounding box

Region of interest, describing the area that will be reconstructed. Using the handles you can adjust the bounding box to the breast tissue area to be reconstructed for slices.

1.2.11 Reconstruction

The calculation of the stack of slices (3D volume) from the projections using a reconstruction algorithm.

1.2.12 Reprocessing

Processing of the projections and 2D image with new image processing or reconstruction parameter set.

1.2.13 Automatic movement of the swivel arm

25 views are acquired in an angular range from -25° to $+25^\circ$.

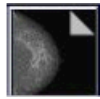


The exposure release button on the control box or on the foot or hand switch must be pressed and held during all exposures.

- The swivel arm is in the 0° position.
 - The first view is acquired for automatic exposure control.
- Swivel arm moves to -25° , second exposure is taken.
- The swivel arm covers the entire angular range from -25° to $+25^\circ$ while an exposure is taken at every 2° .
- Swivel arm returns to the start position.



- Release the exposure button.
- The first view is displayed.
- The slices are automatically reconstructed and then displayed.
- The projections are processed and displayed if activated (by default deactivated).



Inform the patient in detail about the examination procedure, in particular about the time required and the automatic movement of the swivel arm.

1.2.14 Compression plate

The following compression plates can be used for a tomo examination:



Compression plate 25 cm x 36 cm High for tomo examination, tomo quality test only

Compression plate 24 cm x 30 cm Low for tomo examination



Compression plate 22 cm x 26 cm High for tomo examination



Compression plate 18 cm x 24 cm High for tomo examination



Compression plate 12 cm x 24 cm Low for tomo examination

1.2.15 Tomo face shield

A special face shield must be used during tomo examinations:



(1) Face shield



Make sure that the special face shield is always used during a tomo examination if there is a risk that the patient's head can enter the beam path.

1.3 System setting

Before beginning with the tomo examination, the appropriate compression plate and the tomo face shield must be attached to the MAMMOMAT Revelation.

1.3.1 Type of calibration

Your MAMMOMAT Revelation offers a large number of different types of examinations. To ensure the optimal detector settings for each type in all cases, the following different types of calibrations are performed:

Type of calibration	Special features
CONTACT	none
MAGNIFICATION	without magnification table
TOMOSYNTHESIS	none

If the difference between the detector temperature and the calibration temperature deviates more than 7°C the calibration has to be repeated. A warm up of at least 30 minutes of the MAMMOMAT Revelation is necessary in order to ensure optimal results in the image quality.

1.3.2 Calibration intervals

As a rule, the detector should be calibrated every 3 months.

The calibration should also be performed if the current room temperature deviates by more than 7 °C from the temperature at the last calibration.



Calibration is performed without a compression plate. It is recommend that the tomosynthesis calibration be performed after contact calibration.

1.3.3 Performing detector calibration

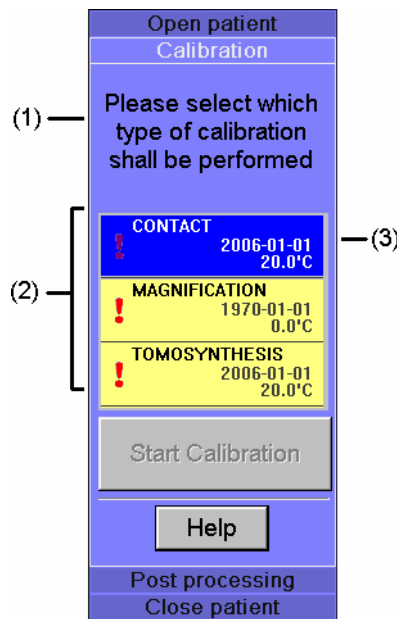
Preparing the swivel arm Before you begin calibration, you have to set the swivel arm up for the calibration.

- 1 Install the 40 mm Plexiglass plate on the swivel arm so that the entire image area is covered.
- 2 Move the swivel arm to the 0° position.
- 3 Remove the compression plate.

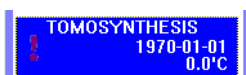
Starting the calibration 1 Select **Patient > Detector Calibration** from the main menu of the **Examination** task card.

Calibration is automatically registered.

The **Calibration** subtask card is displayed.



- (1) Next required step
- (2) Area for selection of type of calibration
- (3) Date of the last calibration for the respective type of calibration (if a "!" appears, the calibration is overdue)



2 Click the **TOMOSYNTHESIS** type of calibration.



When the calibration subtask is selected, the exposure parameters are automatically correctly set and displayed in the generator control field for each anode/filter combination.

See register: Examination, section Generator control field



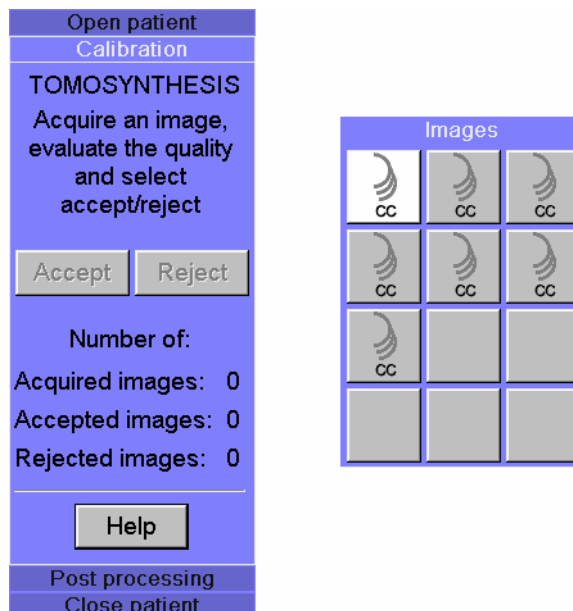
Please note that for the TOMOSYNTHESIS calibration type, the calibration can only be repeated five times. After that the system has to be restarted.

3 Click **Start Calibration**.

Calibration images

When calibration is started, the **Calibration** subtask card for selected typ of calibration changes. The number of projection views to be aquired is shown in the **Images** subtask card.

You must process all displayed projection views.



1 Press the exposure button on the control box until all 26 exposure pulses have been completed. The gantry will remain in 0° position.

Radiation is released and the first calibration image is taken.

After the exposure is complete, the finished image is displayed in the image area.

2 Click **Accept** if the exposure is suitable for calibration.

Windowing may be required to check image quality.

The detector is re-calibrated on the basis of the calibration image.

– or –

Click **Reject** if the exposure is not suitable.

The calibration image is rejected and a new exposure is automatically added.

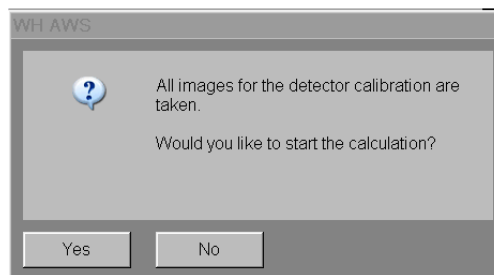
3 Continue acquiring calibration images until you have aquired all projection views.

The number of accepted and rejected exposures is counted in the **Calibration** subtask card.

1.3.4 Ending detector calibration

The calibration process ends as soon as you have calibrated the detector by acquiring all the projection views in the **Images** subtask card.

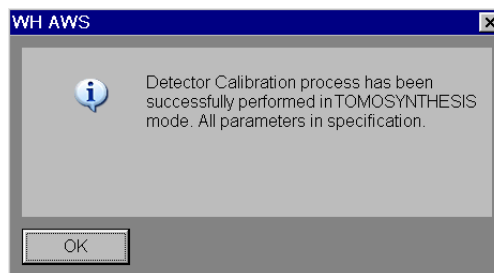
The following message window appears:



Confirm the message window by clicking **Yes** to start calibration calculation.

Calculation successful

The following message window appears when the calculation is successful:



1 Confirm the message window with **OK**.

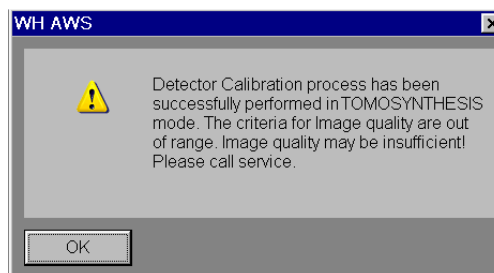
The calibration closes automatically.

2 Remove the 40 mm Plexiglass plate.

You can select and evaluate the calibration results. The results are available in the Service menu, see the "Check calibration results" section in the Operator Manual.

Calculation unsuccessful

The following warning window appears when the calculation is unsuccessful:



This message means that several non-functioning pixels were found during the calibration. This requires a system check by a Siemens service technician. The results are available in the Service menu, see the "Check calibration results section" in the Operator Manual.

- ◆ Call a Siemens service technician or a technician trained by Siemens.



Until the analysis by the service technician, clinical operation may continue if:

- the daily checks run without errors
- there are no visible artifacts
- the quality authorities have no objections

2 Tomosynthesis examination

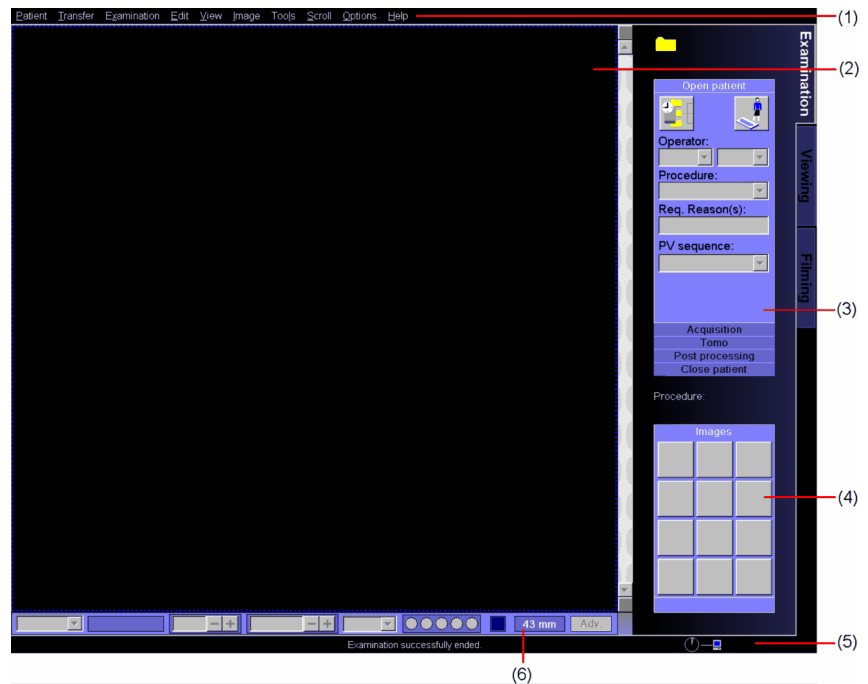
This chapter describes a standard tomo examination. The examination is controlled at the workstation with preset examination parameters.

For information about the control and display elements of the tomo examination see (→ Page 13 *System setting*).

For further information on performing the examination at the workstation and changing examination settings, see the MAMMOMAT Revelation Operator Manual.

2.1 Layout of the Examination task card

The **Examination** task card is divided into different functional areas:



- (1) Menu bar
- (2) Image area
- (3) Stack of subtask cards
- (4) Control area
- (5) Status bar
- (6) Generator control field

2.2 Preparations

2.2.1 General preparations

✓ It is assumed that the MAMMOMAT has been correctly installed and started up.

- 1 Prepare the MAMMOMAT for tomo mode.
- 2 Inform the patient about the examination procedure.

2.2.2 Registering a patient

At the beginning of an examination the patient must be registered via the RIS/Scheduler or manually.



- 1 To open the **Patient Registration** window, click this button.
- 2 Enter the required examination data in the **Patient Registration** window.
- 3 Click the Exam button.

The **Examination** task card is opened.

2.2.3 Performing the examination settings

The settings for the tomo examination are performed in the subtask cards of the **Examination** task card.

The corresponding image processing for each acquisition mode is assigned in the Service menu.

Examination procedure

- 1 Select the required tomo procedure in the **Procedure** list.

The projection sequence preset for the procedure is displayed in the **PV sequence** list.



If the **Procedure** can not be changed please disable the first **PV (projection view)**.

- 2 If necessary, select the **Operator(s)**.
- 3 Adjust the examination parameters, if necessary.

CAUTION

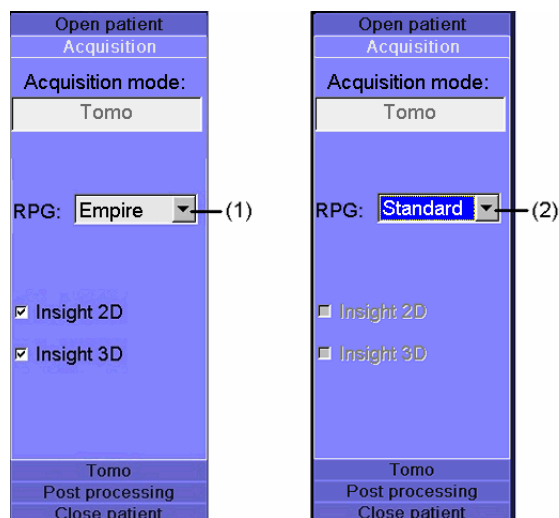
The use of the PRIME + Tomo acquisition mode for breasts with implants.

Repeated image!

- ◆ Don't use **PRIME + Tomo** acquisition mode for breasts with implants.

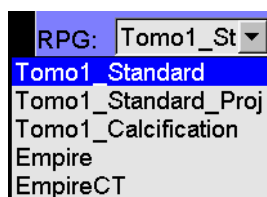
Examination parameters 1 Click the **Acquisition** subtask card into the foreground.

The corresponding acquisition mode and Reconstruction Parameter Group (RPG) for the selected procedure are shown in the **Acquisition** subtask card.



(1) Procedure: Tomo, RPG: *Empire* -> image processing/algorithms required to calculate **Insight 2D/Insight 3D** images

(2) Procedure: Tomo, RPG: *Standard* -> image processing for a standard tomo examination (no calculation for **Insight 2D /Insight 3D**) is possible



2 If required, a different or customized RPG can be selected for standard Tomo examinations. All configured RPGs are shown in the drop down list.

3 For RPG *Empire* you can activate additionally **Insight 2D** or/and **Insight 3D**.

Acquisition mode	RPG	Insight
Tomo	Standard	-
	Standard_Proj	-
	Standard_Calc	-
	Standard_no_seg	-
	Empire	Insight 2D Insight 3D
	EmpireCT	-
	Standard_Phantom	-
	Empire_Phantom	-



The Empire Technology / Algorithms for **Insight 2D/Insight 3D** calculation is an option and only available with the appropriate licence.

2.2.4 Positioning the patient

The tomo examination is intended for seated or standing patients.

- Seated positioning**
- ◆ Use a suitable fixable chair with a rigid back rest to fix the posture of the patient in relation to the swivel arm.

The breast should not be able to slip due to movement of the patient.



Ensure that the patient is positioned correctly.

Please note that the face shield also moves when the swivel arm moves.

The patient's head must not lean against the face shield while the swivel arm is moving.

2.2.5 Compressing the breast



All preparations for the examination must have been made before the compression.

The breast must remain compressed until all exposures have been taken.

CAUTION

If breast implants are not taken into consideration, this will lead to errors in treatment and incorrect settings during the examination.

Risk of injury during compression and tomo examination!

- ◆ Ask the patient about existing implants prior to the examination. Inform the patient about the risks of providing false information.
- ◆ Adjust the preparation and examination of the patient accordingly (e.g., performing compression, system parameter settings).

Performing compression

- 1 Lower the compression plate with the control knob or foot switch and compress the breast with a force of at least 30 N to prevent the breast from moving.
- 2 Patients with implants, or patients who recently have had breast surgery, must not be exposed to "optimized compression" OPCOMP.

CAUTION

Unintended decompression during procedure

Repetition of examination necessary!

- ◆ Move the foot switches outside the reach of the patient and personnel as soon as the patient's breast is compressed.



Please note that a message box is displayed if the thickness of the compressed breast is between 80 and 100 mm:

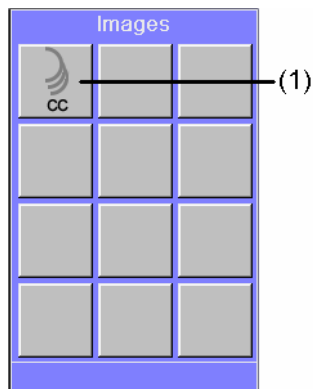
- The image quality is limited.

Please note that a message box is displayed if the thickness of the compressed breast is > 100 mm:

- Only slice images from 1 to 100 mm will be reconstructed.
- No slice images of more than 100 mm will be calculated.

2.3 Acquiring exposures

The exposure to be taken is shown in the **Images** subtask card of the **Examination** task card.



(1) Tomo acquisition

During tomo acquisition, 25 exposures are released. The exposures are acquired successively.

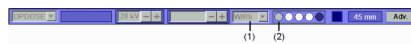
2.3.1 Acquiring tomo images



1 Double-click on the projection view to activate the tomo exposure.

The detector parameters are loaded.

The following settings for a tomo examination cannot be changed:



- (1) The anode/filter combination is always W/Rh.
- (2) Tomo examinations are acquired without grid.



For tomosynthesis acquisitions, different dose levels are available. The dose levels *Medium high* and *High* have longer exposure times which might be visible in the image as blurring.



If the emergency STOP button is pressed during a tomosynthesis examination:

- The examination will be aborted.
- The Entrance Dose will not be correctly displayed in the image.
- All other values (e.g. mAs-, kV values) will be correctly displayed in the image.

2 Check the exposure parameters and adapt them, if necessary.

Tomo images can be taken using the OPDOSE, AEC or MANUAL exposure mode.



The following message appears as soon as the mAs is too high or too low:

Calculated mAs outside valid range.

Please change to AEC mode.

At low compression thickness < 20 mm, reduce the kV in 1 kV increments. For larger compression thicknesses > 50 mm increase the kV in 1 kV increments.

To switch to AEC mode, select the AEC acquisition mode on the generator control panel.

The AEC value set previously is retained and the kV can be increased in 1 kV increments.



- 3 Press and hold the exposure button on the control box as long as the signal is audible.

The button will light up yellow during the exposure.

Radiation is released and tomo images are acquired.

CAUTION

Collision with swivel arm during acquisition.

Injury to patient or operator by pinching!

- ◆ Ensure that there is no risk of collision within the tube arm swivel range ($\pm 25^\circ$) during tomo acquisition.

CAUTION

Tube arm stops or object table moves unintentionally during acquisition.

Patient or operator is squeezed!

- ◆ If the tube arm suddenly stops before reaching end position or object table moves during tomo or stereo acquisition, release the exposure button and decompress. Call service for system check-up.

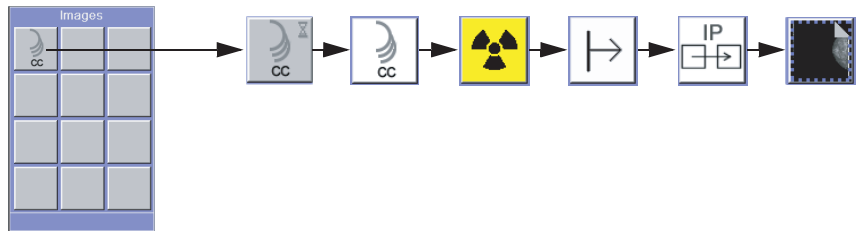
Exposure parameters for 3D implant exposures



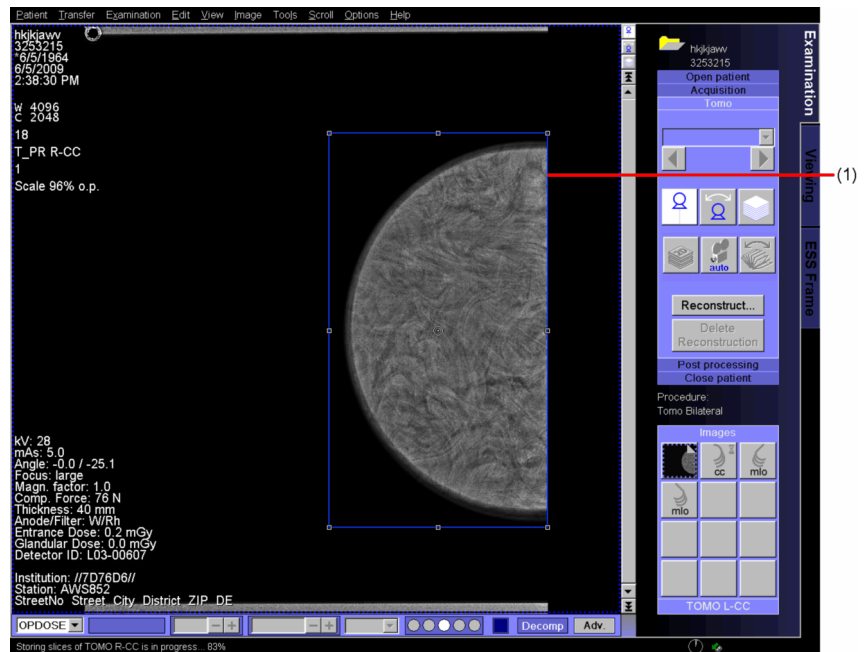
The parameters for the Tomo Implant and 2D+Tomo Implant acquisition modes are shown in the **EXPOSURE Programs** tab card in the **Procedure Handling Configuration** window.

Projection view status

In the **Images** subtask card, the individual projection views up to the reconstructed tomo data set are shown as follows:



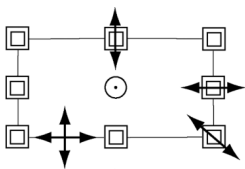
The first view is shown with the bounding box (1). It shows the reconstructed area.



2.3.2 Modifying the bounding box

The bounding box should enclose the entire breast. If the bounding box turns out to be too small or too large, you can modify it with the cursor after the initial reconstruction was performed.

If you click the mouse in the bounding box, the cursor changes its appearance and you can edit the graphic.



1 Place the cursor on one of the handles.

2 Increase or reduce the size of the region until it meets your requirements.

– or –

Move the region in the image. To do so, place the cursor on the contour line between the grab handles.

3 Click the **Reconstruct...** button in the **Tomo** subtab card.

The tomo images will be reconstructed, see (→ Page 32 *Reconstructing tomo images*).



Please note that each parameter set from the **Reconstruction parameter group name** list has different reconstruction properties:

- **Standard** is used for all standard tomo examinations.
- **Standard_Proj** is used for all standard tomo examinations. Additionally the processed projections are available.
- **Standard_Calc** is used in cases where an additional tomo reconstruction is required with a particular focus on micro calcifications.
- **Standard_no_seg** is used for special tomo examinations where the background should be not set black.
- **Empire** is used for all standard tomo examinations.
- **EmpireCT** is used for all standard tomo examinations.
- **Standard_Phantom** is used for phantom tomo examinations.
- **Empire_Phantom** is used for phantom tomo examinations.

2.3.3 Status bar and image text

The status bar shows the progress of the reconstruction of slices (1) and the projection processing (2) in percent.



When calculating the projections, the initial first view is included so that 26 projections are processed.

When all 26 slices/projection views have been generated, the view changes to the **Tomo** subtask card.

2 Tomosynthesis examination

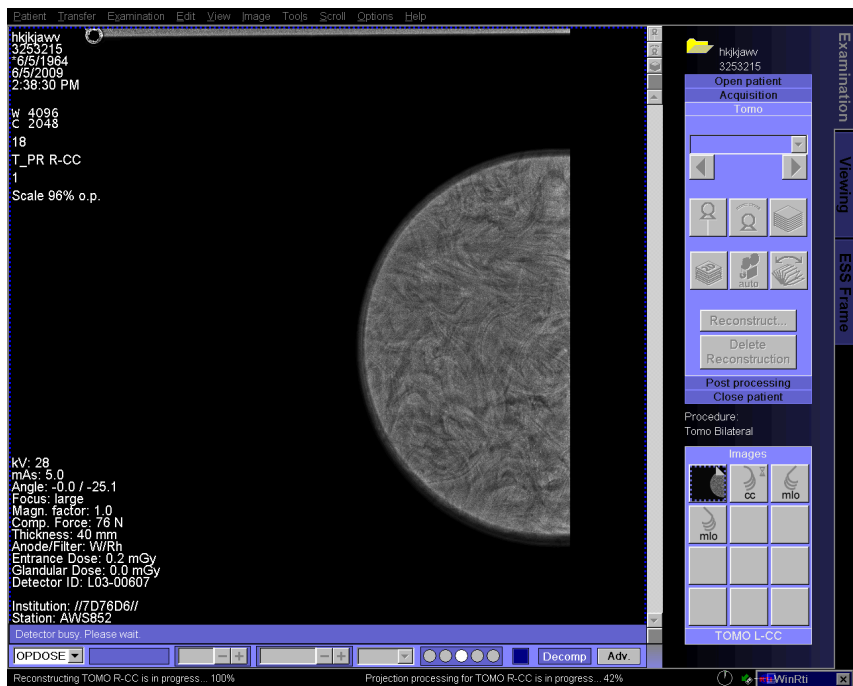


Image text projection images

kV: 28	_____	(1)
mAs: 5.0	_____	(2)
Angle: -0.0 / -25.1	_____	(3)
Focus: large	_____	(4)
Magn. factor: 1.0	_____	(5)
Comp. Force: 76 N	_____	(6)
Thickness: 40 mm	_____	(7)
Anode/Filter: W/Rh	_____	(8)
Entrance Dose: 0.2 mGy	_____	(9)
Glandular Dose: 0.0 mGy	_____	(10)
Detector ID: L03-00607	_____	(11)

- (1) kV value
- (2) mAs value
- (3) Angle of set projection view/projection angle during the exposure
- (4) Focus
- (5) Magnification factor
- (6) Compression force
- (7) Breast thickness
- (8) Anode/filter combination
- (9) Entrance dose
- (10) Glandular dose/projection
- (11) Detector ID

Image text slice images

```

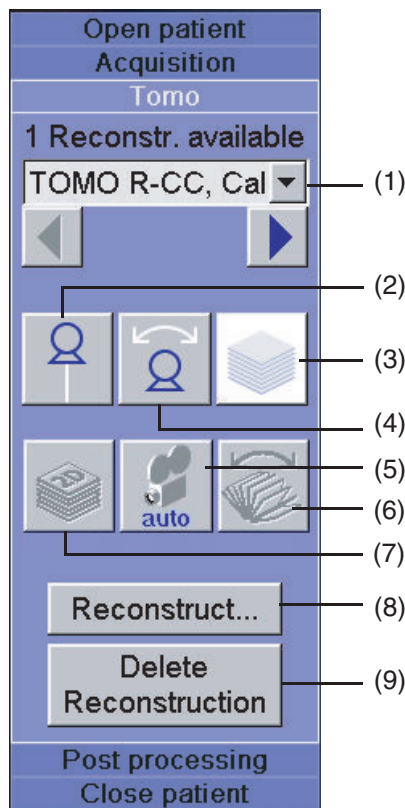
kV: 28
mAs: 55.0
Angle: -0.0 / -25.1
Focus: large
Comp. Force: 56 N
Slice Height: 0 mm of 45 mm —(1)
Slice Thickness: 1 mm —(2)
Anode/Filter: W/Rh
Entrance Dose: 2.3 mGy
Glandular Dose: 0.5 mGy —(3)
Detector ID: L03-00607

```

- (1) Slice height, measured starting from the surface of the detector cover
- (2) Slice thickness
- (3) Glandular dose of complete scan

2.4 Displaying/processing tomo examination images

Tomo examination images can be processed in the **Tomo** subtask card in the **Examination** task card.



- (1) Information bar, projection and reconstruction parameter group (RPG)
- (2) Display first view (when using **2D + Tomo** display 2D image)
- (3) Display reconstructed slices
- (4) Display projection image
- (5) Play automatic movie

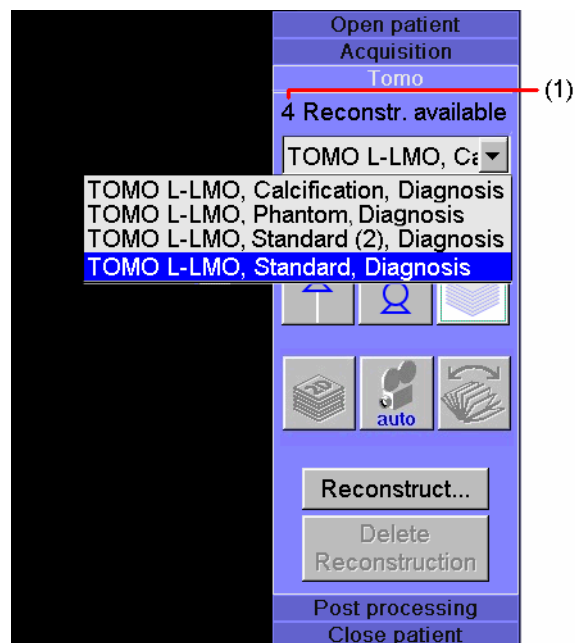
- (6) Display Insight 2D images
- (7) Display Insight 3D images
- (8) Reconstruct tomo images
- (9) Delete selected reconstructed tomo images



Subsequent acquisition must be deactivated in order to process tomo examination images.

2.4.1 Display of reconstructions

- 1 If necessary, select a different reconstruction sequence in the list.
The selected reconstruction sequence is displayed on the monitor.



The number (1) indicates how many reconstructions there are of a tomo scan.



- 2 If there are several exposures, you can use the arrow buttons to skip to the next set of reconstructions.



Please note that the number of slices depends on the compression thickness, compression plate, and compression force.

The compression plate can bend slightly during breast compression; as a result, there could be differences in the compression thickness shown on the digital stand display and the AWS monitor and the number of reconstructed slices may vary slightly if a re-reconstruction is performed. The upper reconstructed slices do not contain real breast tissue.

2.4.2 Displaying tomo images

You can toggle between the different images.

First view Exposure taken at an angle of 0°.

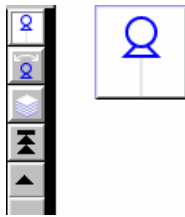
- ◆ Select **View > First view** in the menu bar.

The first view is displayed.

– or –

Click the **Single view** button in the **Tomo** subtask card or in the scroll bar.

Use the shortcut **Ctrl + F1**.



Projection images 25 views from different angles from which the slices are reconstructed.

Note that the acquisitions were taken with a low dose and restricted image quality.



Only available if processing of projections was chosen.

CAUTION

The evaluation of distances in projected tomo images can be inaccurate.

Incorrect measurement results, incorrect diagnosis.

- ◆ Do not use projected tomo images to perform critical measurements.

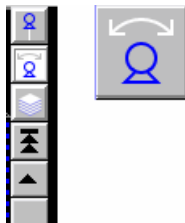
- ◆ In the main menu select **View > Tomo Projections**.

The projection views are displayed.

– or –

Click the **Tomo Projections** button in the **Tomo** subtask card or in the scroll bar.

Use the shortcut **Ctrl + F2**.



Note that projection acquisitions cannot be sent to the **Filming** task card.



Auto Filming is not supported for tomo images.

Slice images These are reconstructed projection-based slices that can be generated with various different reconstruction algorithms (RPG).

- ◆ In the main menu select **View > Slices**.

The slice views are displayed.

– or –



Click the **Slices** button in the **Tomo** subtask card or in the scroll bar.

Use the shortcut **Ctrl + F3**.



If sorting by "Instance Date and Time" is used for a tomosynthesis slice series, the ordering of the slices might be not according to the breast height. Please us sorting according to "slice position" to have the slice ordering regarding breast height.

Insight 2D images 2D image generated from a corresponding tomosynthesis data set.

- ◆ In the main menu select **View > Insight 2D**.

The 2D overview view is displayed.

– or –



Click the **Insight 2D** button in the **Tomo** subtask card or in the scroll bar.

Use the shortcut **Ctrl + F4**.

Insight 3D images 3D image generated from a corresponding tomosynthesis data set.

- ◆ In the main menu select **View > Insight 3D**.

The 3D volumes is displayed.

– or –



Click the **Insight 3D** button in the **Tomo** subtask card or in the scroll bar.

Use the shortcut **Ctrl + F5**.

2.4.3 Reconstructing tomo images

For better visualization of details, tomo images can be reconstructed with different reconstruction parameters, see (→ Page 20 *Performing the examination settings*).

Reconstructing images Reconstructed images are displayed in the **Tomo** subtask card and in the **Patient Browser**.

1 Click the **Reconstruct...** button.

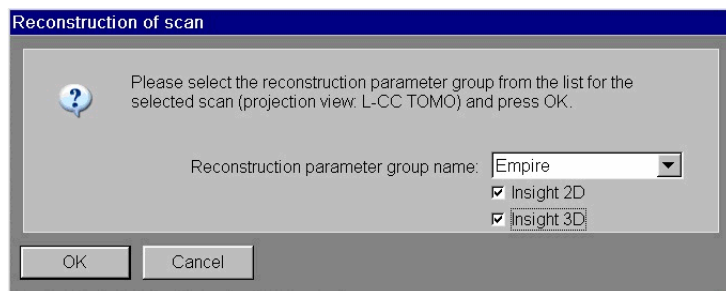
– or –

Click on the image with the right mouse button.

A selection window appears.

2 Select **Reconstruct Tomo Scan...** in the popup menu displayed.

The **Reconstruction of scan** dialog box is displayed:



3 Select a reconstruction parameter from the **Reconstruction parameter group name** list.

E.g.

- **Standard** - is used for all standard tomo examinations
- **Empire** - is used for all standard tomo examinations. Additional you can select the functions **Insight 2D** or/and **Insight 3D**.

CAUTION

The specific Reconstruction parameter group name for calcification is focusing on micro calcification.

Decreased perceptibility of low contrast information of the breast tissue!

- ◆ Use **Standard Reconstruction parameter group name** for all standard tomo examinations in addition to calcification parameter.

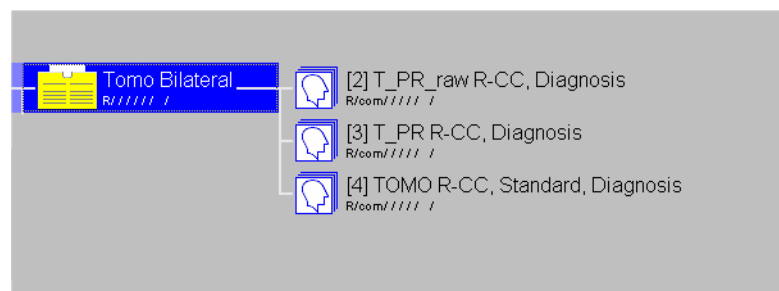
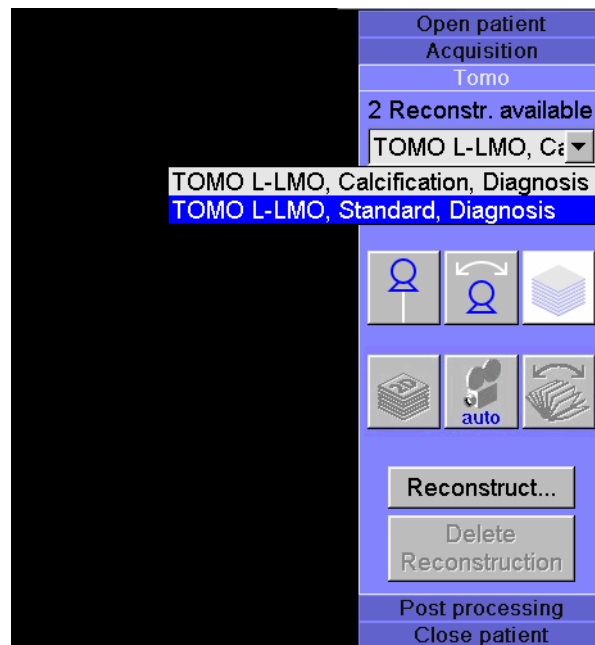


Please note that in some cases it might be necessary to adjust brightness/contrast (or window width and window level) manually each view.

4 Click **OK**.

The tomo images will be reconstructed anew with the selected reconstruction parameter.

At the same time, a new series is saved and displayed with the selected reconstruction parameter in the **Patient Browser**.



i With each additional reconstruction the data volume increases considerably. Therefore, you should save only those reconstructions that are really needed. Before closing the examination, reconstruction data sets that are not required should be deleted.

5 Click **Cancel**.

The **Reconstruction of scan** dialog box closes.

The tomo images remain unchanged.

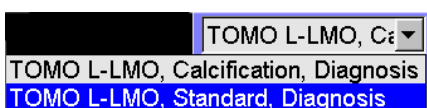
Deleting reconstructed images

You can delete reconstructed images using the pop-up menu or the **Delete Reconstruction** button.



1 Click the **Slices** button in the **Tomo** subtask card.

The reconstructed slices are displayed.



2 Select a reconstruction e.g. **TOMO L-LMO, Standard, Diagnosis** from the list.

3 Click the **Delete Reconstruction** button.

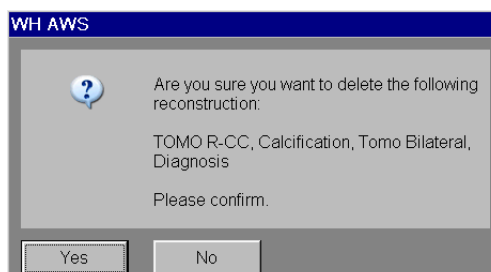
– or –

Click on the image with the right mouse button.

A selection window appears.

- 4 Select **Delete Reconstruction** in the popup menu displayed.

The following message window appears:

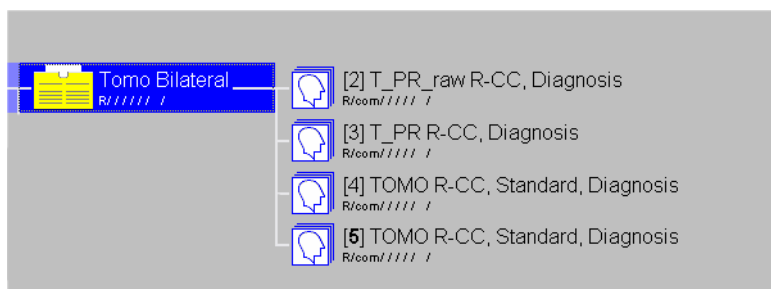


- 5 Click **Yes** to make the changes.

The stored series with the selected reconstruction parameter in the **Patient Browser** are deleted.

– or –

Click **No** if you don't want to make the changes.



If a reconstruction is deleted, the corresponding **Insight 2D** and **Insight 3D** images will be also deleted.

2.4.4 Playing back motion images (movie/cine)

Abnormalities in the images are generally easier to detect if you view the images in quick succession like a movie. The **Tomo** subtask card provides a function for fast, automatic scrolling through the images of a series.



During playback of the movie, data sets should not be corrected or rearranged.

Layout and display mode

- 1 In the menu bar, select the stack display (**View > Slices**) to view a series as a movie.
- 2 Select a large enough layout so that you can see all details. Recommended layout: **1 : 1** The movie takes up the whole screen.

Automatically playing back a movie

If you want to ensure a constant playback speed, you can have the movie played back automatically. In this mode you can change a number of settings for movie playback.

In the **Movie Properties** subtask card, you can:

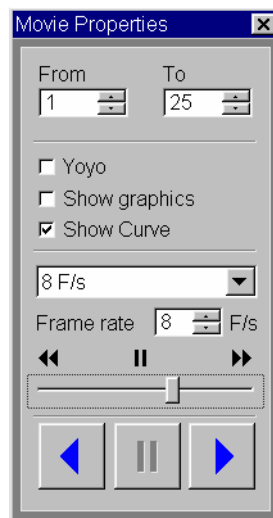
- Exclude irrelevant first/last images
- Pause and restart the movie
- Change the playback speed and direction

Starting the movie



- ◆ Click the **Movie Properties** button.

The **Movie Properties** subtask card is displayed.



Excluding first/last images

- ◆ Use the spin boxes **From** and **To** to specify which images are to be included in the movie.

In this way, you can exclude irrelevant first and last images. This setting can **not** be changed while the movie is being played back.

Pausing the movie, scrolling forward and back in steps



- ◆ Click the Stop button to pause movie playback.

Scroll through the image stack step by step using the scroll bar or the dog ears.

Playback speed and direction



- 1 Select a speed from the list.



– or –

Enter a playback speed using the spin box next to **Frame rate**.

Select a playback speed and direction with the slider:

- All the way to the right – fast forward
- Right center – slow forward
- Center position – freeze frame
- Left center – slow backward
- All the way to the left – fast backward



Change the playback direction by clicking the Forward/Back button.

2 Click the **Yoyo** option.

When the movie has reached the last frame in forward playback mode, it will wind back to the first frame and then advance again to the last frame, etc.

– or –

Deselect the **Yoyo** option to play the movie back in a loop.

Once it has reached the last frame, the movie will start at the first frame again (loop).

3 Click the **Show graphics** option.

The graphics inserted will be shown as part of the movie.

– or –

Deselect the **Show graphics** option.

The graphics inserted will not be shown as part of the movie.

4 Click the **Show Curve** option.

The curves inserted will be shown as part of the movie.

– or –

Deselect the **Show Curve** option.

The curves inserted will not be shown as part of the movie.

2.5 Additional notes on the tomo examination

With the projection and slice views you can query the exposure data of an image.

2.5.1 Correcting projection views

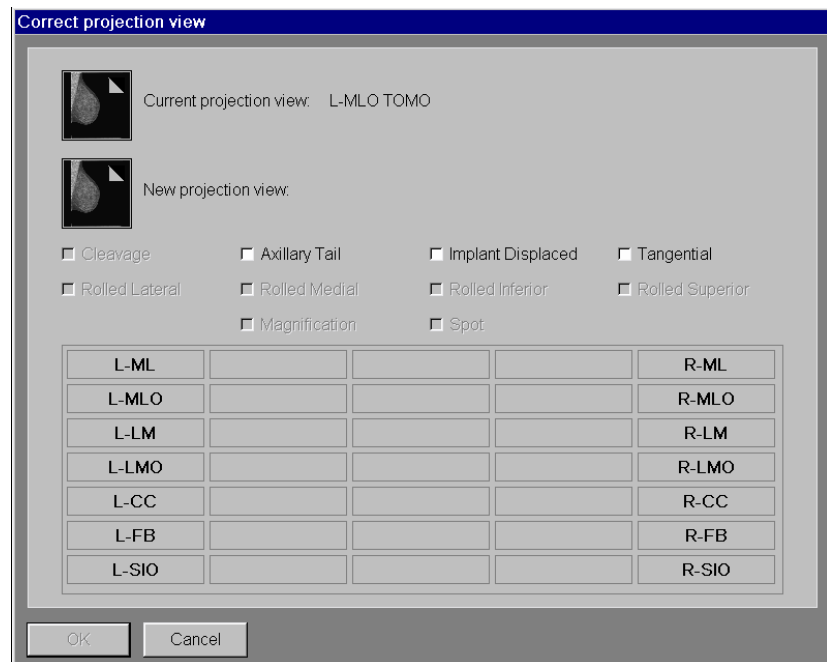
CAUTION

If the incorrect breast side or a different view is exposed than intended, the image is saved under an incorrect projection view.

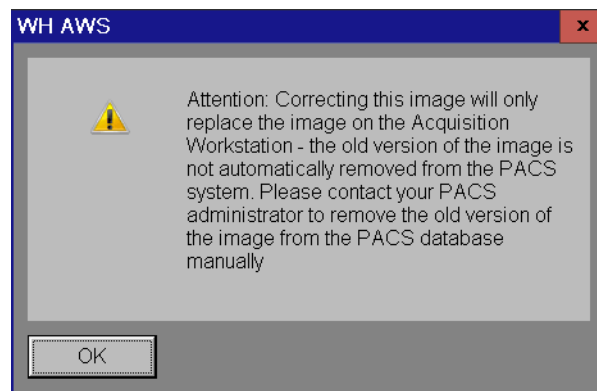
Faulty diagnosis or incorrect treatment possible!

- ◆ Check that the image is assigned to the correct projection view and correct it, if necessary.

- Correction**
- 1 Right-click the relevant image in the **Images** subtask card.
A popup menu is displayed.
 - 2 Select **Correct....**
The **Correct projection view** dialog box is displayed.



- 3 Select the correct projection view in the **Correct projection view** window.
- 4 Click **OK**.



- 5 Click **OK** to make the changes.
All available exposures are reconstructed and displayed in the new projection view.

2.5.2 Adding projection views

In the protocol control (**Images** subtask card) you can modify the projection views preset in the selected procedure as well as their number and sequence for the current examination.

Depending on the selected projection view the projection views can be modified, added, inserted or deleted.

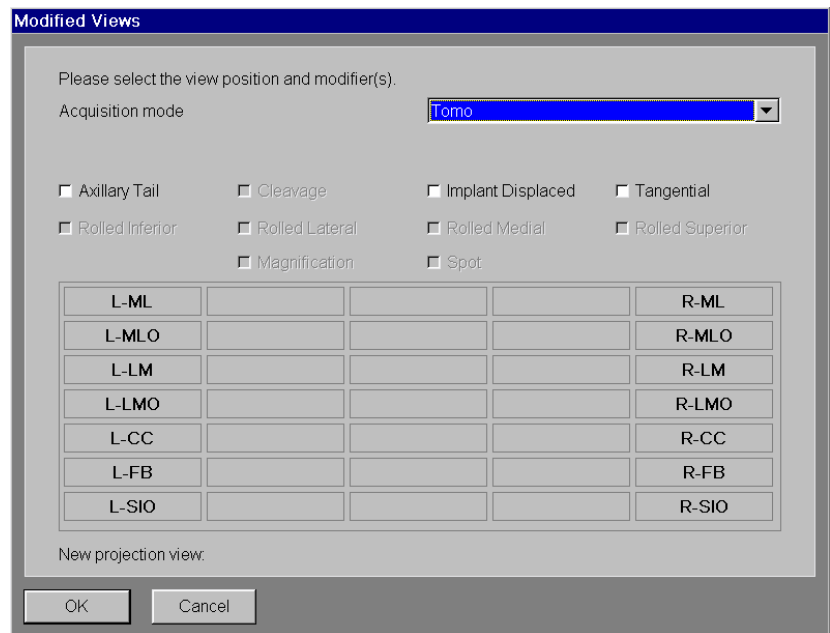
For all these functions the window **Modified Views** appears where you can operate on.

Adding a projection view

1 With the right mouse button, click on the **Images** subtask card of the projection view.

2 Select **Add**.

The **Modified Views** window is opened.



3 Select the desired **Acquisition mode**.

4 If necessary define special settings for the wanted projection view in the upper window area.

The list of the projection views (lower box area) is restricted to the views that fulfill the selected criteria.

5 Select the desired projection view and confirm by clicking **OK**.

The new projection view is added to the **Images** subtask card.

2.5.3 Creating a 2D + 3D exposure

The acquisition mode **2D + Tomo** and **Prime + Tomo** (if option available) produces a conventional 2D exposure and a complete tomo scan during a tomo procedure.



◆ Double-click the button 2D + 3D Exposures.

The detector parameters are loaded.

The following images/slices are created:

- 2D exposure (single image)
- Projections
- Reconstructed slices



The 2D image is part of the projection series.



In the acquisition mode **2D + Tomo** and **Prime + Tomo** (if option available) the indicated glandular dose corresponds to

- the dose applied during the 2D exposure, in the case of a 2D exposure
- the dose applied during the entire scan, in the case of tomo slices
- the dose applied during the single projection, in the case of projection views
- in the case of manual **2D + Tomo** mode:
 - the set mAs value corresponds to the mAs value during the 2D exposure
 - the mAs value for a Tomo scan is twice a 2D FFDM image



When using the **2D + Tomo** the 2D exposure is always done with the Grid Position In, even if the user has selected the option Grid Position Out in Advanced dialog box.

Avoid interrupting the radiation release during a tomosynthesis examination when using the **2D + Tomo** function between the 2D exposure and the 3D scan.



If, during a tomosynthesis examination using the function **2D + Tomo**, an error message appears for the following setting:

- kV value: 32 kV
- mAs value: > 280 mAs

Reduce the mAs value (≤ 280 mAs) in order to continue the examination.

Please note the following settings in order to avoid error messages:

- 23 - 28 kV: < 300 mAs
- 29 - 32 kV: < 280 mAs
- 33 - 35 kV: < 250 mAs

2.5.4 Post-processing examination images

You can process the examination images directly in the **Examination** task card. Some of the post-processing tools are also available in the **Viewing** tabcard and can be **Saved as**. Click on the tool again to deactivate it.



The workplace shall support the ability to mark and annotate dedicated areas of the tomosynthesis slices and send the information via DICOM standard.

Distance lines You can measure the distance between two defined points in an image using a distance line.



1 Select **Tools** > **Distance** or click the button.

The cursor changes its shape.

2 Place the mouse cursor on the starting point of the distance line.

3 Keep the left mouse button pressed and draw a line.

4 Release the mouse button to finish the line.

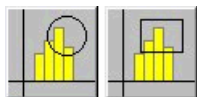
5 Select **Patient** > **Save**.



The tomo slices are saved with the distance lines and sent to a reading workstation.

ROIs You can designate questionable areas in images as **Regions of Interest (ROIs)** and evaluate them. For this purpose, draw a frame around the relevant area.

Rectangular and circular ROIs



1 Select **Tools** > **Circle** or **Tools** > **Rectangle** or click the button.

The cursor changes its shape.

2 Click on the image and draw the ROI (a rectangle or circle) with the mouse button kept pressed.

3 Release the mouse button as soon as the ROI has the desired size.

The gray-scale values inside the ROI are evaluated statistically and the result is indicated on the edge line.

Freehand ROIs



1 Select **Tools** > **Freehand ROI** or click the button.

The cursor changes its shape.

2 Draw the ROI point by point by clicking the mouse button once at each change of direction (polygon definition).

– or –

Keep the mouse button pressed and map the region of interest.

3 Double-click on the last corner point.

The ROI is closed.

The gray-scale values inside the ROI are evaluated statistically and the result is indicated on the edge line.

Saving graphics ♦ Select **Patient** > **Save**.



The tomo slices are saved with the graphics and sent to a reading workstation.

Inserting an annotation



- 1 Select **Tools > Annotate** or click the button.
The cursor changes shape.
- 2 With the left mouse button, click on the position in the image at which you want to insert the text.
The mouse pointer becomes a text cursor.
- 3 Enter your text.
- 4 Complete your text entry with the **Enter** key or click on the image outside the text.
The text is displayed white with shading.
- 5 Select **Patient > Save**.

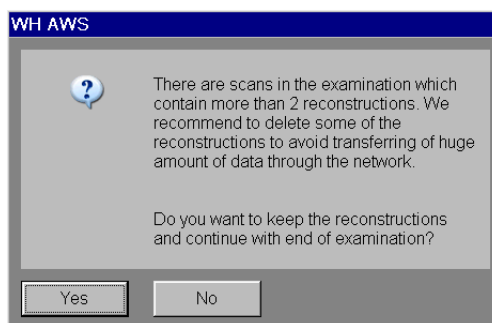


The tomo slices are saved with the annotation text and sent to a reading workstation.

2.6 Ending the examination



- 1 To end the examination, click this button in the **Close Patient** subtask card.
As soon as you have generated more than 3 series with the reconstruction parameters, the following message window will appear before you can close the examination:



- 2 Click **Yes**.
All series will be saved.
– or –
Click **No**.
Switch to the **Tomo** subtask card, see (→ Page 34 *Deleting reconstructed images*), to delete series.

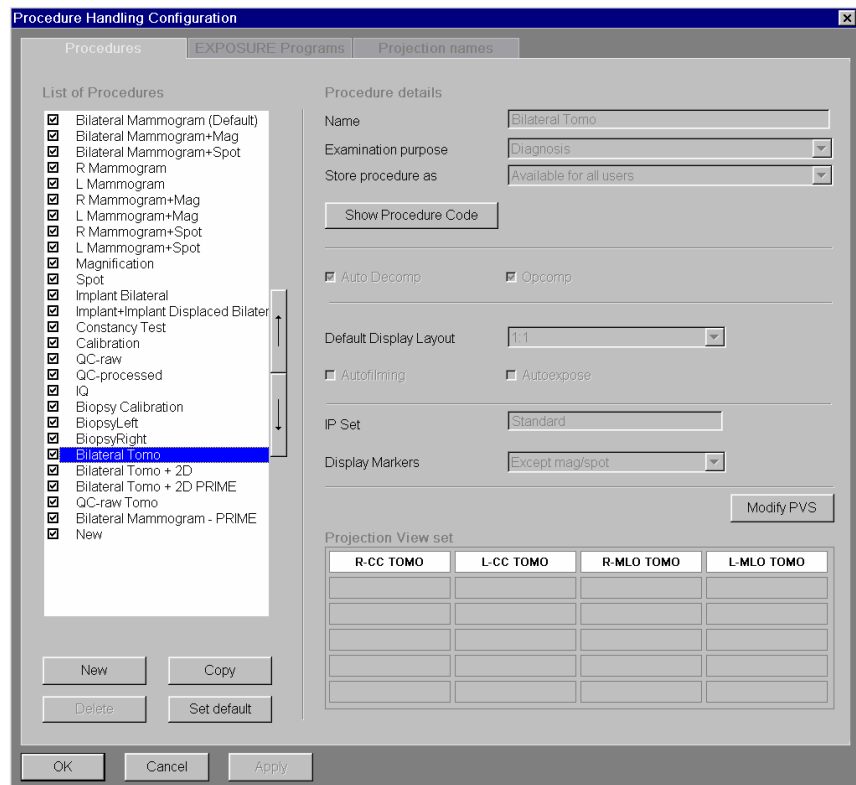
3 Configuration

3.1 Configuring a tomo examination

Only the changes regarding the tomo examination are described here. For the configuration of the **Examination** task card see register Configuration, chapter Configuring examination.

3.1.1 Configuring procedures

You can create additional examination procedures and revise or delete existing procedures in the **Procedures** tab card.



3.1.2 Details of the projection views

In case that the sequence of projection views in a procedure is not in the right order or should be changed go to the **PVS Dialog**.

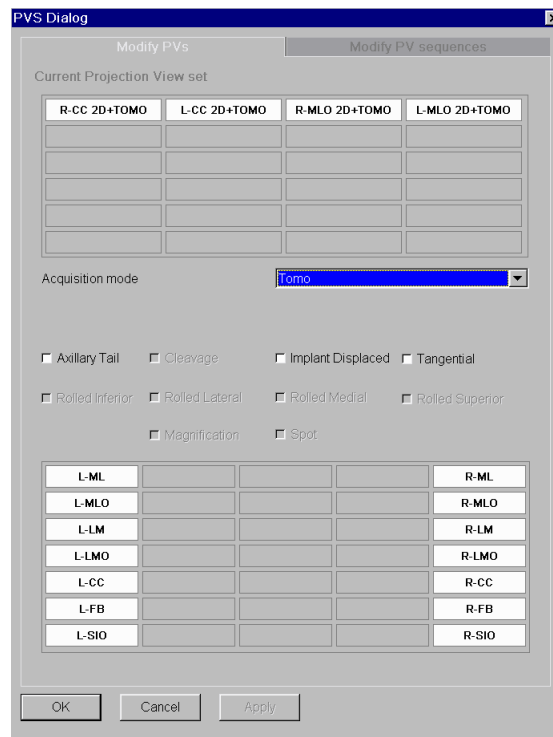
- ◆ Click **Modify PVS**.

The **PVS Dialog** dialog box opens.

Modifying projection views

- 1 Click the **Modify PVS** tab into the foreground.

The corresponding acquisition mode for the current procedure is shown as standard.

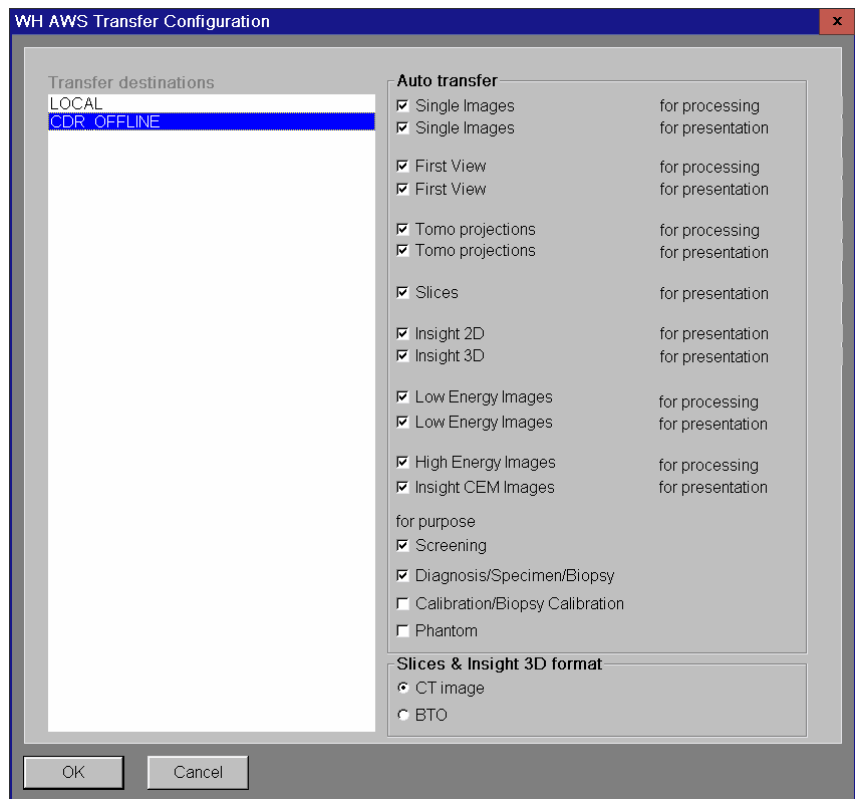


The projection views are defined in the **Projection names** subtask card. A list of available projection views is shown in the **Modify PVs** and **Modify PV sequences** dialog.

- 2 If required, select a different acquisition mode from the **Acquisition mode** selection list.

3.1.3 Image selection for autotransfer destinations

In the **WH AWS Transfer Configuration** configuration dialog you define which sort of image e.g. 2D, Tomo from the examination should be transmitted automatically to the individual destination addresses. You differentiate in this case according to image type and examination purpose of the images.



- Image type**
- ◆ Select the image type that is to be sent to the selected destination address.
 - **Single Images for processing:** only individual raw data (suitable for CAD server); correspond to 2D images
 - **Single Images for presentation:** only single processed images (suitable for reporting station, for example); correspond to 2D images
 - **First View for processing:** only raw data of the first exposure or 2D exposure (suitable for CAD server); correspond to **2D + Tomo** mode (or **Prime + Tomo** if option available)
 - **First View for presentation:** only finished image of the first exposure or 2D exposure (suitable for reporting station, for example); correspond to **2D + Tomo** mode (or **Prime + Tomo** if option available)
 - **Tomo projections for processing:** raw data set of the 25 projections
 - **Tomo projections for presentation:** processed data set of the 25 projections
 - **Slices for presentation:** reconstructed slices out of tomosynthesis (suitable for reporting station, for example)
 - **Insight 2D for presentation:** synthetic 2D images out of tomosynthesis (suitable for reporting station, for example)
 - **Insight 3D for presentation:** synthetic 3D images out of tomosynthesis (suitable for reporting station, for example)

- Slices & Insight 3D format**
- ◆ Select **BTO** or **CT image** to transfer tomosynthesis slices to the defined DICOM note.
 - **BTO**: DICOM modality **Breast Tomosynthesis Object**
The saved graphics, distance lines and annotation in one tomo slice are sent.
 - **CT image**: DICOM modality **CT image**

3.1.4 Configuring the image impression (IP Set)

The **IP Set Config** can only be configured by the application specialist in the **Service** menu.



The workplace shall have the ability to configure which series of the tomosynthesis results will be displayed directly after the exposure:

- raw data of the projection views
- processed projections views
- reconstructed slices
- 2D images of the 2D + tomosynthesis scan
- MIP view
- synthetic 2D view
- raw projection views for quality assurance

- ◆ Select **Service** > ... in the main menu.
Change the **First View** to **Insight 2D** if required.

Siemens Healthcare Service Software - Internet Explorer provided by Siemens Healthcare GmbH

Acquisition System | Reports | Home | Help

General

- System Service Information
- Extract SaveLogs
- Acquisition Images
- Fixed Content Marker
- Strip Features
- MAM Profile
- Country specific labels
- Strip Quality Index

Image Quality

- Factory Settings
- Exposure Programs
- DR Exposure Programs
- IP Set Config
- Tomographic Config
- Tomographic Index

Configuration Report

- Mail Configuration
- Procedure
- PV Names
- IP Configuration
- Exposure Program
- Configuration
- Setup
- Rpge
- Reslice Configuration
- Detector
- Detector Information
- Detector Management
- Statistics
- Detector Command
- Calibration
- Calibration Log

Mammomat

- Remote Service Interface
- Web Service Interface
- AEC Configuration
- Max Compression Force

IP Set Config

IP Sets

Flavor0 (Active)	copy
Flavor1	delete
Flavor2	delete
Flavor3	delete
Flavor4	delete
Flavor5	delete
Flavor6	delete

IP set name: Flavor0

Acquisition mode	IPPG	IPPG Combined
Standard 2D	FD_Gen1	
Spot	FD_Gen1	
Implant	FD_imp	
Prime	FD_Gen2	
Magnification	FD_Mag	
Stereo	FD_Gen1	
Stereo Implant	FD_imp	
Specimen	FD_Mag	
Tomo	Tomo_proj	
2D+Tomo	Tomo_proj	
Prime+Tomo	Tomo_proj	
Tomo Implant	Tomo_proj	
2D+Tomo Implant	Tomo_proj	
Tomo Biopsy	Tomo_proj	
Dual Energy Prime	FD_Gen1	FD_Gen1
Dual Energy Prime	FD_Gen2	FD_Gen2
Specimen Sideways	FD_Mag	
Tomo Biopsy Implant	Tomo_proj	

Tomo acquisition mode	RPG	Insight 2D	Insight 3D	Slices
Tomo	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FirstView
2D+Tomo	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Projections
Prime+Tomo	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Insight3D
Tomo Implant	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FirstView
2D+Tomo Implant	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FirstView
Tomo Biopsy	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Slices
Tomo Biopsy Implant	Empire	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Slices

Fallback IPPG

Fallback IPPGs	Remaining IPPGs
Option1	FD_Gen1
Option2	FD_Gen2
Option3	FD_imp
	FD_Mag
	F1_Gen1
	F1_Gen2
	F1_imp
	F1_Mag
	F2_Gen1
	F2_Gen2

4 Glossary

Bounding box	Region of interest, describing the area that will be reconstructed. Using the handles you can adjust the bounding box to the breast tissue area to be reconstructed for slices.
Empire technology	Unique, multiple algorithms, providing superior image quality in both contrast and detail.
First view	First exposure during tomo scan where the swivel arm is at an angle of 0°. When using 2D + Tomo the first image is the 2D image.
Insight 2D	2D image generated from a corresponding tomosynthesis data set. Specific image processing may have modified the appearance of anatomical structures compared to reconstructed slices and projection images.
Insight 3D	3D image generated from a corresponding tomosynthesis data set. Specific image processing may have modified the appearance of anatomical structures compared to reconstructed slices and projection images.
Processed projections	<p>If the processing of projections is activated, projections acquired during a tomo scan are processed with OpView 2D image processing for better visualization. Per default the processing is deactivated. These images are saved as DICOM MG for presentation.</p> <p>When using 2D + Tomo the first image of the stored projections series is the 2D image.</p>
Raw projections	Single image taken during the tomo scan. 25 projections are acquired during the sweep of 50°, every other degree one projection. The projections are saved as DICOM MG objects.
Reconstruction	The calculation of the stack of slices (3D volume) from the projections using a reconstruction algorithm.
Reprocessing	Processing of the projections and 2D image with new image processing or reconstruction parameter set.
Slices	Stack of images parallel to the detector surface reconstructed from projections with the purpose of display at the workstation monitor.
Tomo scan	Generated data set of a definite view, consisting of raw projections and/or processed projections and/or the slices or combinations of these.

1,2,3 ...

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The CE marking applies only to Medical Devices which have been put on the market according to the above-mentioned EC Directive.

Unauthorized changes to this product are not covered by the CE mark and the related Declaration of Conformity.

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