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syngo CT

Operator Manual – Volume 1

syngo CT 2013B

Answers for life.

syngo CT

Operator Manual – Volume 1

syngo CT 2013B

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
Courier	Is used for on-screen output of the system including code-related elements or commands
`Courier`	Is used to identify inputs you need to provide
Menu > Menu Item	Is used for the navigation to a certain submenu entry
<variable>	Is used to identify variables or parameters, for example, within a string
⚠ 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

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



Legend

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1 General

1.1 Basic Functionalities

This chapter provides information about general tools and frequently used basic functionalities. These functionalities are significant for most of the clinical applications available on your SOMATOM CT system.

Not all functionalities described within this chapter are available in all applications.

Pay attention to the storage capacity of the hard disk displayed by icons in the status bar of the task cards.

As soon as a predefined percentage of the storage capacity of the hard disk is reached, a warning icon is displayed in the status bar. The color of the icon depends on the storage capacity:

- Yellow icon: If 75% of the storage capacity is reached
- Red icon: If 90.25% of the storage capacity is reached

The following functionalities are described in the subsequent sections:

- (→ Page 16 *Configuration*)
- (→ Page 19 *Viewing the Event Log*)
- (→ Page 20 *Configuring Applications*)
- (→ Page 21 *Changing the application-specific configuration*)
- (→ Page 22 *Scrolling*)
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- (→ Page 33 *Using Symbol (Numeric) Keypad*)
- (→ Page 34 *Using Shortcuts*)
- (→ Page 35 *Using syngo WebSpace*)
- (→ Page 35 *Starting the syngo.via client*)

Safety advice

CAUTION

Not observing the operator manuals of the system, system options and accessories!

Injury of the patient.

- Always use the manuals in conjunction with the manuals of the particular units used.
- Follow the safety instructions.

CAUTION

Insufficient memory or disk space may lead to an instable or blocked system!

System is not available in emergency cases.

- Do not ignore the storage capacity warning icons.

CAUTION

Unauthorized access to the operating system!

Software manipulation.

- Users are not authorized to work on operating system level. Any software manipulation is forbidden.

CAUTION

Impermissible or faulty manipulations, or changes of the software or hardware, or connection of the system to a network!

Unauthorized access; damage to the equipment.

- Make sure that all necessary precautions with respect to the existing level of security are considered when adding a functionality or altering the shipped configuration.
- You are not permitted to open or remove the housing of the equipment or to install third-party software.

CAUTION

Impermissible or faulty manipulations or changes of the hardware or software can cause the system to malfunction!

This can cause injury and/or damage to the equipment.

- Do not open or remove the cladding of the equipment nor install third-party software.

CAUTION

Using *syngo* directly on a public or private network may lead to insufficient system performance!

Possible degradation of system performance or unexpected system behavior.

- Only use *syngo* in a secure and load-adapted network.

CAUTION

User is not instructed in how to operate the applications!

Wrong basis for diagnosis.

- The operator must be qualified to use the applications.

CAUTION

Wrong configuration of **Presentation State** support when configuring network nodes!

Loss of post-processing results.

- When configuring network nodes, enable **Presentation State** support only after verifying the remote node for PR support.

1.1.1 Configuration

The following functionalities are described in the subsequent sections:

- Setting the language
- Adjusting the date format
- Setting date and time

Setting the language

CT supports the following user interfaces:

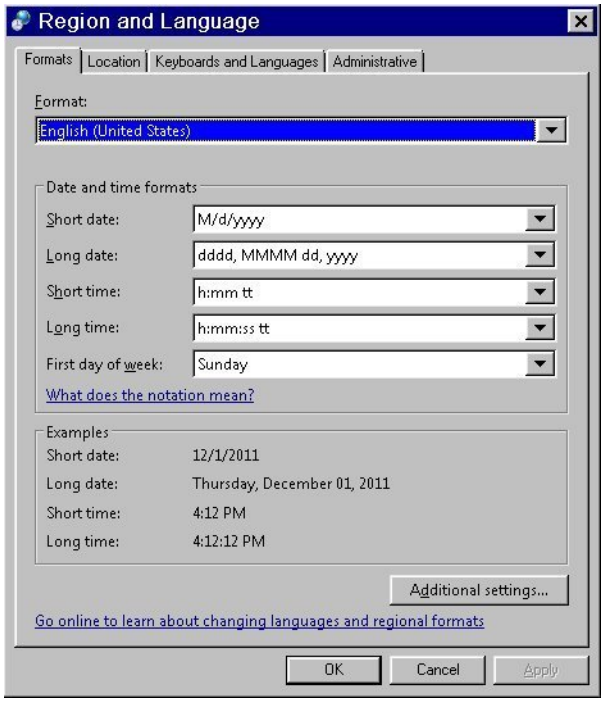
- English (United States)
- German (Germany)
- French (France)
- Spanish (Spain)
- Japanese
- Chinese (PRC)

syngo does not support local differences in languages.

If you change the language to Japanese or Chinese, an error message occurs after changing the language settings and confirming with **No** for logoff. Perform system restart to continue.

1 Select **Options > Configuration...** to open the **Somaris/7 – Configuration Panel**.

2 Double-click the **Regional and Language Options** button in the **Somaris/7 – Configuration Panel** to open the **Region and Language** dialog box.



3 In the **Format** area of the **Formats** tab card, select the language.

Select only the listed languages and locations. Otherwise system errors may occur.

4 Click the **OK** button to confirm the new language.

The **Regional Settings** dialog box pops up, asking you to restart the system in order to implement the changes.

5 Confirm with **OK** again to restart *syngo* with the new language.

For further information on changing the language or the supported keyboard, contact the Siemens service.

Adjusting the date format

You are recommended to use the following date formats:

- For western languages: dd-MM-yyyy
- For U.S. English: MM-dd-yyyy
- For Chinese and Japanese: yyyy-MM-dd

1 Select **Options > Configuration...** from the main menu.

2 Double-click the **Regional and Language Options** button in the **Somaris/7 – Configuration Panel** to open the **Region and Language** dialog box.

3 In the **Date and time formats** area of the **Formats** tab card, select the date format from the **Short date** selection list.

4 Confirm with **OK**.



You must adjust the date format after each change of the language settings (→ Page 16 *Setting the language*).

Setting date and time

Safety advice

CAUTION

The internal identification of patient data, for example, studies, series and images, uses the system time for generation of the patient identification. If it is necessary to turn the system clock back, duplicate identifiers may be created!

Data may be assigned to wrong patient.

- If it is necessary to turn the system clock back for synchronization purposes, wait until the previous clock setting has been passed before creating new patient data.

1 End the current examination and close all patients.

2 Select **Options > Configuration...** from the main menu.

3 Double-click the **Date and Time** button in the **Somaris/7 – Configuration Panel** to open the **Date and Time** dialog box.

4 On the **Date and Time** tab card, click the **Change date and time** button.

5 In the **Date and Time Settings** dialog box, adjust the date and time settings, and confirm with **OK**.

6 To open the **Time Zone Settings** dialog box, click the **Change time zone** button.

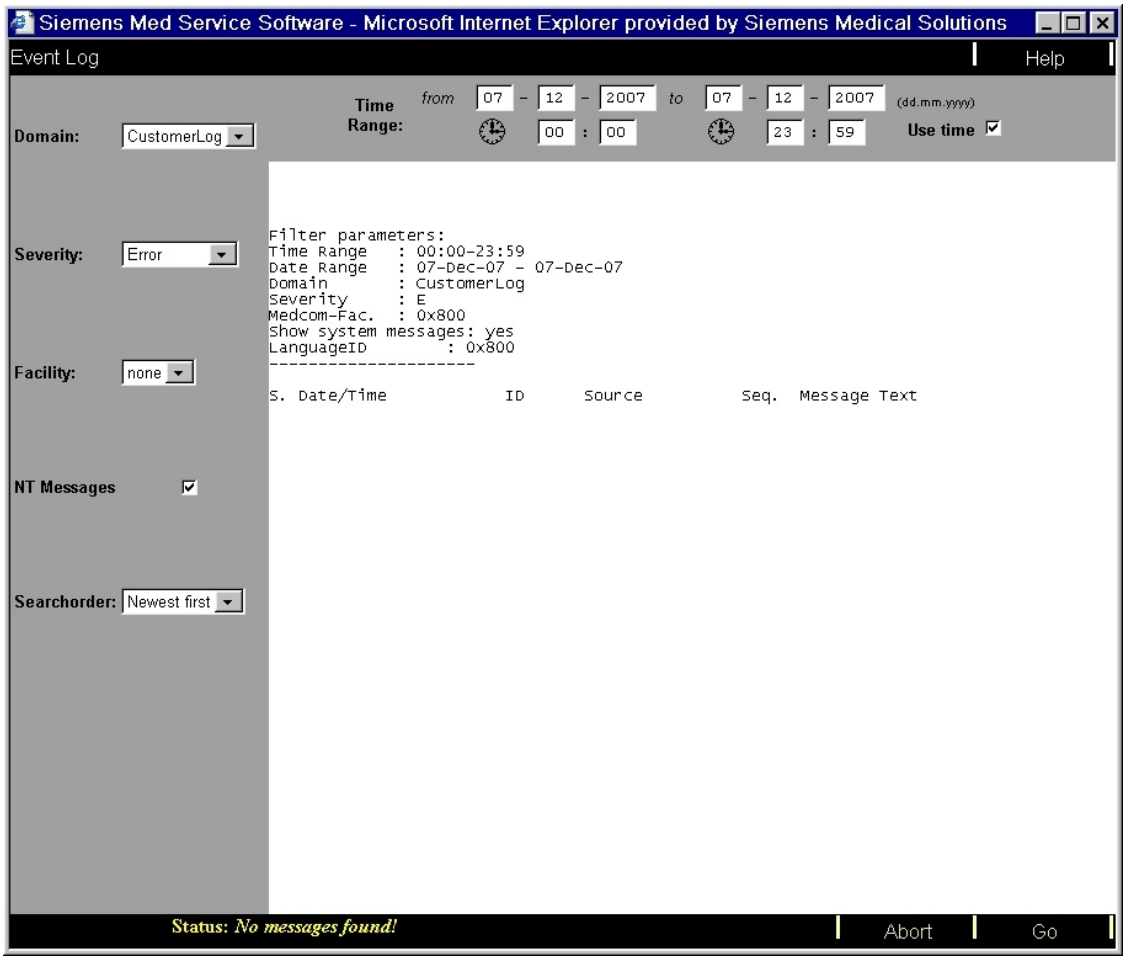
Keep the option **Automatically adjust clock for daylight saving changes** unchecked.

7 Reboot the system to update these settings.

If the difference to the previous time setting is more than 24 hours, the system will be reinstalled.

1.1.2 Viewing the Event Log

1 Select **Options > Service > Event Log...** to display the **Event Log** dialog box.



2 Enter the **Time** or **Time Range** and select additional filter parameters to specify your search for log entries.

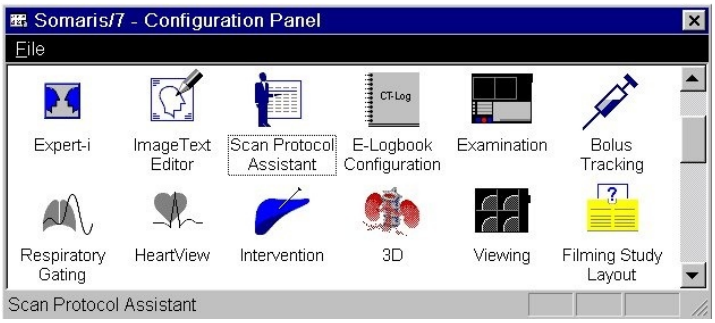
3 Click the **Go** button.

1.1.3 Configuring Applications

Depending on the application you can configure task cards, windows, and individual functions of the program, that is, adapt them to your requirements.

1 Select **Options > Configuration...** from the main menu.

The **Somaris/7 – Configuration Panel** opens.



2 Double-click the icon representing the desired application to open the corresponding configuration window.

3 Adapt the functions of the application to your individual requirements.

1.1.4 Changing the application-specific configuration

You can change the application-specific configuration in the **Local Service** configuration without entering a password in advance.

1 Select **Options** > **Service** > **Local Service...** from the main menu to open the **Local Service** configuration.

The **Authentication** window is displayed.

2 Delete all entries from the entry fields.

3 Click the **OK** button.

The **Service Software** window is displayed.

4 Click the **Configuration** button.

5 Select the **Application** option in the **Local Host** category from the navigation bar on the left and enter your changes.

The **Application Specific Configuration** window is displayed.

6 Click the **Save** button to save the changes you made.

7 Reboot the system.

1.1.5 Scrolling

Scrolling means moving through loaded images, series, or studies. You can scroll by using the following options:

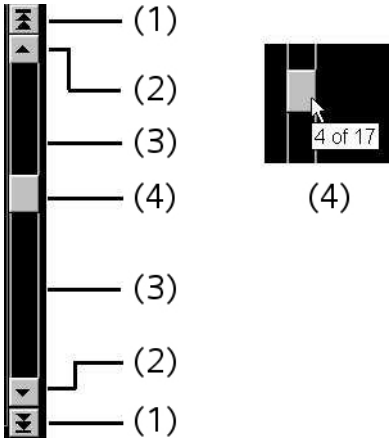
- **Scroll** menu
- Scroll bar
- Symbol keypad
- Dog ear
- Mouse wheel

The following functionalities are described in the subsequent sections:

- Using the scroll bar
- Using the dog ear
- Using the symbol keypad for scrolling

Using the scroll bar

- Click the different parts of the scroll bar or drag the slider.



(1) Display of first / last image

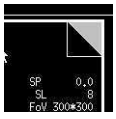
(2) Display of previous / next row (stack mode: previous / next image)

(3) Display of previous / next page (stack mode: previous / next image)

(4) Scrolling through image stack. The current image number is displayed.

Scrolling through the image stack, you can view the image number.

Using the dog ear



1 Click the outer triangle of an image to scroll forward by one image.

2 Click the inner triangle to scroll back by one image.

Using the symbol keypad for scrolling

- Press the keys on the symbol keypad to scroll image by image, series by series, or study by study (→ Page 33 *Using Symbol (Numeric) Keypad*).

1.1.6 Switching to the Next Patient

In the **Patient Browser**, you can switch to another patient.

- Switch to the desired patient by clicking the next patient folder in the **Patient Browser**.

1.1.7 Using SmartSelect Menu

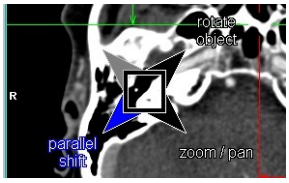
The SmartSelect menu allows you to choose a working mode or a function quickly without focusing away from the current image.

You can use the SmartSelect menu, for example, for the following procedures:

- Activating the parallel shift function
- Zooming and panning
- Rotating objects

The available functions of the SmartSelect menu depend on the application and the mode you are working in.

1 Click the right mouse button shortly.



The SmartSelect menu appears.

2 Move the mouse into the direction of the desired function.

The selected function is displayed in blue. A gray arrow indicates functions, which are not available in the current context. Available functions are displayed in black.

Deactivating SmartSelect menu

- Choose the center frame to deactivate all functions.

1.1.8 Using Context Menu

The available functions of the context menu depend on the current examination mode or the application you are working in.

1 Click the right mouse button.

The context menu is displayed.

2 Select the desired option from the context menu.

1.1.9 Selecting Images

Not all image-selection functionalities are available in all applications.

The following functionalities are described in the subsequent sections:

- Selecting a single image
- Selecting images explicitly
- Selecting images up to the end of series
- Selecting complete series
- Deselecting images

Safety advice

CAUTION

If you load large data sets, the image pixel data will be downsampled!

Possible insufficient image quality.

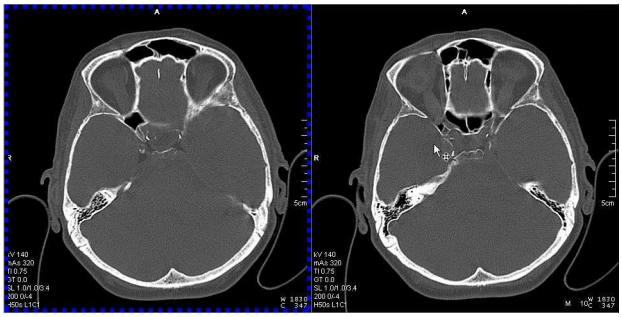
- Be aware of reduced image quality if indicated in image display.

Selecting a single image

- Click an image to select it.

  - or -

  Use the arrow keys of the keyboard to change the current selection.

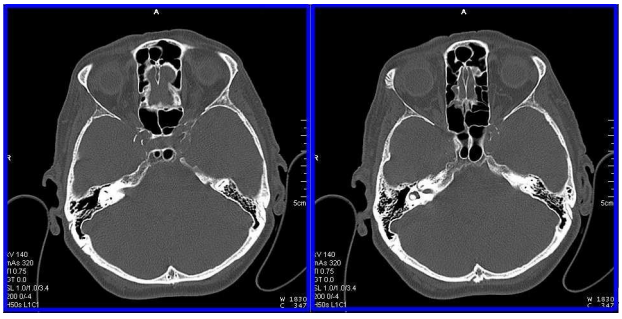


Selecting images explicitly

- Hold the **Ctrl** key down and click individual images (multi-select).

  - or -

  Hold the **Shift** key down to select several consecutive images.



Selecting images up to the end of series

1. Select a single image.
2. Select **Edit > Select On Succeeding** from the main menu.

Selecting complete series

1. Select an image from each required series individually.
2. Select **Edit > Select Series** from the main menu.



With **Select On Succeeding**, you have to select the first image of each required series to select all series completely.

Deselecting images

If none of the segments has a blue border, one or more images are selected in the background.

- Hold the **Ctrl** key pressed and click individually selected images again.

  - or -

  Select **Edit > Deselect All** from the main menu or select a single image.

1.1.10 Making notes

The **Note** function allows you to save and view site-specific instructions, or any other information as notes. Each user of the workplace can read the notes, but only the author of the notes can edit or delete them.



The maximum length of a note is limited to 3000 characters, and the maximum number of notes is limited to 50.

You can sort the notes by date and author.

- On the main menu of any task card, choose **Options** > **Notes** to open the **Notes** dialog box.

Adding a new note

1. On the menu, choose **Add** to open the **Add Note** dialog box.
2. In the entry field, enter the text of the note.
3. Click the **Save** button.

Editing a note

1. Select a note.
2. On the menu, choose **Edit** to open the **Update Note** dialog box.
3. Change the text of the note.
4. Click the **Save** button.

Deleting a note

1. Select a note.
2. On the menu, choose **Delete**.
3. Click the **Yes** button to confirm the deletion.

   - or -

   Click the **No** button to cancel the deletion.

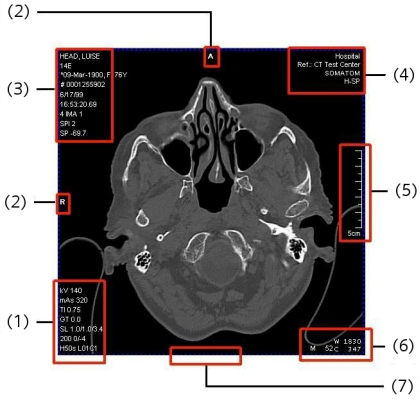
1.1.11 Using Image Text

The following functionalities are described in the subsequent sections:

- Text information in medical images
- Editing text in medical images
- Showing and hiding image text

Text information in medical images

There is the following text information displayed in medical images:



(1) Scan and reconstruction parameters

(2) Orientation labels

(3) Patient and examination data

(4) System-specific information and patient position

(5) Scale bar

(6) Window and pixel values and (for 3D images) orientation cube

(7) Image comment

Scan and reconstruction parameters

Image text	Example
Contrast/bolus agent (+C)	+C
Voltage (kV)	kV 120

Image text	Example
mAs (exposure)	mAs 240
Scan time (TI)	TI 0.5
Gantry tilt (GT)	GT 5.0
Slice width (SL)	SL 1.25 / 0.6
Slice width/collimation/Pitch (for spiral only)	SL 0.75 / 0.6 / p 1.2
Size and center (x/y) of Field of View (FoV)	188 0/-26
Convolution kernel and reconstruction parameters	A10f L11C0

Patient and examination data

Image text	Example
Patient name	John Doe
Patient ID	210329160014
Date of birth, sex, age	*21-March-1929, M, 32Y
Accession number	#12345
Examination Number	STUDY 1
Acquisition date	5-Nov-2004
Acquisition time	16:13:15.71
Series and image number	1 IMA 217
Compression Quality	CQ 75
Scan type or image type and scan number:	
TOP (topogram)	TOP 1
SEQ (sequence)	SEQ 7

Image text	Example
SPI (spiral)	SPI 2
4D SPI	4D SPI 98
4D SEQ	4D SEQ 78
SEQ DE (Dual Energy)	SEQ DE 9
SEQ DS (Dual Source)	SEQ DS 2
SPI DE (Dual Energy)	SPI DE 9
SPI DS (Dual Source)	SPI DS 2
SPO (spiral oblique)	SPO 4
FLASH SPI DS	FLASH SPI DS 2
FLU (Fluoroscopy)	FLU 3
ROT (rotation mode)	ROT 8
RTD (real-time display)	RTD 8
RTD DS (Dual Source)	RTD DS 8
MON (monitoring)	MON 9
MUL (multiscan)	MUL 2
STA (static)	STA 3
Slice position (SP)	SP 607.8
Table height (TH)	TH 100

System-specific information and patient position

Image text	Example
Institution	Hospital
Referring Physician	

Image text	Example
Manufacturers model name	DEFINITION
Software version	*syngo* CT 2006G
Patient position (direction and position) and view position:	
H (head first) F (feet first) LL (left lateral) RL (right lateral) SP (supine) PR (prone) CR (cranial) CA (caudal)	H-SP-CR or H-SP (topogram mode)

Window and pixel values

Image text	Example
Window width (contrast) (W)	W 250
Window center (brightness) (C)	C 50
Mini mean (M)	M -3

Image comments

Image text	Example
TrueStack reconstruction	TS

Editing text in medical images

You can configure the displayed text information via the entry **Customized Text**.

1 Select **Options > Configuration...** to open **Somaris/7 – Configuration Panel**.



2 Double-click the **Image Text Editor** button to enter or change text in medical images.

The **Image Text Configuration** dialog box opens.

Defining the text elements

1 Select the required image type from the **View Name** selection list.

2 Select the **Customized Text** option.

3 Define the text elements to be displayed in the images by selecting and deselecting the corresponding checkboxes on the left.

4 Click the **Apply** button to apply your changes.

5 Click the **OK** button to confirm your changes and to close the dialog box.

- or -

Click the **Cancel** button to discard your changes and to close the dialog box.

Changing the font properties

You can change the font properties for all text elements. Your changes of the font properties will be retained for the next evaluations.

1 Select the **Apply All** checkbox to change the format of all image text elements.

- or -

Select the text element desired in the preview image.



2 Click the **B** icon to display the selected text in bold typeface.

The selected text is displayed in bold typeface.

3 From the **Color** selection list, select the font color.

4 From the **ScaleFactor** selection list, select the font size.

5 In the preview area, check the appearance of the image text.

6 Adjust the settings, if necessary.



The orientation labels and scale bar cannot be formatted.

7 Click the **Apply** button to apply your changes.

- or -

Click **OK** to confirm your changes and to close the dialog box.

- or -

Click **Cancel** to discard your changes and to close the dialog box.

Showing and hiding image text

1 Select **View > All Text** to show the image text.

2 Select **View > Customized Text** to show the predefined image text elements.

3 Select **View > No Text** to hide all image text.

1.1.12 Using Symbol (Numeric) Keypad

The keys on the symbol keypad provide quick access to frequently performed operations and applications.

Here are the following symbol keypad functions configured for your system:

	Window Center - (Numeric: **Num**)		Window Center + (Numeric: **/**)
	Window Width - (Numeric: *****)		Window Width + (Numeric: **-**)
	Correct image text (Numeric: **6**)		Configurable (Numeric: **9**)
	Scroll study back (Numeric: **7**)		Scroll study forward (Numeric: **8**)
	Scroll series back (Numeric: **4**)		Scroll series forward (Numeric: **5**)

	Scroll image back (Numeric: **1**)		Scroll image forward (Numeric: **2**)
	Patient Browser (Numeric: **.**)		Mark (Numeric: **3**)
	Copy to Film Sheet (Numeric: **Enter**)		Send to Node 1 (Numeric: **+**)
	Patient Registration (Numeric: **0**)		

1.1.13 Using Shortcuts

Shortcut keys are keys or key combinations that you can press to perform an action that is available from a menu.

The following shortcuts are configured at your system:

- **Alt**+letter: Function of menu/button with underlined letter
- **Ctrl**+**Tab**: Switch active task card/page through stack of cards
- **Ctrl**+**Shift**+**Tab**: Switch to the backward direction
- **Ctrl**+**I**: Import data
- **Ctrl**+**V**: Paste
- **Ctrl**+**C**: Copy
- **Ctrl**+**P**: Expose film job
- **Ctrl**+**W**: Save window values
- **F5**: Switch to the **Examination** task card (*syngo* Acquisition Workplace only)
- **F6**: Switch to the **Viewing** task card

- **F7**: Switch to the **Filming** task card
- **F8**: Switch to the **3D** task card

1.1.14 Using *syngo* WebSpace

syngo WebSpace is a server/client technology that offers for example, workflow friendly interactive real-time 3D on any regular PC via remote access to radiologists and clinicians.

1 Install the client software on your PC.

2 Double-click the shortcut icon **WebSpace** on your desktop to start *syngo* WebSpace.

For more information on *syngo* WebSpace, refer to the specific documentation.

1.1.15 Starting the *syngo*.via client

This feature enables you to use the *syngo*.via client at the *syngo* CT Workplace. You can use almost all functionalities which are provided by the *syngo*.via server. The session will be launched in a separate dialog box.

A Siemens service technician installs and configures the *syngo*.via client on your *syngo* CT Workplace.

If you want to export or save data to the hard drive of *syngo* CT Workplace, use only the directories inside H:\Sitedata.

To film your activities on the desktop, use the **Camtasia Recorder** which is installed on the *syngo* CT Workplace (→ Page 141 *Opening the Camtasia Recorder*).

Starting the client

You can open the *syngo*.via client on the main menu of any task card.

1 On the main menu, choose **Applications** > **syngo.via** > **syngo.via** to open the *syngo*.via client.

2 In the *syngo*.via client dialog box, click the minimize icon in the upper right hand corner to return to *syngo* classic.

The client remains open in the background.



3 In the status bar, click the *syngo*.via icon to return to the *syngo*.via client.

Starting the image call-up

In the **Patient Browser**, you can start the image call-up of a patient from the *syngo*.via client.

✓ The image data of the selected patient is available on the *syngo*.via server.

1 On the main menu, choose **Patient** > **Browser...** to open the **Patient Browser**.

2 In the **Patient Browser**, select a patient.

3 On the main menu of the **Patient Browser**, choose **Applications** > **syngo.via** > **syngo.via (Current Patient)**.

- or -



In the **Patient Browser**, click the **Load to syngo.via** icon.

The data of the selected patient is displayed in the *syngo*.via client.

Updating the *syngo*.via client

When you start the *syngo*.via client, a message box appears if an update of the *syngo*.via client is available.

1 Click **Yes**.

The installation package is displayed.

2 Click the **Start syngo.via installation** button.

A message box is displayed.

3 Click the **Run** button.

When the update is finished, the *syngo*.via client starts automatically.

4 Close the client.

5 Restart the application.

Closing the client

◆ In the *syngo*.via client dialog box, click the **x** icon in the upper right hand corner to close the *syngo*.via client dialog box.

1.2 Standard Evaluation Methods

This chapter provides information about general tools and basic functionalities frequently used. These functionalities are significant for most of the clinical applications available on your SOMATOM CT system.

The following functionalities are described in the subsequent sections:

- Loading Images
- Windowing Images
- Zooming and Panning
- Performing 2D and 3D Evaluation
- Saving Images
- Saving screenshots
- Filming
- Transferring Data



If you are not familiar with the basic functionalities of the *syngo* software, refer to: *Basic Functionalities*. (→ Page 13 *Basic Functionalities*)

1.2.1 Loading Images

Safety advice

CAUTION

Patient mix-up is possible if different patients are open in different applications!

The diagnosis and treatment may be made on the basis of incorrect information.

- Check patient credentials in each application.
- Either close the patient in *syngo* post processing application or load the new patient as soon as you switch to another patient in PACS.
- Do not load another patient into *syngo* using the Browser while a patient is already loaded.

You load images via the **Patient Browser**.

1 Call up the **Patient Browser** by selecting **Patient > Browser...** from the main menu.

2 Select the patient, study, or series in the navigation or content area of the **Patient Browser**.

3 Click the corresponding application icon on the tool bar to load the selected images into the application task card.

If the **Close after Loading** option is selected in the **Options** menu the **Patient Browser** is closed.

1.2.2 Windowing Images

The imaging methods provide diagnostic information in the form of grayscale images with up to several thousand different gray-scale values. With windowing, you can focus on the range of gray-scales of the diagnostically relevant area and tissue type.

The following functionalities are described in the subsequent sections:

- Setting the scope of selection
- Assigning predefined window settings
- Windowing with the mouse
- Restoring window values

Setting the scope of selection

◆ Select **Image > Windowing On Succeeding** to be able to process all images up to the end of the series.

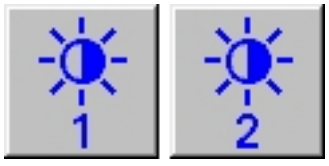
- or -

Select the series first if you want to window all images of a series.

An explicit selection of images overrides **Windowing On Succeeding**.

Assigning predefined window settings

1 Select the images you want to window.



2 Click one of the icons on the **Image** subtask card to switch between two window values stored with the image.

- or -

Select **Image > Windowing** and select a window setting from the submenu.

- or -

Use the corresponding keys of the symbol keypad for fine adjustment of the window settings.

You can modify the default values of **Window 1** and **Window 2** in the **Somaris/7 – Configuration Panel**. For more information, refer to: (→ Page 13 *Basic Functionalities*)

Windowing with the mouse

1 Move the mouse up or down with the mouse wheel pressed to change the window center.

2 Move the mouse to the right or to the left with the mouse wheel pressed to change the window width.

Restoring window values

- Select **Image > Home Window** to undo your changes.

1.2.3 Zooming and Panning

The following functionalities are described in the subsequent sections:

- Zooming and panning with the mouse
- Restoring the zoom factor
- Using the Blow up mode

Zooming and panning with the mouse

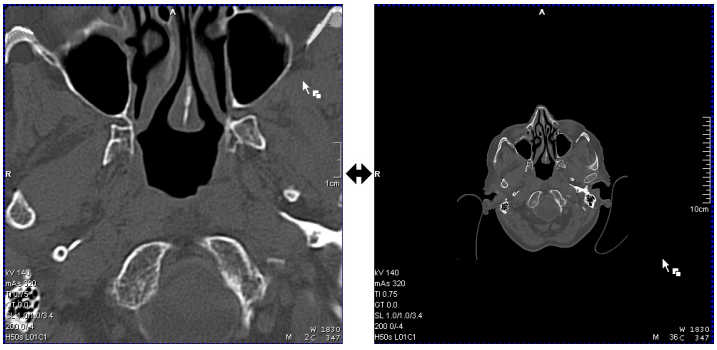
Zooming with the mouse is applied to all the selected images.



1 Click the **Zoom/Pan** icon.

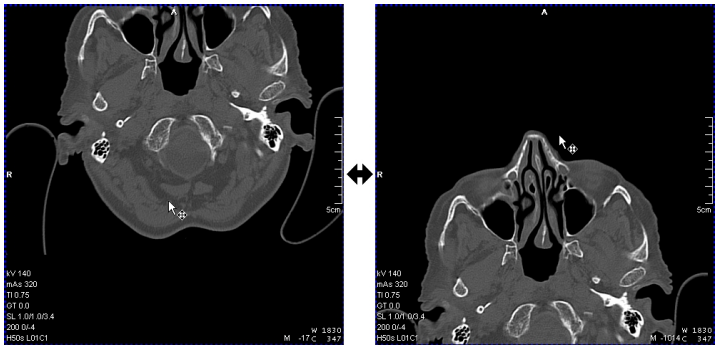


2 Drag the mouse cursor up or down at the edge of the segment to zoom the image.





3 Drag the mouse cursor within the center part of the segment to pan the image.



4 Click the **Zoom/Pan** icon to deactivate the **Zoom/Pan** function of the left mouse button.

Restoring the zoom factor



1 Click the **Home Zoom/Pan** icon.

The last saved zoom factor of the images in the database is restored.

- or -

Select **Image > Zoom Factor...** in the main menu.

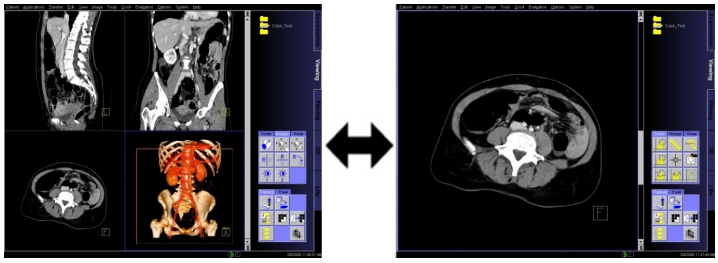
The **Zoom Factor** dialog box is displayed.

2 Enter a predetermined zoom factor.

Using the Blow up mode

1 Double-click a segment to activate the **Blow up** view.

2 Double-click the **Blow up** view again to return to the initial layout of the chosen segment.



1.2.4 2D and 3D Evaluation

Any graphic tool used for image evaluation is activated and switched off again by selecting it in the menu or by clicking the corresponding icon.

The following functionalities are described in the subsequent sections:

- Measuring distances
- Measuring angles
- Evaluating regions (ROIs)
- Configuring the result display of statistical evaluations
- Evaluating pixels with the pixel lens
- Entering comments
- Deleting graphic and textual elements

Safety advice

CAUTION

Distance and angle measurements in the topogram!

Incorrect measurement values due to the projection technique used.

- Only perform distance measurements in the topogram in the longitudinal direction (head-foot direction).
- Do not perform angle measurements.

Measuring distances

For distance measurements, the geometric accuracy of the measurement system in the center of rotation is ±0.1 mm.

If you change the imaging parameters (for example, window, reconstruction parameter, FoV, kernel), it may influence the image impression. It can have effects on the start- and endpoints of distance measurements you selected.

For volume measurements, the geometric accuracy of the measurement system in the center of rotation is ±0.1 mm in the scan plane.

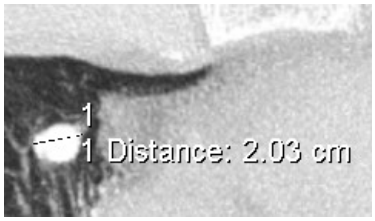
If you change the imaging parameters, it may influence the visual border line impression of the displayed evaluated structures (for example, nodule).



1 Click the **Distance** icon of the **Tools** subtask card.



2 Drag out a line between two points in the image while holding down the left mouse button to display the distance in the image.



Measuring angles



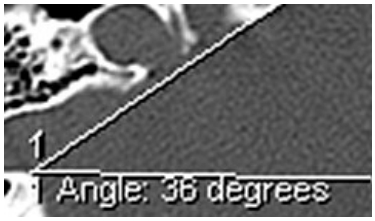
1 Click the **Angle** icon to activate angle measurement.



2 First drag out one line while holding the left mouse button down. The line represents the first leg of the angle.

3 Draw another line for the second leg.

The angle size is displayed in the image.



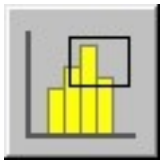
You must pull each line toward the origin of the angle or away from the origin of the angle. Otherwise the complementary angle with respect to 180° is calculated.

Evaluating regions (ROIs)

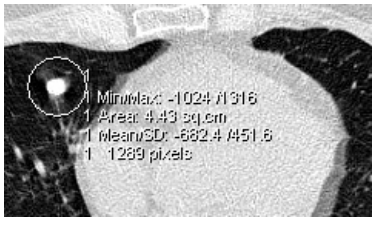
If you load a series that contains images with different resolutions, different values in the corresponding images may result when drawing ROIs.

The area values of the images with different resolutions might differ from each other. The calculation is based on the number of pixels contained in the ROI. Consequently, the calculated area is smaller in the image with the higher resolution.





1 Click the **Circle** or **Rectangle** icon on the **Tools** subtask card.



2 Click the image and draw the ROI (rectangle or circle).

3 Release the mouse button.

- or -



Click the **Freehand ROI** icon.

4 Drag the mouse around your region of interest, and double-click the end point.

You can also draw the region point to point by clicking with the mouse at each change of direction (polygon definition).

You can move the text block of the evaluation results to any location in the image.

Configuring the result display of statistical evaluations

You can configure the data displayed via **Somaris/7 – Configuration Panel**.



(1) Evaluated gray scale range

(2) Highest and lowest gray scale value

(3) Mean value and standard deviation

(4) Area of the ROI in cm^2

(5) Number of pixels in the ROI

- Select **Options** > **Configuration...** from the main menu and select the **Viewing** button.

You can also configure the data by right-clicking the different ROI icons on the **Viewing** task card.

Evaluating pixels with the pixel lens

You can display the average value of gray scales (for example, Hounsfield values for CT images) of a 5 x 5 pixels area.

The pixel marker does not reflect the area of 5 x 5 pixels currently measured. The marker has a constant size and is independent of the zoom factor of the image.

Safety advice

CAUTION

The pixel marker has a constant size and is independent of the zoom factor of the image!

Wrong diagnosis caused by misleading image information.

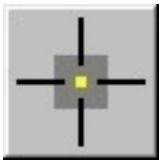
- Please note that the pixel marker is only a pointer indicating the *position* (not the size) of the measured area.

CAUTION

Use of pixel lens in the **Viewing** task card and in the **3D** task card!

The pixel lens may display different values.

- Be aware of differences in pixel lens measurements. The pixel lens measurement in the **Viewing** task card considers a rectangle around the clicked point, whereas measurement in the **3D** task card considers a cube surrounding the clicked point.



1 Click the **Pixel Lens** icon on the **Tools** subtask card.



2 Click the image to display the pixel values permanently.

The cursor changes shape. The pixel value at the position of the cursor in the image is displayed.

Entering comments



1 Click the **Annotation Text** icon on the **Tools** subtask card.

The mouse cursor changes to a cursor with a small rectangle attached.

2 Click the position in the image at which you want to insert the text.

3 Enter the text you want to insert.

Deleting graphic and textual elements

1 Click the graphic or text you want to delete or select **Edit > Select > All Graphics** to select all graphics and text in the image.

The graphic elements and text in all selected images are marked.

2 Select **Edit > Delete Graphics** from the main menu.

- or -

Press the **Del** key on your keyboard.

1.2.5 Saving Images

1 Select the images or series you want to save.

2 Click the **Save As** icon in the control area.

3 Select whether to save images in new series or append images to existing series in the upcoming **Save As** dialog box.

4 Click the **OK** button.

The images are saved in the local data base.

1.2.6 Saving screenshots

You can create screenshots of the user interface for non-diagnostic purposes in single monitor mode as well as in dual monitor mode.



This functionality is available only on the *syngo* Acquisition Workplace.

1 Select **System** > **Run** > **Save Screenshot** from the main menu.

The screenshot is created and saved in H:\Sitedata\SaveScreenshot.

2 Double-click the desired *.jpg file to open the screenshot.

The screenshot is displayed in the **Windows Photo Viewer** dialog box.

Use the File Browser to access the entire made screenshot.

1.2.7 Filming

You can expose the images of an examination on film.

You can film and print multiframe images only from the **Viewing** task card. You cannot film multiframe images from the **Patient Browser**. A message box is displayed if the selected images are multiframe images.

The following functionalities are described in the subsequent sections:

- Copy to Filming
- Exposing images

Copy to Filming

1 Select the images to be filmed in the **Patient Browser** or on the task cards.



2 Click the **Copy To Film Sheet** icon of the control area.

- or -

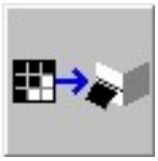


Press the **Copy to Film Sheet** key on the symbol keypad (Num **Enter**).

You can also select all images and results for filming via **Edit > Select All** in the main menu. This option is not available in all applications.

Exposing images

1 Check the layout settings in the **Filming** task card.



2 Click **Expose Film Task** to expose all images on the **Filming** card to film on a preset camera.

1.2.8 Transferring Data

The following functionalities are described in the subsequent sections:

- Transferring images to the **Viewing** task card
- Exporting data to CD-R and DVD-R
- Sending data to network nodes

Safety advice

CAUTION

Transferring manipulated non-square matrices or viewing segments!

Diagnostically relevant areas of images may be lost.

- When manipulated images are exported or sent to another workstation, the related original images should be sent, as well. It is strongly recommended to base the final diagnosis always on the original images and not on modified or manipulated images.

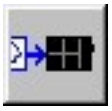
CAUTION

Lossy compression is selected for data transfer!

Image quality of the lossy compressed images may no longer be adequate for diagnostic purpose.

- Do not use lossy JPEG compression for sending data to a report or primary diagnosis workstation.
- Do not use lossy JPEG compression for archiving.
- Note: Application of lossy compression will be indicated in image text except if **No Text** is switched on.

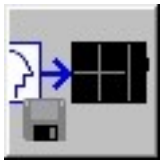
Transferring images to the Viewing task card



- Select the images and click the **Load to Viewing** icon to transfer images from the Patient Browser to the **Viewing** task card.

  - or -

  Select the images and click the **Save and Load to Viewing** icon to transfer images from the **3D** task card to the **Viewing** task card.



Exporting data to CD-R and DVD-R

Safety advice

CAUTION

When you simultaneously export data to a device, like CD-R or DVD-R drive, and try to read data from the same device with external (non-*syngo*-based) applications, one job or both jobs can fail (depending on the timing)!

Possible loss of data. When data is being written to a drive, any external access at the same time will destroy the current write job and could even damage the storage disk.

Data already stored on a multi-session disk might also become unreadable.

- Do not try to access the device with non-*syngo*-based applications while it is writing data or reading data.
- To ensure successful writing or reading, check the **Local Job Status** to see if there are any write or import jobs in progress.

CAUTION

Taking out the CD-R, CD or DVD too early!

Loss of data and destruction of the CD-R, CD or DVD possible.

- Do not remove the CD-R, CD or DVD from the recorder until the recording process has been completed and the status LED has gone out.
- Use the **Transfer** menu to eject media.

CAUTION

Switching to multi session mode may destroy data previously recorded on this medium!

Previously stored data can no longer be read.

- Only delete the data that you have exported on a CD-R from the local database after you have completed the session.

CAUTION

DVD-R Medium used for export or archive may get corrupted or may not be readable with other DVD devices!

Loss of data or user perception of loss of data.

- Configure and use local media only as 'archive' media if the requirements regarding retention and readability are sufficiently fulfilled, for example, the manufacturer approved the media for archiving.
- Verify readability of the data on the medium before the data is deleted in the database.



- Click the **Export data** icon to export data to CD-R or DVD-R.

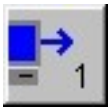
Do not use CD-R or DVD-R for longterm storage of data because data may get lost.

Depending on the configuration of your system the same icon is used for **Archive To**.

Sending data to network nodes

During installation, Siemens Service sets up various network connections as standard addresses in the network.

1 Select the data that you want to transfer.



2 Click the **Sending data to network node** icon to send the data to the configured network node.

3 Use **Storage Commitment** for **Send/Archive** actions to avoid deletion of images before you stored them. (Provided if your archive supports this functionality.)

If a network destination is configured to receive DICOM graphics encoded within the pixel data, color images like VRTs are sent without graphics.

1.3 Patient Browser

In the **Patient Browser** dialog box, the hierarchical structure of the patient and examination data is displayed. Patient data from the databases and the connected drives is displayed.

The icons for calling up different applications and functionalities are gathered in the toolbar.



You can search for patient data to examine a patient again, or to review, film, or archive the images.

You can search for patient data in the **Patient Browser** by navigating through the data levels, by mouse click, or by using the keyboard.

You can speed up your search by sorting the data displayed, or by filtering the data displayed and only viewing a certain subset.
(→ Page 60 *Sorting data*)

For enhanced data objects, you can display the following information in addition to the common image instance attributes:

- Number of frames
- Number of dimensions
- Textual description of the dimensions

In the **Browser Configuration,** you can define icons to be displayed in the tool bar of the **Patient Browser** dialog box. You can call up the configuration via **Options** > **Configuration...** from the main menu and clicking the **Patient Browser** icon.

The following functionalities are described in the subsequent sections:

- Displaying Patient Data
- Assigning Patients or Studies
- Searching for and Selecting Patient Data
- Correcting Data
- Storing and Sending Data
- Importing Data
- Deleting Data in Patient Browser

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

Safety advice

CAUTION

Not all graphic and evaluation results created by one software can be interpreted!

Not all information from post-processing available for diagnosis.

- A message box appears if not all information can be loaded and displayed.
- Be aware when using such data for diagnosis.
- Use original application to view the post processing results.

1.3.1 Displaying Patient Data

The following functionalities are described in the subsequent sections:

- (→ Page 54 *Calling up the Patient Browser*)
- (→ Page 55 *Viewing structured reports*)
- (→ Page 55 *Updating HIS/RIS information manually*)
- (→ Page 56 *Updating the display of the databases*)

Calling up the Patient Browser

You call up the **Patient Browser** to display patient data.



- Call up the **Patient Browser** by selecting **Patient > Browser...** from the main menu.

  - or -



Press the **Browser** key on the symbol keypad (Numeric: **.**).

Viewing structured reports

You can load structured reports (SR) in the SR Viewer.

1 In the **Patient Browser**, select a structured report from the series list in the tree view, for example, Circulation SR.



2 Click the **Load Last Report** icon.

The Circulation SR will be opened in the SR Viewer.

When you select a study or a patient in the tree view instead, all reports available for the selected study or patient are opened in the SR Viewer.

Updating HIS/RIS information manually

You can update the HIS/RIS information manually.

The default RIS name is configured in the **Registration Configuration** dialog box.

The Patient Browser shows the current active RIS node name in the navigation area below **Scheduler**. The active RIS node is displayed in the tree view and in the single view.

- Select **View > Update Worklist** to update the scheduler to ensure that you are always working with the latest data.

  - or -

  Double-click the **Scheduler** icon to update it.



If your system is connected to an HIS/RIS system, the scheduler is automatically updated at regular intervals (default 60 minutes). It is updated with information from the registration depending on the service configuration. You can also configure the maximum number of query results and the query waiting time.

Switching to another database

If the navigation area is hidden, you can switch to another database via the main menu.



- Select **View > Tree** and click the database symbol concerned.

Updating the display of the databases

You can update the display of the databases if necessary. The **Patient Browser** is not automatically updated. This is the case, for example, if you perform a constancy test scan for the quality assurance.

- Select **View > Refresh** from the main menu.

  - or -

  Click the **Refresh** icon.



  The display of the navigation and content area is updated.

1.3.2 Assigning Patients or Studies

In the **Patient Browser**, you can modify the assignment of patient groups or studies.

This information applies to users performing daily routine operations with patient data protected by the Security Package (HIPAA).

Assigning existing data

You need the privilege **Patient Browser > Edit > Modify Patient Groups** to assign patients or studies to patient groups.

1 Call up the **Patient Browser** by selecting **Patient > Browser...** from the main menu of any task card.

  - or -



  Press the **Browser** key on the symbol keypad (Numeric: **.**).

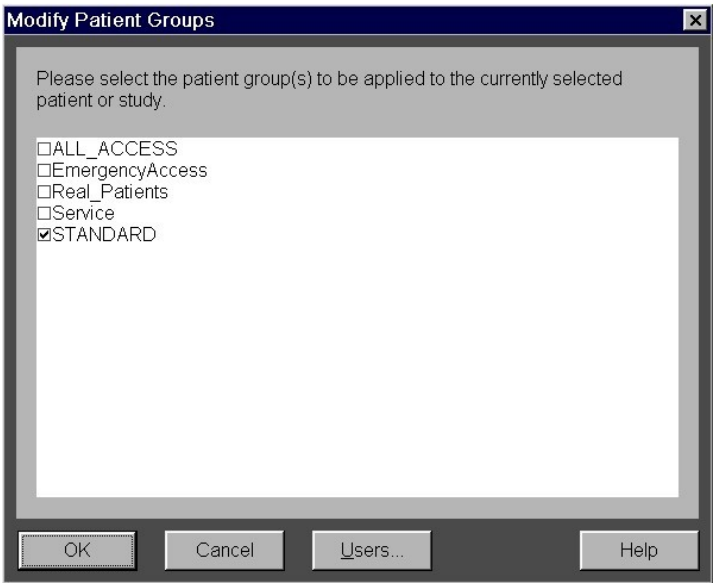


You must close the **syngo Security Configuration** dialog box to work with the **Browser** key on the symbol keypad.

2 Select the desired patient or study in the local database.

3 Select **Edit > Modify Patient Groups** from the main menu of the **Patient Browser**.

  The **Modify Patient Groups** dialog box is displayed.



CAUTION

Patient folders contain data from other patient or series, for example, after patient merge, import of data from external media!

The diagnosis or treatment may be made on the basis of incorrect information.

- Check that data is assigned to the correct patient and series before using the data.

4 Select the group you want the currently selected patient or study to be assigned to.

5 Confirm your selection with **OK**.

1.3.3 Searching for and Selecting Patient Data

Safety advice

CAUTION

If the Patient ID is not unique, studies may be listed, which do not belong to the patient selected and displayed in the information area!

Import of wrong patient data possible.

- Always check the patient data before importing them into your system.

The following functionalities are described in the subsequent sections:

- (→ Page 58 *Searching for data*)
- (→ Page 59 *Filtering data*)
- (→ Page 60 *Deactivating the filter*)
- (→ Page 60 *Sorting data*)
- (→ Page 61 *Searching for and retrieving patient data from storage media*)
- (→ Page 62 *Using Patient Search function on remote network nodes*)
- (→ Page 65 *Searching for and finding patients*)

Searching for data

You can search for patient data to examine a patient.

1 Scroll through the list of patients using the scroll bar until you find the required patient.

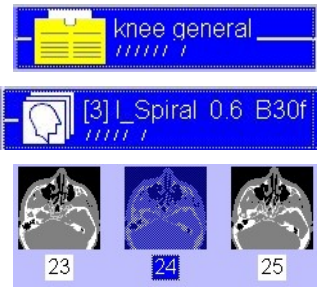


2 Click the patient entry in the navigation area to view the information levels stored for this patient.

All the studies of this patient are displayed in the content area.



If **View > Image Stamps** is activated, all data objects are displayed as image stamps on the image/data level.



3 Click a study in the navigation area to select it and to view all the associated series.

4 Click a series in the navigation area to select it and to obtain an overview of all the images in the content area.

5 Click an image in the content area to select it.

Filtering data

You can search for patient data easier if you filter it.

Additionally, menu entries corresponding to the icons for the filter options are in the **Filter** menu of the main menu.

1 Select a filter using the **Filter** menu or the tool bar (if configured).

You can configure all filter icons in the browser settings. You can call up the configuration via **Options** > **Configuration...** from the main menu and clicking the **Patient Browser** icon.



2 Click the **Not Archived** icon.

Only the data, which is not stored, is displayed.



3 Click the **Not Printed** icon.

Only the data, which is not printed yet, is displayed.



4 Click the **Not Sent** icon.

Only the data, which is not sent to the network yet, is displayed.



5 Click the **Not Marked** icon.

Only the data, which is not marked, is displayed.



6 Click the **Marked** icon.

Only marked data is displayed.

If you do not find the specific patient data in a search, make sure that no filter is activated.

Creating filter criteria

- Call up the **Filter Specification** dialog box to create your own filter criteria by selecting **Options > Filter Settings...** from the main menu.

  These user-defined filters are placed in the **Filter** menu as additional menu entries.

Deactivating the filter

You can also deactivate all filters.

- Select **Filter > Off** from the main menu.

  - or -

  Click the **Not Filtered** icon.



All the data is displayed unfiltered.

A filter remains active until you replace it by another filter or turn off the filter. If you exit the **Patient Browser**, and call it up again later on, the last filter selected is still active.

Sorting data

The search for patient data is easier if you sort it.

1. Select a data level in the navigation area to display its elements in the content area.
2. Choose the **Sort** menu.
3. Choose one of the menu items to sort the navigation tree, for example, **Patient ID**.
4. Select **Sort > Reverse Order** to reverse the order of selected data level.

In case the selected sort order cannot be applied, the following default order is automatically used:

- Patient Name
- Study Description
- Series Number
- Instance Number

Searching for and retrieving patient data from storage media

You can also import patient data from storage media.

You can find information on the storage media released by Siemens in the Hardware Operator Manual.

When you insert a disc, wait for a few seconds until the system has read the disc before you continue to work.



1 Click the icon of a data medium in the navigation area to display all the patient data stored there.

Select **View > Source** to hide or display storage media individually in the navigation area.

2 Search for, and select patient and examination data by clicking through the data levels in the navigation area.



3 Click the **Import** icon to import the selected data into your local database.

You can process only data stored in the local database.

Using Patient Search function on remote network nodes

With **Patient Search** and **Search Selected**, you can retrieve patient and examination data from workstations and long-term storage systems that are working with other DICOM program systems or previous *syngo* program versions. These systems are not displayed in the navigation area.

For information about DICOM structures and features, read the actual DICOM conformance statement.

Safety advice

CAUTION

If *syngo* receives images but the study or series UID is already available in the local database, the data will be assigned to this locally existing patient. This happens regardless of the patient identification (name, date of birth, gender and patient ID) of the received images. Changes of patient information on other systems will not automatically change the patient information in *syngo*!

Data retrieved from PACS or other nodes seems to be misaligned or lost, but is stored elsewhere in the database.

- Imported data will always be appended to the already existing patient on the local system, based on matching DICOM UIDs.
- If you imported data, but cannot find them on the local system under a certain name, use other criteria from the study or series to search for the imported data, or filter the data.
- To completely avoid these inconsistencies, always delete the local patient data after you have successfully archived them.

Opening the Patient Search dialog box

1 Select **Patient** > **Search** in the main menu.

The **Patient Search** dialog box is displayed.

2 Click the triangle to the left of the dialog box to display any collapsed search area.

3 Click the triangle to the left of the dialog box to hide any of the search areas.

Searching for patient studies

1 Open the **Patient Search** dialog box.

2 In the **Basic Search** area, enter or select your desired search criteria, for example, **Patient ID**.

3 In the **Advanced Search** area, enter or select further search criteria.

4 From the **Node** selection list, select the network node where the data being searched for is located.

5 Click the **Search** button to start the search.

All patients and studies that are found are displayed in the information area.

Each study is displayed as a folder which shows the modalities and the study date.



In case the query exceeds the configured maximum number of matches, it is aborted. The matched queried results are displayed even though they are incomplete. The matched queried results are displayed in red. At the end of the result list, the message **Incomplete patient list** is displayed.

While searching, the **Search** button is renamed to **Stop Search**. By clicking this button, you can stop a search if the expected match already appears in the matching list, or if you have entered the wrong search criteria.

Searching for patient series

1 In the **Patient Search** dialog box, click the desired study at the top of the results area.

All series that belong to the study are displayed in the table below. Use the series information such as **Modality** or **Body Part Exam** to identify the desired series.

2 Select a series in the table.

3 Click the **Image List** button to see the instance numbers of a series.

The **Image Search** dialog box displays all instances, their IDs, and all numbers of frames in cases of multiframe images.

4 Click the header of the column to sort in ascending or descending order.

5 Import the desired studies or series, or import single images of the patient.

Saving and loading search attributes

1 In the **Type New Query Name** selection list, enter the name for the search you want to save.

2 Click the **Save** button to save the search.

3 From the **Type New Query Name** selection list, select the search you want to load.



To delete a saved query, you can select it in the **Type New Query Name** selection list and click the **OK** button.

Importing patient data, studies, series, or structured reports

After searching for the desired patient study or series, you can import the images belonging to a patient, study, or series. The importing of structured reports is handled the same as the importing of series. You can also import multiple studies of a patient and multiple series of a study.

1 Click a study to display the corresponding series.

The series are displayed in the series details list.



2 From the information area or the search details list, select one or more patients, studies, or series.

- or -

In the series details list, select a series and click the **Image List** button.

3 In the **Image Search Results** dialog box, select the desired instances.

4 Click the **Import** button.

The selected data is copied from the network node to your workstation and displayed in the navigation and content area of the **Patient Browser**.

Once a previous import request has been made by clicking the **Import** button or by double-clicking, a new query can be initiated for a different node. Then the queried results can be imported by selecting the required information.

5 In the **Patient Search** dialog box, click the **Import Job Status** button to view the current status of the import jobs.

In the **Import Job Status** dialog box, you can also delete and stop import jobs.

Searching for and finding patients

In the **Patient Browser**, it is possible to find a patient using one of the following attributes:

- **Patient Name**: The search is conducted using the entire patient name (first name, middle name, and last name)
- **Patient ID**

The **Find** function supports all databases and is available in both views – tree view and single view – but only when the display level is **Patient**.

1 In the **Patient Browser**, choose **Edit** > **Find** to open the **Find** dialog box.

- or -

Press **Ctrl** + **S** on your keyboard.

2 From the **Select** selection list, choose an attribute for a patient search, for example, **Patient Name**.

3 In the **Find What** entry field, enter a search string.

You can also use wildcards (*).

4 Select the **Match whole word only** checkbox if you know exactly the name or ID.

5 Select the **Match case** checkbox if you want to search case sensitively.

6 Click the **Up** or **Down** radio button to determine the search direction in the **Patient Browser**.

7 Click the **Find Next** button to start or continue the search.

The first or next found patient will be focussed in the **Patient Browser**.

Once the **Find** function is initiated from the **Study/Series/Instance** level in the tree view, the focus will be shifted to the corresponding patient level.



When you are trying to find Japanese patient names while using the **Patient Name** attribute, all name component groups (SINGLEBYTE, IDEOGRAPHIC, PHONETIC) are considered. The patient is selected if one of the component groups matches the entered patient name string.

1.3.4 Correcting Data

On the *syngo* Acquisition Workplace, you can correct, add, or rearrange patient data and information already stored in the database.

The following functionalities are described in the subsequent sections:

- Using the Correct dialog box
- Modifying the patient position
- Displaying the history of changes

Safety advice

CAUTION

Rearranging series or images to another series may lead to wrong image information if the selected images or series are not compatible!

Wrong diagnosis caused by wrong image information.

- Correct the attributes which do not correspond first and then rearrange the series or images.

CAUTION

If any Radiotherapy (RT) object is involved in a correction or rearrangement, the references to and from other objects are not updated. The Correct and Rearrange function checks if any RT objects are involved and prompts for confirmation!

Possible loss of references between images and RT objects.

- Use the application that was used to generate the RT object for managing their references.
- First correct images, for example, patient demographics, before using them within RT.

CAUTION

Correcting or rearranging objects containing references!

Possible loss of references.

- Rearrange the entire hierarchical group containing all objects with references in order to maintain the references.
- Only references found within the selection will be adapted.

Using the Correct dialog box

You use the **Correct** dialog box for correcting or modifying patient data and information.

Safety advice

CAUTION

Inconsistent patient data or image information for *syngo* applications like Osteo CT, Pulmo CT, Volume, Circulation, Dental CT, LungCARE CT or Calcium Scoring!

Wrong basis for diagnosis.

- Do not modify patient data (**Edit > Correct** in the **Browser** menu) after results have been calculated.

1 Select the patient, study, series, or images that you want to correct in the navigation or content area of the **Patient Browser**.

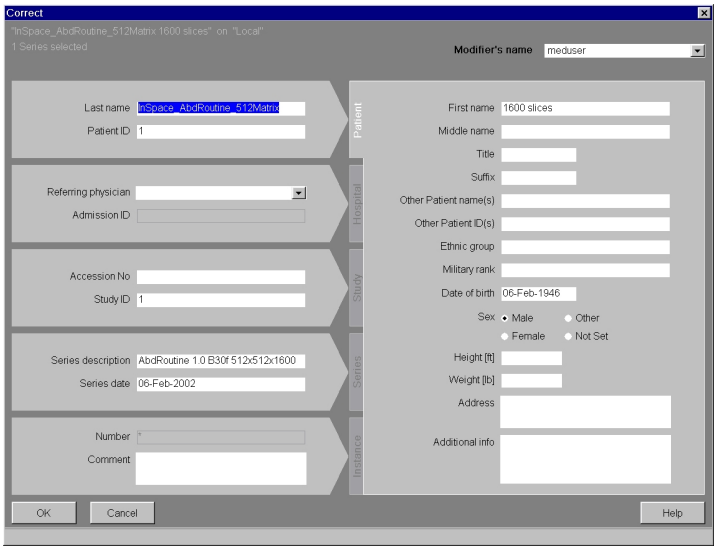
2 Select **Edit > Correct** from the main menu of the **Patient Browser**.

- or -



Click the **Correct** icon on the tool bar.

The **Correct** dialog box opens.



Depending on the data level, some fields of the dialog box are dimmed.

3 Select the required tab, and correct the relevant data.

4 Enter your name under **Modifier's name** or select your name from the selection list.

5 Click **OK** to save the new data.

If you want to correct data that is delete-protected, remove the delete-protection by selecting **Edit > Remove Protection** from the main menu.

Modifying the patient position

Correcting the patient position for multistudies

You can correct the patient position of multistudies consistently.

1 Select the series in the **Patient Browser**.

2 Select **Edit** > **Correct Patient Position** menu entry from the main menu.

The **Patient Position Dialog** dialog box is displayed.

3 Click the desired icon.

4 Click the **OK** button to correct the patient position of the selected series and all other series having the same frame of reference UID.

The frame of reference (FoR) establishes the relation between the horizontal table position and the position of the patient. A FoR is related to series, so all images of one series always have the same FoR.

Displaying the history of changes

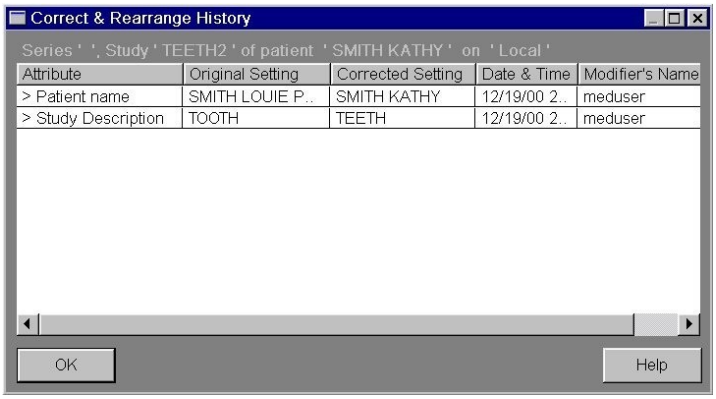
You can view the modifications and the examination data of the patient in the **Patient Browser**.

1 Select the patient, study, series, or image stored in the local database whose history of changes you want to view.



2 Click the **History** icon on the tool bar.

The **Correct & Rearrange History** dialog box is displayed.



3 Click **OK** to close the history display.



The entries in the **Correct & Rearrange History** dialog box are generated by your system. You cannot make changes by yourself.

If an object was moved, the entry is marked with > under **Attribute**.

1.3.5 Storing and Sending Data

The following functionalities are described in the subsequent sections:

- (→ Page 72 *Exporting to offline media*)
- (→ Page 74 *Exporting or importing raw data*)
- (→ Page 75 *Exporting to Plug and Play devices*)
- (→ Page 77 *Storing data on storage media*)
- (→ Page 79 *Ejecting DVD/CD*)
- (→ Page 79 *Obtaining the Local Job Status*)
- (→ Page 80 *Sending data via the network*)
- (→ Page 81 *Obtaining Network Job Status*)

You can find information on the storage media released by Siemens in the Hardware Operator Manual.

Safety advice

CAUTION

Systems that do not use storage commitment only report back to the sending system when the data has been fully received (flags A and S). A user or an auto-delete mechanism at the sending system might subsequently delete the sent data. However, this response does not imply that the data has already been stored at the receiving system!

In the case that the receiving system cannot store the data, the data might irrevocably be lost.

- Double-check that the data is actually stored on the receiving system. Use storage commitment whenever it is supported by the sending and receiving systems.

CAUTION

Misleading or misinterpretation of the storage commitment flags AC/SC. Storage Commitment means storage to hard disk but this may not fulfill or guarantee regulatory requirements about long-term archiving. You can delete the committed objects!

Possible loss of data within the required period for retention.

- Observe the regulatory requirements regarding long-term archiving.

CAUTION

Switching off a device while writing to the device!

Possible loss of all data and damage of media.

- Never switch off the device while writing to the device.

Transferring data

You can transfer data in several ways by using the menu items of the **Transfer** menu of each application card.

1 Click the **Export to...** menu item to transfer data, for example, to CD-R or DVD-R.

2 Click the **Send to...** menu item to transfer data, for example, to other workstations and network nodes.

3 Click the **Export to Off-line...** menu item to export data to a directory on the local hard disk/to the File Browser.
(→ Page 138 *Transferring CT Data*)

4 Click the **Record Off-line Files** menu item to burn data from the **CDBurn** folder on CD selected by **Export to Off-line...**.

Depending on your system configuration, not all described options may apply.

Exporting to offline media

You can export patient or examination images from the database to the local file system, to a remote folder in the network, or to a USB device (such as a USB hard drive or memory stick
(→ Page 75 *Exporting to Plug and Play devices*)). There are several file formats for exporting available.

A service technician must configure the paths used by this function.

It is also possible to make the exported data anonymous, for example, for presentations.

You cannot write data to a CD-R/DVD if you use the **Export to Off-line** function.

To access a folder at a remote network node, the following prerequisites must be fulfilled:

✓ The folder must be configured as “shared” at the remote node.

✓ The Windows operating system must be able to establish a network connection.

1 Select the data objects you want to copy from the **Patient Browser**.

- or -

Select the images (or single frames of a multiframe) in the **Viewing** task card.

For multiframes exported as BMP or JPEG, the first frame will be exported.

2 Choose **Transfer** > **Export to Off-line...** to open the **Export to Off-line** dialog box.

3 From the **Path** selection list, select one of the predefined paths.

4 From the **Select format** selection list, select a graphics format.

JPEG images should not be used for diagnosis.

5 From the **Quality factor** selection list, select the quality factor (only for JPEG images).

Note that the higher the quality, the larger the size of the exported images.

6 In the **Frame Rate** entry field, enter the desired number (only for the AVI format).

7 Select the resize factor (only for Bitmap and JPEG images).

- **none** (default): Images will be exported in original size.
- **2X**: Images will be exported in double size.
- **4X**: Images will be exported in quad size.

8 Select the **anonymously** option to export data anonymously, for example, for presentations.

You cannot export data to the root directory of a USB device. If you choose the root directory of a USB device for an anonymous export, the data is exported to the folder **NON_DICOM_ANONYM_FILES** which is created automatically.

9 Click the **OK** button.

If a remote share is selected as an offline directory, you must connect it by using the **Connect As...** button.

Exporting or importing raw data

You can export raw data from the *syngo* Acquisition Workplace only.

Using **Export CT Data** and **Import CT Data** you can store and fetch data > 4 GB to storage media.

In case the data exceeds a size of 4 GB the raw data symbol is marked with **XL** in the content area of the **Patient Browser**.

For the export and the import of data, you must use the same method.

1 Select **View > Image Stamps** as display mode to display the raw data symbol in the content area of the **Patient Browser**.



2 Select the raw data symbol.

3 Select **Patient > Export CT Data** or **Patient > Import CT Data** from the main menu.

The selected data is exported to the export root determined in the File Browser. For more information, refer to:
(→ Page 138 *Transferring CT Data*)

Exporting of raw data is very time consuming.

Exporting to DICOM media

For the export of data smaller than 4 GB, you are recommended to export to DICOM media (storage media released by Siemens).

- Select **Transfer > Export to...** in the **Patient Browser**.

  - or -

  Choose **Transfer > Export to Off-line...** to create DICOM files.

Exporting to Plug and Play devices

Plug and play (PNP) devices provide you with flexibility in data exchange on portable storage media. You can connect external media via the USB interface.

The following PNP devices are recommended:

- USB memory stick
- USB external hard disk 2.5"
- USB external hard disk 3.5"

No other USB devices like USB CD or USB DVD drives/burners, PDAs, audio players, card readers, digital cameras, USB devices with security features, or flash memories with multiple partitions, e.g., U3 sticks, are supported. Their usage is not recommended and on your own responsibility.

Make sure that the USB sticks or hard disks are preformatted (FAT 32/NTFS) and that they provide enough storage capacity. It is neither possible to format the devices nor to delete data currently stored on the devices.

You can export patient data, images, and reports to an external USB device.

Safety advice

CAUTION

Removal of USB device without deactivation by the software!

Possible loss of data, damage of the operating system, and damage of media.

- Do not immediately unplug a USB device.
- Always use the software functionality for safe removal before unplugging.

CAUTION

Plugging or unplugging USB devices during acquisition can make the system unstable which may affect other processes like running acquisition tasks!

Loss of data, acquisition process disturbed.

- Do not plug in or unplug USB devices during acquisition tasks or other critical processes.

CAUTION

Using USB devices without own power supply!

The USB controller can be permanently damaged.

- Use USB devices as recommended in the operator manual.

CAUTION

Use of non-integrated USB storage device!

Reboot request of the operating system.

- Ignore the reboot request and press **Cancel**.
- Finish your examination or application.
- Restart the system with **System** > **End** > **Restart System**.

1 Connect the USB device.

2 Select the data you want to export.

3 Select **Transfer** > **Export to Off-line...** in the **Patient Browser**.

The **Export to Off-line** dialog box opens.

4 From the **Path** selection list, select **(USB)**.

5 Click **OK** to store the data on your USB device.



6 Click the **USB** icon in the status bar to eject the USB device.

You have to ensure that the data was completely written prior to removing the USB device.

If the **USB** icon is not updated when a new USB device has been plugged in, you have to contact your system administrator. The default Windows drivers might not detect the new hardware.

Storing data on storage media

You can store data on storage media, for example, CD-R, or DVD-R.

You can find information on the storage media released by Siemens in the Hardware Operator Manual.

CD-Rs and DVD-Rs are not suitable for long-term storage.

In the **Transfer Configuration** dialog box, you can activate the **Display Recordable Patient Size dialog** checkbox. The **Recordable Patient Size** dialog box displays the needed storage space before you start to burn the CD or DVD.

CAUTION

A recording error may make a medium unusable!

In multi-session mode, all data previously stored on that medium could be lost, too.

If this happens, any archive flags set to this data in the database become invalid.

- Only delete the data that you have archived on a media from the local database after you have successfully finalized and verified the media.

CAUTION

A medium is not finalized!

Another system or device may show this medium as empty or defective, or the data of the last session is missing.

- Use 'Eject with finalize' to complete the work on this medium and to ensure that the medium is readable on other systems or devices.
- If a medium on which you expected to find data seems to be empty or defective or the last data is missing, try to use original or another *syngo* system to finalize the medium for further read-only access.

1 Select the data that you wish to store in the navigation and content area of the **Patient Browser**.

2 Select **Transfer > Export to...** from the main menu of the **Patient Browser**.

The **Export To** dialog box opens.

It is recommended to clear all entries in the Local Job Status before transferring data. For more information, refer to: (→ Page 79 *Obtaining the Local Job Status*)

3 Select **[CD/DVD-Writer]** from the selection list of the **Export To** dialog box.



4 Click the **Export** button to store the data on the default CD/DVD drive.

5 Enter a unique designation for the CD-R/DVD-R in the dialog box displayed.

6 Click the **OK** button.

Ejecting DVD/CD

You eject the DVD-R only by using **Eject from...** from the main menu after the export is finished and not by using the **Eject** key at the DVD drive.

Safety advice

CAUTION

Taking out the CD-R, CD or DVD too early!

Loss of data and destruction of the CD-R, CD or DVD possible.

- Do not remove the CD-R, CD or DVD from the recorder until the recording process has been completed and the status LED has gone out.
- Use the **Transfer** menu to eject media.

1 Select **Transfer > Eject from...** from the main menu of the **Patient Browser**.

The **Eject From** dialog box opens.

2 Select **[CD/DVD]** from the selection list of the **Eject From** dialog box.



3 Click the **Eject** button to eject the CD-R/DVD-R from the drive.

Obtaining the Local Job Status

You can obtain the status of pending and active storing local jobs.

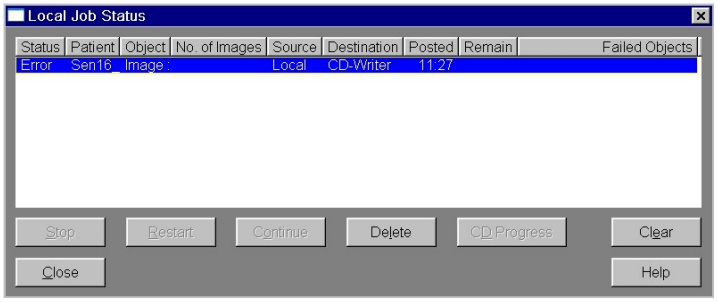
1 Select **Transfer > Local Job Status...** from the main menu to obtain an overview of pending and active storing jobs (importing and exporting).

- or -



Click the status bar on one of the icons for local data transfer.

The dialog box **Local Job Status** opens.



2 Double-click the desired job to get detailed information of the job status.

Sending data via the network

During installation, Siemens Service sets up various network connections (for example, **Node 1** and **Node 2**) as standard addresses in the network.

1 Select the patient, study, series, or the images in the navigation area or content area.



2 Press the **Send to Node 1** key on the symbol keypad to send the data to the preconfigured network address.

- or -

Select **Transfer > Send to...** from the main menu of the **Patient Browser**.

The **Send To** dialog box opens.

Do not configure non-archive nodes as longtime archive.

3 Select the desired destinations from the selection list of the **Send To** dialog box.



4 Click the **Send** button to send the data to the selected node.

You are recommended not to transfer raw data to a DICOM node. If necessary, use the other **Transfer** functions respectively **Export CT data** function depending on the data size.

Obtaining Network Job Status

You can obtain the status of pending and active network jobs.

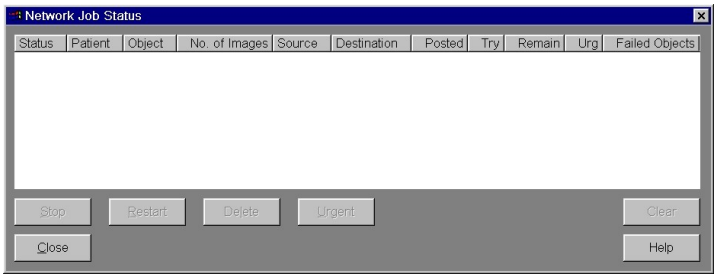
1 Select **Transfer > Network Job Status...** from the main menu to obtain an overview of pending and active network jobs (sending and receiving).

- or -



Click the status bar on an icon for remote data transfer.

The dialog box **Network Job Status** opens.



2 Double-click the desired job to get detailed information of the job status.

1.3.6 Importing Data

The following functionalities are described in the subsequent sections:

- Importing data from storage disks
- Importing data from the hard disk
- Importing data from PNP devices

Importing data from storage disks

You can import data from storage disks.



Data from hard disk, DVD-R, or CD-R must be imported into the local database first before it is possible to load them into a task card.

1 Insert the disk on which the patient or examination data is stored.

2 Click the corresponding icon of the drive in the navigation area of the **Patient Browser** and select the required data.

3 Select **Transfer > Import**.

The selected data is copied from the external storage disk to the database and placed at the corresponding position in the database.

You can watch the progress of the import process in the **Local Job Status** dialog box. For more information, refer to:
(→ Page 79 *Obtaining the Local Job Status*)

Importing data from the hard disk

You can copy objects, for example, images or series, from your local hard disk, or from a remote folder into the local database.

1 On the main menu of the **Patient Browser**, choose **Transfer > Import from Off-line...** to open the **Import from Off-line** dialog box.

You can only import images in the DICOM format, for example, IMA files.

2 Select the required drive and directory from the **Path** selection list.

3 Select the files or directories you want to import.

If a remote share is selected as an offline directory, you must connect it by using the **Connect As...** button.

4 Click the **OK** button.

The objects are imported into the database and appended to any existing patient data objects or a new patient folder is created.

Importing data from PNP devices

Plug and play (PNP) devices provide you with flexibility in data exchange on portable storage media. You can connect external media via the USB interface.

You can import patient data, images, or raw data from an external USB device.

The following PNP devices are recommended:

- USB memory stick
- USB external hard disk 2.5"
- USB external hard disk 3.5"

Make sure that the USB sticks or hard disks are preformatted (FAT 32/NTFS) and that they provide enough storage capacity. It is neither possible to format the devices nor to delete data currently stored on the devices.

1 Insert the USB device on which the patient or examination data is stored.

2 Select **Transfer** > **Import from Off-line...** in the main menu of the **Patient Browser**.

The **Import from Off-line** dialog box pops up displaying the files saved on the USB device.

3 Select the files you want to import.

4 Click the **OK** button.

The selected data is copied from the USB device to the database and placed at the corresponding position in the database.

1.3.7 Deleting Data in Patient Browser

The following functionalities are described in the subsequent sections:

- Deleting data manually
- Deleting data automatically
- Protecting data from deletion
- Removing delete protection

Series that are protected or locked, studies that contain protected or locked series and not reconstructed raw data are not deleted.

If deletion is started it cannot be stopped or suspended by other jobs.

You can delete patient data in the Patient Browser only if no other application wants to access the same data.

Safety advice

CAUTION

A recording error may make a medium unusable!

In multi-session mode, all data previously stored on that medium could be lost, too.

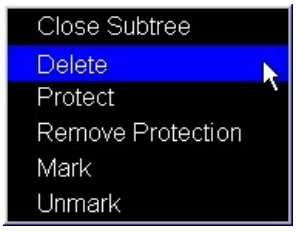
If this happens, any archive flags set to this data in the database become invalid.

- Only delete the data that you have archived on a media from the local database after you have successfully finalized and verified the media.

Deleting data manually

You can explicitly delete patient data in the **Patient Browser** manually.

1 Select the data that you want to delete in the navigation area or content area.



2 Select **Edit > Delete** from the main menu.

- or -



Click the **Delete** icon on the tool bar.

3 Confirm with **Yes** in the dialog box displayed.

You can turn off the confirmation dialog box, when selecting **Options** > **Configure Browser...** from the main menu and deactivate the **Confirm Deletion** checkbox.

Unprotected data is then always deleted immediately without confirmation.

The deleted data remains in the system until the garbage collector starts running.

Deleting data automatically

You can configure the automatic deletion in the **Auto Delete Configuration** dialog box to be performed regularly meeting selected criteria.

Configuring automatic deletion is only possible at the *syngo* Acquisition Workplace.

To open the configuration dialog box select **Options** > **Configuration** from the main menu and select the **Auto Delete** icon.

If automatic deletion is not configured for regular deletion, you can always start it manually.

Safety advice

CAUTION

Deletion confirmation deactivated!

Possible loss of data.

- The option in the **General** tab card to configure the **Delete Confirmation** dialog box should not be switched off.
- Be careful when activating a filter for auto deletion of data sets that it fits to your workflow as well.

CAUTION

Deletion confirmation deactivated!

Possible loss of data.

- The option in the **General** tab card to configure the **Delete Confirmation** dialog box should not be switched off.
- Be careful when setting permissions to delete documents without check if flags are not set.

CAUTION

Deactivation of the **Delete Confirmation** dialog box for **Auto Delete**!

Loss of data, delay of diagnosis or therapy.

- The **Delete Confirmation** dialog box for **Auto Delete** should always be switched on, especially on modalities.
- If the **Delete Confirmation** dialog box for **Auto Delete** is switched off, **Auto Delete** will start without user confirmation.

CAUTION

The **Delete Confirmation** dialog box for auto deletion is kept open for a long time on scanner systems!

Loss of data if objects chosen for auto deletion are updated by acquisition when the Delete Confirmation dialog box is open.

- Do not keep the **Delete Confirmation** dialog box open for a long time in parallel during a patient examination, and close it before a patient registration.

CAUTION

Conflicting **Auto Delete Configuration** and **Transfer Configuration**!

Loss of data if both functionalities start in parallel.

- Do not use the **Sent** flag for rule "Delete all Series with flags..." if auto transfer is configured to start when the **Sent** flag is set in combination.
- Use storage commitment whenever the sending and receiving systems supported it.
- If this combination is not avoidable, always crosscheck if the data chosen for auto deletion is actually stored on the receiving system before confirming auto deletion.

1 On the main menu of the **Patient Browser**, choose **Edit** > **Auto Delete**.

- or -

On the main menu of the **Patient Browser**, choose **Edit** > **Auto Delete RawData**.

If automatic deletion is activated manually or automatically, the **Auto Delete** dialog box is displayed. It asks you whether you want to delete the selected series or studies. Depending on the amount of data to be deleted, opening the dialog box may take up to a few minutes.

You can delete raw data only on the *syngo* Acquisition Workplace. Only if you have already performed a reconstruction of the raw data, you can delete them with the **Auto Delete RawData** function.

2 Click the **Delete** button to delete the corresponding data.

- or -

Click the **Cancel** button to close the dialog without deleting.

3 Click the **Change Default Settings** button to open the **Auto Delete Configuration** dialog box where you can modify the deletion settings.

4 Click the **Show list** button to verify or change the data to be deleted.

The **Patient Browser** in list mode is displayed and all studies that fulfill the criteria are listed. You can now select and delete the studies.

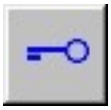
Protecting data from deletion

You can protect data from deletion.

1 Select the data that you want to protect against deletion in the navigation or content area.

2 Select **Edit > Protect** from the main menu.

- or -



Click the **Protect** icon on the tool bar.

Removing delete protection

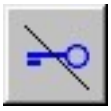
You can remove delete-protection. Delete-protection always includes all lower data levels and the related entries of the higher data levels.

Removing delete protection of separate data

1 Select the delete-protected data in the navigation or content area.

2 Select **Edit** > **Remove Protection** from the main menu.

- or -



Click the **Remove Protection** icon.

Removing delete protection of multiple data

1 In the navigation or content area, select a patient, study, or series with delete-protected data in the lower data levels.



2 Click the **Unprotect All** icon.

The **Patient Browser** closes.

The **Unprotect All Showlist** dialog box opens and displays all related protected data.

3 To adapt the selection, deselect separate data.



4 Click the **Unprotect All** icon of the **Unprotect All Showlist** dialog box.

A message box opens informing you about the data levels for which delete protection will be removed.

5 Confirm with **Yes**.

1.4 FAST Cardio Wizard

On the **Examination** task card of the *syngo* Acquisition Workplace, you can use **FAST Cardio Wizard** as a user guidance to help you during the whole cardiac examination.

There are two different modes for **FAST Cardio Wizard**: **Default** mode and **Custom** mode.

Under the **Default** mode, you can view the respective wizard for scan or reconstruction for the following cardiac related entries provided by Siemens:

- CaScoring
- Coronary CTA
- ChestPain
- Test Bolus or Bolus Tracking

Under the **Custom** mode, you are able to edit the default content and save the modification.

The following functions of the **FAST Cardio Wizard** are described in the subsequent sections:

- Configuring the **FAST Cardio Wizard**: For selecting the mode or the language of the wizard
- Using the **FAST Cardio Wizard**: For loading, viewing or editing the wizard

1.4.1 Configuring the FAST Cardio Wizard

On the *syngo* Acquisition Workplace, configuration changes are visible after registration of the next patient for the **FAST Cardio Wizard**.

1 Choose **Options** > **Configuration...** to open the **Somaris/7 – Configuration Panel** from the main menu.

2 Double-click the **Examination** icon in the **Somaris/7 – Configuration Panel**.

The **Examination Configuration** dialog box is displayed.

3 Select the **Workflow** tab card on the **Examination Configuration** dialog box.

The **FAST Cardio Wizard** pane is displayed at the bottom of the **Workflow** tab card.

Selecting default mode for FAST Cardio Wizard

1 Select the **Activate Wizard** checkbox.

If **Activate wizard** is unchecked, the **FAST Cardio Wizard** icon will not be shown on the **Patient Model Dialog**.

2 Select the **Default** checkbox.

3 Click the **OK** button to confirm.

The **Default** mode is activated and the system will display the default content of the wizard.

The default content of the **FAST Cardio Wizard** contains 1 to 6 steps, each of which has its index, title, image and description. The images may have tooltips.

Selecting custom mode for FAST Cardio Wizard

1 Select the **Custom** checkbox.

2 Deselect the **Lock edit mode** checkbox if this is activated.

If the **Lock edit mode** is activated with the **Custom** mode, the edit mode will be locked and the system will display the custom content of the **FAST Cardio Wizard**.

3 Click the **OK** button to confirm.

You are able to make the following modifications in the **Custom** mode:

- Edit the wizard title
- Edit the wizard image
- Edit the wizard description
- Add or delete steps in the wizard

You are also able to restore the **FAST Cardio Wizard** back to the default wizard when editing.

Setting language for FAST Cardio Wizard

1 Select one language in the **Language** list.

2 Click the **OK** button to confirm.

When you have selected a language for the **FAST Cardio Wizard**, you can only edit the wizard text using the selected language in **Custom** mode.

Following languages are provided: Chinese, English, French, German, Japanese and Spanish.

The default language of the wizard is the same as the system language. The language of the wizard can also be different from the system language.

1.4.2 Using the FAST Cardio Wizard

The **FAST Cardio Wizard** enables you to view and edit cardiac workflow information during the whole cardio examination.

If you want to see the recorded workflow of the **FAST Cardio Wizard** in the video by using **Camtasia Recorder**, you need to check on the **Capture layered window** under **Applications** > **Desktop** > **Camtasia Recorder** > **Tools options** > **Program**.

Loading a FAST Cardio Wizard protocol

The **FAST Cardio Wizard** button is visible on the **Patient Model Dialog** window if the following conditions are met:

- ✓ The license key is available.
- ✓ A cardiac protocol is linked to the **FAST Cardio Wizard** in the **Scan Protocol Assistant**.
- ✓ The **FAST Cardio Wizard** is activated in **Examination configuration**.
- ✓ The body size is **Adult**.



1 Click the **FAST Cardio Wizard** icon on the **Patient Model Dialog** window during the examination of the current patient.

The protocol reset as a **FAST Cardio Wizard protocol** in the **Scan Protocol Assistant** is loaded into the chronicle.

2 Select another cardiac protocol from the **Cardiac** group in the **Patient Model Dialog** to replace the reset one, or to append after the reset one if necessary.

If you load a cardiac protocol from the regular **Cardiac** group directly, the **FAST Cardio Wizard** will not be available.

3 Click the **OK** button.

4 Select **View** > **FAST Cardio Wizard** in the main menu if it is deactivated.

The wizard is displayed.

The **FAST Cardio Wizard** menu item is disabled if one of the following conditions is met:

- The **FAST Cardio Wizard** is not activated in **Examination configuration**.
- The **FAST Cardio Wizard** is not activated in the **Patient Model Dialog**.

Viewing the FAST Cardio Wizard

You can view cardio workflow information in the **FAST Cardio Wizard** when it is activated in **Default** mode.

You can view the content of the current step. Other steps are displayed in miniatures. You can click the minature of a step to display its content.

Showing or hiding the FAST Cardio Wizard

When the **FAST Cardio Wizard** has been activated, you can show or hide it if necessary.

- Select or deselect **View** > **FAST Cardio Wizard** in the main menu to show or hide the wizard.

Positioning the FAST Cardio Wizard

You can move the wizard, but cannot resize it.

The default position of the wizard is above the **Examination** card at the right-top corner of the display.

If the wizard is closed and opened again, it will be displayed at its previous position even after rebooting the system.

- Drag and drop the wizard to the place you want.



The position of the wizard can be memorized in the following ways:

- When no scan entry is scanned, all the individual wizards will be displayed at the same position.
- If at least one scan entry has been scanned, each individual wizard will be displayed at its own memorized position.

Using automatic wizard navigation

When the **FAST Cardio Wizard** is activated and shown, it will provide automatic wizard navigation for some entries, for example, for the **Topogram** entry.

1 Click the **Topogram** entry in the chronicle.

  The corresponding wizard for **Topogram** entry is displayed.

2 Select the **Trigger** subtask card.

  The ECG signal information will be displayed in the wizard.

3 Press the **Load** button.

  The patient breathing instruction information will be displayed.

There is no triggering to display certain steps in the **Custom** mode.

The **FAST Cardio Wizard** also provides special information for positioning of the ECG electrodes and images for US users.

Editing the FAST Cardio Wizard

You can edit the **FAST Cardio Wizard** if the wizard is in **Custom** mode with the **Lock Edit Mode** deactivated.

The cardiac wizard always contains 1 to 6 steps and you can switch between steps during editing.

1 Select one of the steps as the current step in the wizard.



2 Click the **Start Editing** icon in the top right corner of the wizard.

The wizard changes to edit mode. The background color of the title box and description box turns to white.

3 Click the edit boxes to activate them and make modifications to the content if necessary.

- or -

Right-click the edit box.

The context menu is displayed.

4 Select **Undo**, **Cut**, **Copy**, **Paste**, **Delete** or **Select All** to make necessary modifications.

When you edit the steps in **Custom** mode, the description for each step is limited to 8 lines.

Editing the image



1 Click the **Remove current image** icon to delete the image if needed.

The image disappears from the current step and a new image with several icons is displayed with tooltips.

You can capture different screenshots or load a new image by following the tooltips.

You are not able to carry out the following actions:

- To capture snapshots in blow-up mode
- To load images from the local disk when the scan status is not idle
- To capture a snapshot of the subtask card or load images from the local disk when the dialog for the E-Logbook appears.

2 Click the **Take a screenshot of topogram** icon to capture a snapshot of the topogram.

- or -

Click the **Take a screenshot of tomogram** icon to capture a snapshot of the tomogram.

- or -

Click the **Take a screenshot of Subtask Card** icon to capture a snapshot of the subtask card.

- or -

Click the **Load image from file** icon to load an image from the local disk.

You can load the image from the files in H:\SiteData\ScanGuide.

Inserting or deleting a step

You are able to insert or delete steps of the wizard, but if no more steps are allowed to be inserted or deleted, the corresponding button for inserting or deleting steps is disabled.



1 Click the **Insert a Step** button to insert a step before the current step.



2 Click the **Delete a Step** button to delete the current step.

Restoring Wizard



- Click the **Restore Wizard to default setting** icon if you want to restore the wizard to default setting.

Confirming the changes



- Click the **Save Changes** icon to save the modifications and end editing.

  The captured screenshot will be stored in the H:\SiteData \ScanGuide\Screenshot folder if the changes are saved.

  - or -



Click the **Discard Changes** to discard the modifications and end editing.

1.5 Viewing

On the **Viewing** task card, you can view the results of an examination and evaluate it or prepare it for diagnostics.

You can process and evaluate images as follows:

- Change window values
- Enlarge, pan, rotate, and flip images
- Highlight regions of interest (ROIs) using drawing tools (circles, rectangles, freehand regions)
- Provide them with comment texts
- Evaluate them statistically (CT, MR only)
- Display measured values for pixel points or ranges
- Measure distances and angles on the images

You can also use the **Viewing** task card to compare image material of different examinations and, depending on configuration, of different patients.

You can first load the images using the **Patient Browser** or from the **3D** task card into the **Viewing** task card. Here you can select one of various ways of arranging the image material and displaying it in the most beneficial way for your diagnostic viewing.

You can then process and evaluate the images.

You can then save the processed and evaluated images, print them, expose them on film or send them to other locations in your network.

The following functionalities are described in the subsequent sections:

- Loading and Displaying Images
- Changing Image Settings
- Subtracting Images
- Calculating the Average
- Filtering Images
- 2D Evaluation
- Saving Images

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

1.5.1 Loading and Displaying images

You can load a series that contains images with different resolutions. It may result in different values when calculating areas of ROIs.

The following functionalities are described in the subsequent sections:

- (→ Page 97 *Transfering images*)
- (→ Page 98 *Loading multiple studies or patients*)
- (→ Page 98 *Loading multiframe images*)
- (→ Page 99 *Using the image-stripe or stack display*)
- (→ Page 99 *Dividing the image area*)
- (→ Page 101 *Displaying images in the Mother-in-Child function*)
- (→ Page 101 *Displaying segments in a blow-up window*)

Transfering images

You have to open the **Patient Browser** to display patient data.

1 Open the **Patient Browser** by selecting **Patient** > **Browser...** from the main menu.

2 Select the patient, study, or series in the navigation or content area of the **Patient Browser**.

You can transfer the images of more than one patient, study, or series to the **Viewing** task card. To do so, use multiple selection in the navigation or content area.



3 Click the **Load to Viewing** icon on the tool bar to transfer the associated images to the **Viewing** task card.

The **Patient Browser** closes if the **Close after Loading** option is selected in the **Options** menu.

Loading multiple studies or patients

With Multi View, you can have multiple patients displayed simultaneously in the **Viewing** task card.

Patients with different patient IDs, but otherwise identical data, are handled as different patients by the system.



1 Click the **Multi View** icon on the **View** subtask card to activate this display mode.

2 Use drag-and-drop to load multiple studies or patients (multi study layout).

3 Drop each patient in a different study view.

Loading multiframe images

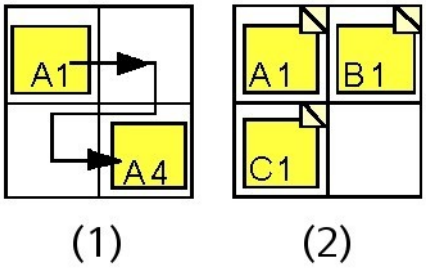
When you load multiframe images, each multiframe is treated as a series. If you load a series consisting of several multiframe images and normal images, each multiframe image and each normal image will be loaded in a separate segment.

- Load a single enhanced data object in all types of layouts into the **Viewing** task card.

If images belong to different patients, the **Viewing** task card changes automatically to multi view layout. It is not possible to load two series of the same patient in stripe layout into the **Viewing** task card, even if one of the series contains an enhanced multiframe.

Using the image-stripe or stack display

You can display series and images as an image stripe or a stack.



(1) Image Stripe display

(2) Series Stack display



- Click the **Image Stripe** icon on the **View** subtask card to activate this display mode.

  The loaded series and images are shown one after the other.

  - or -

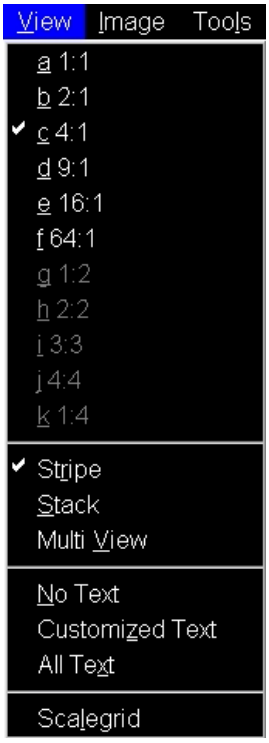
  Click the **Series Stack** icon on the **View** subtask card to activate this display mode.

  All images of a series are stored in a stack one on top of the other. You can see the first image of each series.

Dividing the image area

You can change the appearance of the image area according to your needs.

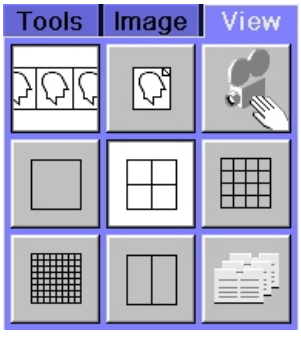
A large format display is suitable to see diagnostic details while a small format display allows you to obtain an overview.



- Select a layout in the **View** menu.

  The active view is now marked with a checkmark.

  - or -



Select a layout with the icons on the **View** subtask card.

The corresponding icon is now active.

For more information on changing the image settings, refer to: (→ Page 13 *Basic Functionalities*).

Displaying images in the Mother-in-Child function

The Mother-in-Child function allows you to display an additional reference image in a small area of the image segments.

The first reference image of the loaded series is used as the mother image, by default.

Activating the Mother-in-Child mode

1 On the main menu, choose **Options** > **Configuration...** to open the **Somaris/7 – Configuration Panel**.

2 Double-click the **Viewing** button to open the **Viewing Configuration** dialog box.

3 Select the **MIC General** tab card.

4 Select the **Position of Mother Image** checkbox.

5 Select the **Top Right** option to position the mother segment in the top right-hand corner of the basic segments.

- or -

Select the **Bottom Right** option to position the mother segment in the bottom right corner of the basic segments.

6 If you want to show the mother segment even when it is empty (no suitable mother image is defined), activate the **Enable display of empty mother segment** checkbox.



In stack mode, a dog-ear occupies the top right-hand corner of the image segment. In this case, the mother segment is automatically positioned in the bottom right-hand corner and is independent of the selected position.

Selecting the mother image

✓ The mother image and the child image must be in the same frame of reference.

1 In the image area of the **Patient Browser**, select the new mother image.

2 Drag-and-drop the new mother image into one of the mother segments of the **Viewing** task card.

The mother image is changed for the whole loaded series.

Displaying segments in a blow-up window

You can blow-up the contents of a small segment on a large window to view its details.



This function is available only for small segments. Otherwise, an error message is displayed.

1 Select a segment.

2 Press the **Space** key on your keyboard.

1.5.2 Changing Image Settings

The following functionalities are described in the subsequent sections:

- (→ Page 102 *Selecting images*)
- (→ Page 102 *Windowing images*)
- (→ Page 103 *Zooming and panning*)
- (→ Page 103 *Rotating and flipping*)
- (→ Page 104 *Changing dimensions*)
- (→ Page 104 *Fitting images to the Field of View*)
- (→ Page 104 *Using the interactive movie*)

Selecting images

You have the following possibilities to select the required images:

- Select a single image
- Select individual images
- Select images up to the end of one series
- Select complete series
- Deselect images

◆ Perform one or more of the described actions.

Windowing images

You have the following possibilities to window images:

- Select the desired images
- Assign predefined window settings
- Window with the mouse and the keypad
- Restore window values

In the image in which you are currently windowing, the changed window values are displayed immediately. As soon as you release the mouse wheel, the new window values are applied to all images of the same selection.

- Perform one or more of the described actions.

Zooming and panning

You have the following possibilities of zooming/panning images:

- Zoom/pan with the mouse
- Activate the Blow up mode
- Restore the zoom factor

With **Tools** > **Capture Area**, you can define an area in the image for zooming.

Safety advice

CAUTION

The zoom factor for reference image display is selected such that the complete volume can be displayed. This pre-selected zoom factor influences the spatial resolution for reconstruction. The spatial resolution may be lower than the spatial resolution of the original images!

Reduced image quality (lower resolution) due to default zoom level.

- Center the relevant area, and select a suitable zoom factor before starting calculation of ranges or resampling.

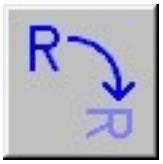
- Perform one or more of the described actions.

Rotating and flipping

You can rotate and flip images according to your needs.

Orientation labels are rotated and flipped together with the image. Any annotations and graphics you enter are deleted when you rotate or flip an image.

1 Select the images that you want to edit.



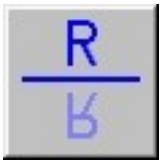
2 Click the **Rotate 90** icon on the **Image** subtask card to rotate the image 90 degrees clockwise.

- or -



Click the **Flip Vertically** icon on the **Image** subtask card to flip the images vertically.

- or -



Click the **Flip Horizontally** icon on the **Image** subtask card to flip the images horizontally.

Changing dimensions

This feature is available for enhanced data sets having different dimensions. The data is loaded with the first dimension. To modify the order of the data set, proceed as follows:

- Select **Scroll** > **Change Dimension** from the main menu.

  The data sets will be sorted accordingly.

In multi view, **Change Dimension** will only be enabled if you have selected a frame of an enhanced data object. **Change Dimension** will be dimmed if you have selected frames of different patients.

Fitting images to the Field of View

You can display the anatomy in the same size in all images by fitting images to the Field of View (FoV). This function is useful if you want to compare images of a patient with different FoV phases.

1 Display the images in the series stack mode.

2 Choose **Image** > **Fit to FoV** to adjust all images in the stack.

Using the interactive movie

You can use the interactive movie function to play back your evaluation.



1 Click the **Interactive Movie** icon on the **View** subtask card.

2 Hold the left mouse button down in the image and move the mouse up or down to play back the movie forward or backward.

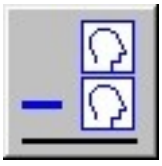
3 Click the **Interactive Movie** icon again to terminate the Movie mode.

1.5.3 Subtracting Images

In order to subtract original images, you perform the following steps:

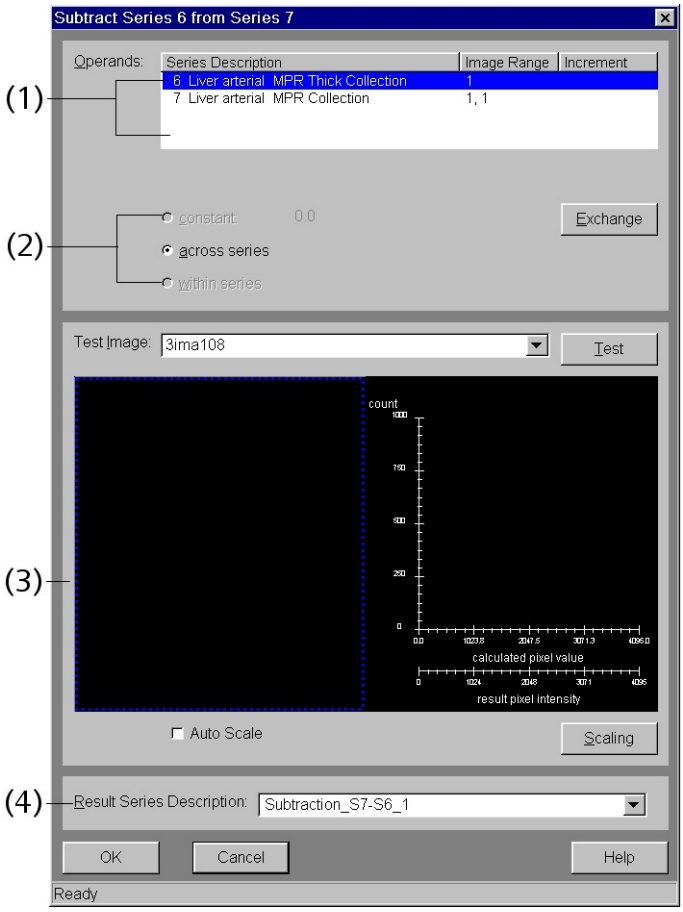
- Restricting the original images
- Deleting operands and operation modes
- Starting subtraction

1 Select individual images/series in the **Viewing** task card or in the **Patient Browser**.



2 Click the **Subtract** icon on the **Eval** subtask card.

The **Subtract** dialog box is displayed.



(1) Operand field with a list of loaded images and series

(2) Operation mode

(3) Test image

(4) Name of the result series

Restricting the original images

1 Select a series (line) in the operand field.

2 Double-click the selected series in the column **Increment**.

3 Enter an increment in the spin box displayed.



For example, if you only want to apply subtraction to every second original image, the value 2 is entered in the Increment column.

4 Complete your entry by clicking outside the spin box with the mouse.

Deleting operands and operation modes

The type of subtraction you can apply (subtracting images or constants) depends on the number and assignment of original images (one or more series).



- Select operation mode **constant** and enter a value.

If you want to subtract one or more images from a constant, reverse the operands with **Exchange**.

- or -



Select operation mode **within series** to subtract the gray scale values of one image from the gray scale values of the other images (one series loaded).

- or -

In the operand field click the series whose images are to be subtracted from the images of the remaining series (two or more series loaded).

The sequence of subtraction is always remaining series – selected series.

If there are more than two series in the operand list, the selected list is subtracted from the remaining series.

A new series with the subtraction images is generated for every other series and saved in the **Patient Browser**.

Starting subtraction

- Click **OK** to start calculation.

In the input field **Result Series Description**, you can change the suggested name.

1.5.4 Calculating the Average

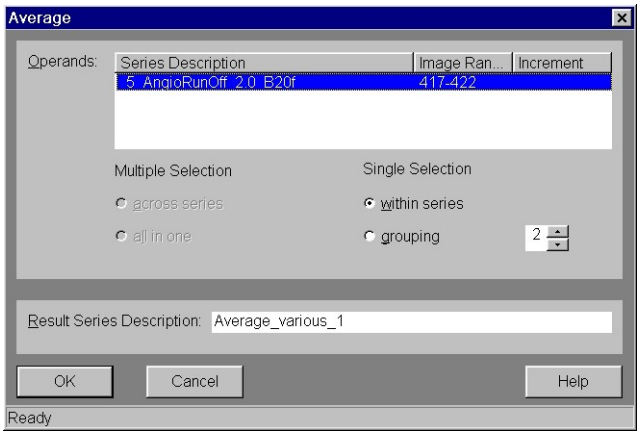
The system provides the possibility of average calculation.

1 Select one image or a set of images or series.



2 Click the **Average** icon on the **Eval** subtask card.

The **Average** dialog box is displayed.



3 Enter an increment, if you want to use a subset of the original images for the evaluation.

4 Click **OK** to start the calculation.

1.5.5 Calculating temporal minimum or maximum projections

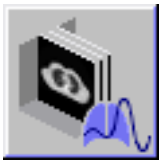
The t-MIP function calculates temporal minimum intensity projection (tMinIP) or temporal maximum intensity projection (tMaxIP) volumes from multiphase data, for example, respiratory gating data. Each voxel of a result volume displays the minimum or maximum HU value of all voxels at the same image position of all phases that are used for calculation. The result is saved as a new series within the study.

✓ Individual series for each phase are available. By using the Conversion tool, you can split-up a multiphase reconstruction, that contains only one series, into multiple series according to the phases included. (→ Page 135 *Splitting-up Heartview 4D series*)

1 Select individual series in the **Viewing** task card or in the **Patient Browser**.

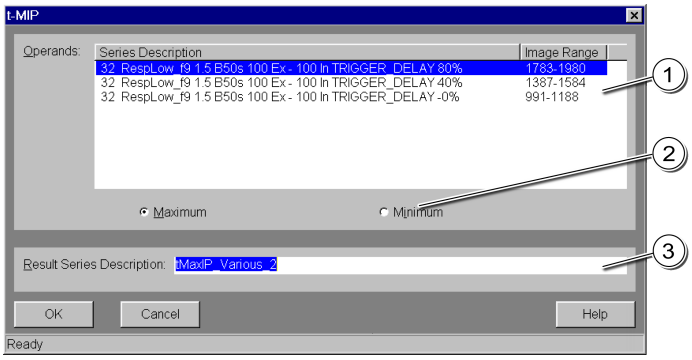
2 From the main menu, choose **Evaluation** > **ImageManipulation** > **t-MIP**.

- or -



On the **Eval** subtask card, click the **t-MIP** icon.

The **t-MIP** dialog is displayed.



(1) **Operands**

Lists the series that are used for calculation. You can add further series by dragging them from the Patient Browser. You can remove series by choosing **Delete** from the context menu.

(2) **Maxmium**/**Minimum** projection

Select the corresponding checkbox to calculate the result using either the maximum HU values or the minimum HU values across input phases.

(3) **Result Series Description**

Name of the result series. You can change the suggested name.

3 Adjust the calculation settings and click **OK**.

The calculation is started.



4 To show the progress of the calculation, click the corresponding icon in the status bar.

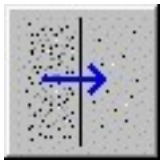
The **Calculation Status** dialog is displayed.

After completion of the calculation job, the new series is available in the study. The Patient Browser is automatically updated.

1.5.6 Filtering Images

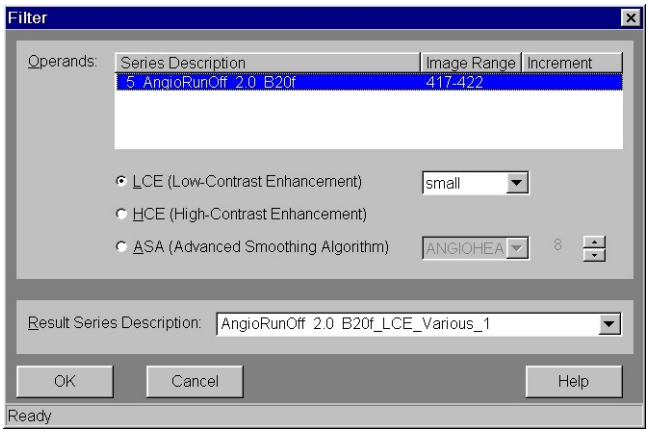
You can make your selection from three preset filter effects. The option **Low Contrast Enhancement** also offers you a drop-down list in which you can set four different levels of contrast from small to very strong.

1 Select one image or a set of images or series.



2 Click the **Filter** icon on the **Eval** subtask card.

The **Filter** dialog box is displayed.



3 Enter an increment, if you want to use a subset of the original images for the evaluation.

4 Select one of the filters.

5 Click **OK** to start calculation with the set filter strengths.

If large amounts of data are selected processing may take some time.

1.5.7 2D Evaluation

To evaluate result images in the Viewing task card, you can measure distances and angles, and evaluate Regions Of Interest (ROIs).

ROIs are used to mark anomalies in the images and evaluate the gray scale within these regions statistically. ROIs can be circular, rectangular, or freehand regions.

The following functionalities are described in the subsequent sections:

- (→ Page 111 *Annotating images*)
- (→ Page 112 *Measuring length*)
- (→ Page 112 *Customizing the graphic text*)
- (→ Page 113 *Deleting graphic elements and text*)

For more information on changing the image settings, refer to: (→ Page 42 *2D and 3D Evaluation*)

Safety advice

CAUTION

Thickness, length, and angular measurements on MIP and SSD images do not reflect the actual anatomical conditions!

Wrong basis for diagnosis.

- Do not perform thickness and length measurements on MIP and SSD images.

Annotating images

You can write up to 30 characters into a line, after that, line breaks are inserted automatically.



You can force a line break by pressing **Shift** + **Enter**.

- Click the **Annotation Text** icon on the **Tools** subtask card.

Measuring length

You can measure the length of a structure, i.e., a blood vessel.

1. Draw the shape with a freehand line (**Tools** > **Freehand Distance**).
2. End the line with a double-click.

Customizing the graphic text

You can change the font color and the font size for the graphic objects which contain text.

The changes are applied only to the currently selected graphics and are retained for the next evaluations.

1. Right-click the selected graphic object and choose **Font** from the context menu.

   - or -

   On the **Tools** subtask card, right-click the corresponding graphic tool icon, and choose **Font** from the context menu.
2. From the **Type** selection list, select the graphic type.
3. Select the **Select All Graphics** option to apply the font properties to all types of graphic objects.
4. From the **Color** selection list, select the font color.
5. From the **Scale Factor** selection list, select the font size.
6. Click the **Apply** button to apply your changes.

   - or -

   Click **OK** to confirm your changes and close the dialog box.

   - or -

   Click **Cancel** to discard your changes and to close the dialog box.

Deleting graphic elements and text

1 Select individual, several, or all graphic and text elements you want to delete.

With **Edit** > **Select** > **All Graphics**, you can select all graphic elements and text in the selected image segments.

2 Select **Edit** > **Delete Graphics** or press the **Del** key on your keyboard.

1.5.8 Saving Images

Evaluated images can be saved.

Safety advice

CAUTION

Modifications in medical images are not saved automatically in the same way as image comment. Additionally, in case of a user switch where the new user has no adequate access rights, modifications of the image text may also be lost!

Image modifications may be lost.

- Use **Patient** > **Save...** in order to save the image comment and **Patient** > **Save As...** to save the image with modifications as a new image.

CAUTION

Modifications in medical images are not saved automatically in the same way as image comment! Additionally, in case of a user switch where the new user has no adequate access rights, modifications of the image text may also be lost.

Possible loss of image modifications.

- Choose **Patient** > **Save As...** in order to save the image with modifications as a new image.

1 Select the images or series that you want to save.

2 Select **Patient** > **Save As...**.

3 In the **Save As** dialog box, click the **Save images in new series** option.

4 Enter the new series description in the text input field and confirm with **OK**.

- or -

Click the **Append images to series** option.

5 Select the series in the selection list using the serial number and serial description and confirm with **OK**.

Saving window values only

Alternatively, you can save the window values only.

- Select **Image** > **Save Window Values**.

  The current window values are saved for the selected images.

1.6 Filming

You can expose the images of an examination on film or print them on paper for documentation and reporting.

The following functionalities are described in the subsequent sections:

- (→ Page 116 *Transferring Images to Filming*)
- (→ Page 117 *Selecting Images and Sheets*)
- (→ Page 118 *Editing Film Jobs*)
- (→ Page 127 *Associating layouts with a study, series, or protocol*)
- (→ Page 129 *Setting a film task layout*)
- (→ Page 131 *Exposing on Film*)



If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

Safety advice

CAUTION

Using scalable page mode may reduce the image quality. The resulting image quality may no longer be sufficient. The scalable page mode does not support real size!

Possible wrong diagnosis.

- Be aware of image quality reduction if scalable page mode is configured.

CAUTION

Use of paper printouts for diagnosis!

Wrong diagnosis caused by wrong image information.

- Only use images on film for diagnostic purpose.

CAUTION

The printed flag is set if the images are successfully transferred to the printer control. Not all printers, for example, paper printers, may be able to solve printing problems themselves!

Possible loss of image printout.

- Verify that the printouts are available before you delete images.

1.6.1 Transferring Images to Filming

Safety advice

CAUTION

Transferring manipulated non-square matrices or viewing segments!

Diagnostically relevant areas of images may be lost.

- When manipulated images are exported or sent to another workstation, the related original images should be sent, as well. It is strongly recommended to base the final diagnosis always on the original images and not on modified or manipulated images.

1 First select the images that you want to film in the **Patient Browser** or on the task cards.



2 Click the **Copy to Film Sheet** icon.

- or -



Push the **Copy to Film Sheet** key on the symbol keypad (Num: **Enter**).

Filming images with Window 1 and Window 2

By performing the following workflow steps you can film images with **Window 1** and **Window 2**, either interleaved or appended.

1 Select **Options** > **Configuration...** from the main menu of any task card.

2 Double-click the **Filming Layout** icon on the **Somaris/7 – Configuration Panel**.

3 Activate **Copy series** (for Double window) on the **Series** tab card in the **Filming Layout** dialog box and confirm with **OK**.

4 Copy the images from the **Patient Browser** or **Viewing** via **Copy to Film** sheet icon, main menu, or keyboard key.

1.6.2 Selecting Images and Sheets

You can select or deselect images and sheets for filming:

- Select one or more images
- Select complete series
- Deselect images

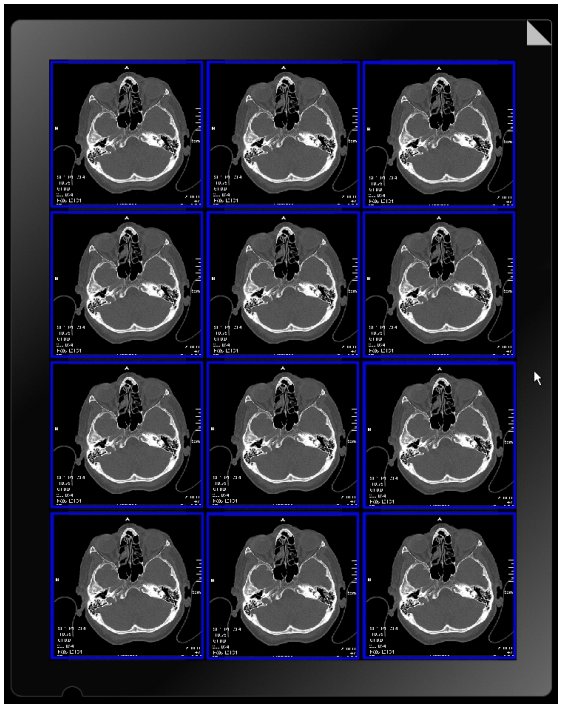
For more information, refer to: (→ Page 13 *Basic Functionalities*)

The following functionalities are described in the subsequent sections:

- Selecting film sheets
- Selecting an entire film job

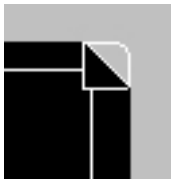
Selecting film sheets

1 Click the border of the film sheet to select all the images it contains.



- or -

Click the border of the first film sheet of your choice holding the **Ctrl** key down.



2 Page to another film sheet using the dog-ears.

3 Extend your selection by a single film sheet (hold the **Ctrl** key pushed).

- or -

Extend your selection by all the film sheets in between (hold the **Shift** key pushed).

Selecting an entire film job





- Click the opened film job to select all the film sheets with all images of this job.

The folder icon of a selected film job is highlighted (blue). All the images of this job are shown with a continuous blue line border.

1.6.3 Editing Film Jobs

The following functionalities are described in the subsequent sections:

- (→ Page 118 *Creating a layout*)
- (→ Page 120 *Changing the layout*)
- (→ Page 121 *Modifying the current Filming properties*)
- (→ Page 123 *Windowing images*)
- (→ Page 124 *Copying and moving images or film sheets*)
- (→ Page 124 *Changing the reference image*)
- (→ Page 124 *Deleting images or film sheets*)
- (→ Page 125 *Showing or hiding image text and graphics*)
- (→ Page 126 *Selecting another camera*)

Creating a layout

You can create new layouts or open existing layouts and edit them.

1 Select **Options** > **Configuration...** from the main menu and double-click the **Filming Layout Editor** icon.

The **Filming Layout Editor** dialog box is displayed.

2 Click the **Create** button.

The **Create Regular Layout** dialog box is displayed.

3 Click in the upper left-hand corner, and drag the mouse to define the number of rows and columns in the new layout.

As soon as you release the mouse button, the selected division is displayed in the title bar of the dialog box.

4 Click the **OK** button to confirm the number of rows and columns.

Merging segments

1 Press the **Ctrl** key on your keyboard and select the segments you want to merge.

2 Click the **Merge** button.

The selected segments merge into a single segment.

Splitting segments

1 Select the segment you want to split.

2 Right-click and select the required division mode from the context menu, e.g., **Split Horizontally**.

The segment is split accordingly.

Saving layouts

1 Click the **Save** button if you are finished.

- or -

Click the **Save As** button to save the layout with a new name.

2 Enter a name for the new layout.

3 Click the **OK** button.



If you want to create more layouts, create all layouts first, then restart the application after all desired layouts are done.

Deleting layouts

1 Click the **Delete** button to open the **Delete Layout** dialog box.

The **Delete Layout** dialog box contains the following tab cards:

- **User-Defined** layout tab card: Once layouts have been deleted, they cannot be restored.
- **Siemens Default** layout tab card: You can restore layouts from hidden layouts.

2 Select the layouts to be deleted.

It is not possible to delete the layout buttons that are present as icons on the **Filming** task card.

3 Click **OK**.

Applying the settings

1 Click **OK**.

2 Restart the application.

You will find the new layouts in the selection list on the **Filming** task card.

If you want to edit a layout, click the **Open** button in the **Filming Layout Editor**, and select the desired layout from the selection list. Now you can merge and split segments.

Changing the layout

With the layout of the film sheet, you define the number and size of the segments on a film sheet.

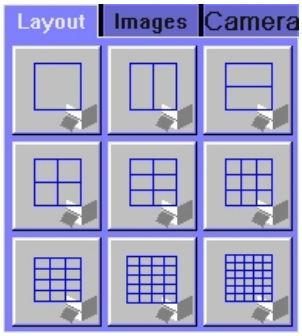
To change the size and position of an image within the segment, select **Image** > **Zoom/Pan**.

Information Segment

You can display an information segment as the first image of the series. It contains patient overview and common information. For that purpose, activate the **Information Segment** checkbox on the **Series** tab card in the **Filming Layout** dialog box. You can open it by selecting **Patient** > **Filming Layout...** from the main menu.

You can change the content of the Information Segment with the Image Text Editor. You can open the Image Text Editor by selecting **Options** > **Configuration...** in the main menu. There, double-click the **Image Text Editor** icon.

1 Select individual images or a film sheet or select an entire film job.



2 Click the **Layout** subtask card on the **Filming** task card into the foreground.

3 Click the icon for a film layout to display the selected images in this format.

4 From the **Layouts** selection list in the lower right-hand control area, select a layout.

If you want to add new images from the **Patient Browser** to a film job, you can do that easily by drag-and-drop. The images are inserted into the film job in front of the target segment.

Modifying the current Filming properties

In the **Film Properties** dialog box, you can modify the properties of the currently selected images and set the options for the current film task.

1 In the **Filming** task card, select the images that you want to modify.

2 Choose **Film** > **Properties...** to open the **Film Properties** dialog box.

Setting the film sheet division

The division determines the number of segments on the film sheet. If single images have been selected, instead of the film sheet or film task itself, a new film sheet is created which displays the images in this selected division. The sequence of images in this film task is kept.

1 From the **Layout** selection list, select a film sheet division, for example, **2x2**.

2 Select the **Preview** checkbox to display a preview of the selected layout.

The preview is displayed instead of the text elements list.

3 Deselect the **Preview** checkbox to display the text elements list again.

Defining the aspect ratio

◆ Select the **Fit to segment** option to display the image as large as possible.

- or -

Click the **Original Image** option to display the image in real-size (that is 1 cm in reality corresponds to 1 cm on the screen).



If the real-size image is too big for the segment, it will be clipped on all 4 sides. The displayed image clip may be smaller when it is printed.

You are notified if the system cannot display the images in real-size, for example, because pixel information is missing. Instead, the images will be displayed with the aspect ratio: **Fit to Segment**.

- or -

Select the **Clip document** option to zoom the image so that it matches the larger side of the segment.

The image parts beyond the segment boundaries are clipped: either the top and bottom, or the right and left side.

Showing and hiding overlay graphics

1 Select the **Hide** option to hide all graphics.

2 Select the **Show** option to display the graphics again.

Setting up the reference image

1 Select the **Reference image** checkbox to display the reference (mother) image in tomograms (Mother-in-Child).

Each segment of the selected series include a small reference image in the upper right or lower right-hand corner.



You can replace the default reference image or insert a new one. See (→ Page 124 *Changing the reference image*).

2 Select the position of the reference image, for example, **Top right**.

Setting the image text display

- Select the **No text** option to hide the text.

  - or -

  Select the **All text** option to show the text.

  - or -

  Select the **Customized text** option to specify the text elements to be displayed on the images.

Gray checkboxes indicate that images with varying image text settings have been selected.

In the customized options, you can display or hide the scale bar.

Displaying a preview

- Select the **Preview** checkbox to display a preview of the created layout.

Applying the properties

- Click **OK** to apply the properties.

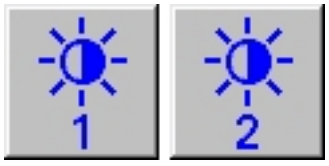
  - or -

  Click **Cancel** to abort the action.

Windowing images

If you use the function (F) keys on your keyboard for windowing images, the windowing is only applied to the selected images but not on the whole series. You can select the **Select series** menu entry from the context menu first to change the windowing value on the whole series.

1 Select the images for processing.



2 Click either the **Window 1** or the **Window 2** icon to switch between two predefined window values.

Additionally, you can use the pressed mouse wheel or the keypad for windowing the images manually.

Copying and moving images or film sheets

If you only want to move images within a film sheet, you can also do that easily by drag-and-drop. In this case, deselect the **Zoom/Pan** icon.

1 Select the images/film sheets that you want to copy or move.

2 Select **Edit** > **Copy** in the main menu.

- or -

Select **Edit** > **Cut** in the main menu.

3 Select the image in front of which you want to insert the selected images.

4 Insert the images with **Edit** > **Paste** in the main menu.

Changing the reference image

If the display of reference images (Mother-in-Child) is specified for a series, each segment of the Virtual Film Sheet (VFS) includes a small reference image in the upper right or lower right-hand corner.

A reference line indicates the location of the large image which is displayed in the basic segment.

You can replace the default reference image, or insert a new one.

1 Open the **Patient Browser** and select a reference image for the series.



Only one image is allowed as the reference image for a series.

2 From the **Patient Browser**, drag-and-drop the single image on the reference part of an image segment of the VFS.

After dropping the image, the reference image is changed for the whole series.



To switch the reference image display on or off, or to set the position of the reference image for this film job, use the **Filming Properties** dialog box. See (→ Page 122 *Setting up the reference image*).

Deleting images or film sheets

1 Select one or more images or film sheets.

2 Select **Edit** > **Delete** in the main menu.

- or -



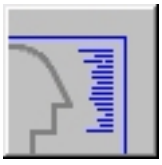
Click the **Delete** icon or push the **Del** key on the keyboard.

You can also delete images with **Film** > **Clear Document(s)** in the main menu. In this case, the segments of the deleted images remain empty. Use **Film** > **Repack** afterwards to reorganize the film sheet or the entire film job (gaps are filled again).

Showing or hiding image text and graphics

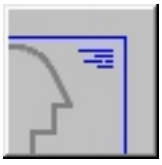
If you want to set **Customized Text**, you can call up the **Film Properties** dialog box with **Properties...** in the context menu.

Showing or hiding image text



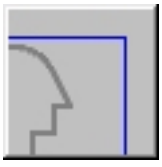
- Click the **All Text** icon on the **Images** subtask card to have all text information about the images filmed.

- or -



Click the **Customized Text** icon to have only part of the text information exposed on film.

- or -



Click the **No Text** icon to hide all text information in the segments.

Showing or hiding graphics



- Click the **Show Graphics** icon to display graphics (for example, ROIs) and annotations.

- or -



Click the **Hide Graphics** icon to hide graphics and annotations.

If you click the **Hide Graphics** icon, you also hide the Patient Protocol.

Selecting another camera

Safety advice

CAUTION

Exposing images with a non-verified camera!

Wrong basis for diagnosis.

- Only use cameras that have been released by Siemens.

CAUTION

Missing camera test!

Wrong basis for diagnosis.

- Perform the camera test regularly at the recommended intervals.

1 Click the **Camera** subtask card on the **Filming** task card into the foreground.



- or -

Select **Film** > **Change Camera...** to call up the **Change Camera and Film Size** dialog box.



2 Select a camera from the list.

This selection list contains all the cameras connected to your system.

1.6.4 Associating layouts with a study, series, or protocol

In the **Filming Study Layout** dialog box, you can assign a specific layout to a study. It can either be a layout you have created yourself, or one that has been created by the Siemens Service during configuration of your system.

The following functionalities are described in the subsequent sections:

- Assigning film layouts
- Canceling a layout assignment
- Deleting a layout

◆ Select **Options** > **Configuration...** from the main menu and double-click the **Filming Study Layout** icon.

The **Filming Study Layout** dialog box is displayed.

Assigning film layouts

You can only assign one specific layout to each study, series, or protocol. This layout is then automatically used for filming the images.

You can assign a layout by selecting a study, series, or protocol stored on your system, and the required layout, and then linking the two.



If a layout other than the standard layout is already assigned, you must first cancel this link before you can assign a new study-specific layout.

Selecting a film layout

In the **Film layouts** selection list, you will find a list of the available layouts.

◆ Select the required film layout.

Selecting a study/series/protocol

In the **Available Studies** area, you can see a list of the studies with their series/protocols.

1 Click the **+** symbol in front of a study to display the series or protocols associated with it.



You can only select entire studies if they are not subdivided into series/protocols. In such cases, the **+** or **-** symbol in front of the entry is missing.

2 Click a study, series, or protocol to select it.

Linking the layout

◆ Click the down arrow icon to assign the layout to the selected study, series, or protocol.

As soon as you have assigned a study-specific layout, the corresponding study, series, or protocol is entered in the **Studies/ Series linked to selected layout** list. Here you can see for what studies, series, or protocol the displayed layout is set. In the **Currently linked layout** column in the **Available Studies** area, you can see which layout is linked with a certain study.

If an image belongs to a study linked to two layouts (one for study/series and one for study/protocols), the layout assigned to the protocol will be chosen when sending the image to the film sheet.

Canceling a layout assignment

If you want to assign a different study-specific film layout to a study, series, or protocol, you must first cancel the old layout assignment.

1 Select the study, series, or protocol in question in the **Studies/ Series linked to selected layout** list.

2 Click the up arrow icon.

The standard layout is now assigned to the study, series, or protocol again and you can assign a new study-specific layout.

Deleting a layout

Your system can store and manage up to 100 layouts. Therefore, you should regularly delete those film layouts that you do not require any longer to make space for new study-specific layouts.

1 Select a layout that you do not require any longer from the **Film layouts** selection list.

2 Click the **Delete Layout** button.

The entry will be deleted from the list.

You cannot delete the standard layout.

1.6.5 Setting a film task layout

The **Filming Layout** dialog box is used to define a new film layout as well as change an existing layout. These layouts can be linked to a certain type of examination. A film layout is composed of the elements on the **Film Job** and **Film Sheet** tab cards.

The following functionalities are described in the subsequent sections:

- Defining and changing film layouts
- Setting a film task layout

Defining and changing film layouts

You can define up to 100 different layouts.

1 From the main menu, choose **Patient** > **Filming Layout...** to open the **Filming Layout** dialog box.

2 Select the **Film Task** tab card.

3 In the **Layout name** selection list (above the tabs), enter a name for the new layout.

- or -

Select the layout that you want to modify from this list.



The system provides a default film layout: **Layout General Default**.

4 Use the **Film Task** and **Series** tab cards to define your layout.

5 Click the **Apply** button to save your settings.

- or -

Click the **OK** button to save your settings and exit the dialog box.

- or -

Click the **Cancel** button to abort the action.

Setting a film task layout

The layout configuration for film tasks consists of the following steps:

- On the **Film Task** tab card, you can define the settings for a film job.
- On the **Series** tab card, you can define the settings for the film sheet layout.

1 Open the **Filming Layout** dialog box.

2 Select the **Film Task** tab card.

3 Select the **New film job by patient** checkbox to start a new film job whenever images of a new patient are copied to **Filming**.

4 Select the **New film sheet by** checkbox, and select one of the options to define when the images should be copied to a new film sheet.

5 Select the **New row of images by** checkbox, and select one of the options to define when images should be displayed in the next row.

6 In the **Number of copies** entry field, enter the number of copies.

7 In the **Expose every n-th document** entry field, enter a number to define which images you want to be filmed.

8 From the **Film size** selection list, select the size of the film (printout).

9 Select the corresponding **Segment lines** option either to hide or to display and print the segment lines.

10 Select the **Page number on print out** checkbox to print a page number on every film sheet.

11 Click the **Apply** button to save your settings.

- or -

Click **OK** to save your settings and exit the dialog box.

- or -

Click **Cancel** to abort the action.

1.6.6 Exposing on Film

Adding a paper printer

1 On the main menu of any task card, choose **Options** > **Configuration...**.

2 Click the **Add Printer** button to open the wizard for adding a printer.



When adding a network printer, make sure you click **Select a shared printer by name**. Clicking **Add a printer using a TCP/IP address or hostname** may lead to an error message.

3 Follow the instructions given by the wizard and finish the installation.

4 Restart the system.

After a system restart, the new printer is available in the **Filming** task card.

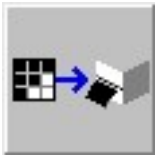
Exposing a film sheet

1 Select one or more film sheets in the **Filming** task card.

2 Select **Film** > **Expose Film Sheet** to process only the selected film sheets.

Exposing a film job

1 In the **Expose every n-th document** entry field, enter a number to define which images you want to be filmed.



2 Click the **Expose Film Task** icon as soon as you want to expose one of the film jobs in the queue.

You can call up the **Film Job Status** dialog box by clicking the **Film Job Status** icon on the **Filming** task card. In the dialog box, you can get information about film jobs that are waiting to be executed in the queues for each camera and printer.

1.7 Data Set Conversion

The **Data Set Conversion** tool prepares DICOM images of other manufacturers that are already imported into the *syngo* database, making them accessible for CT applications.

Additionally, the tool splits up a series from Siemens CT multi-phase reconstruction into series of different phases or slice positions.

The tool can be started alongside other applications.

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

1.7.1 Converting Data Sets

The following functions are described in the subsequent sections:

- Configuring Data Set Conversion
- Starting Data Set Conversion
- Splitting-up Heartview 4D series
- Ending Data Set Conversion

Configuring Data Set Conversion

In case pixel values of the original data exceed the range compatible with existing Siemens systems, the original images are lossy compressed during data set conversion.

Safety advice

⚠ CAUTION

Compression method is set to irreversible compression (Lossy JPEG)!

The resulting images are no longer completely identical to the original images. Information of medical relevance may be lost.

- Lossy compressed images should not be used for primary diagnosis, the image quality may not be sufficient.
- Lossy compression is indicated in the image displayed. The indication will be displayed except if “No Text” is in effect.
- Pay attention to corresponding entries in the image text.

1 Select the **Options > Configurations...** menu item.

The **Somaris/7 – Configuration Panel** appears.

2 Double-click the **Conversion** button.



The **DICOM Converter Configuration** dialog box appears.

3 Deselect the option **Mark images as lossy compressed**, if indispensable, if you do not want images with modified pixel range to be marked.

As the option **Mark images as lossy compressed** is activated by default, images with modified pixel range are labeled with, for example, CQ!, CF 10 (Compressing Factor 10).

If marked as lossy compressed, images are not accepted for further processing by CT applications.

4 Click **OK** to close the **DICOM Converter Configuration** dialog box.

Starting Data Set Conversion

You start **Data Set Conversion** via the **Patient Browser**.

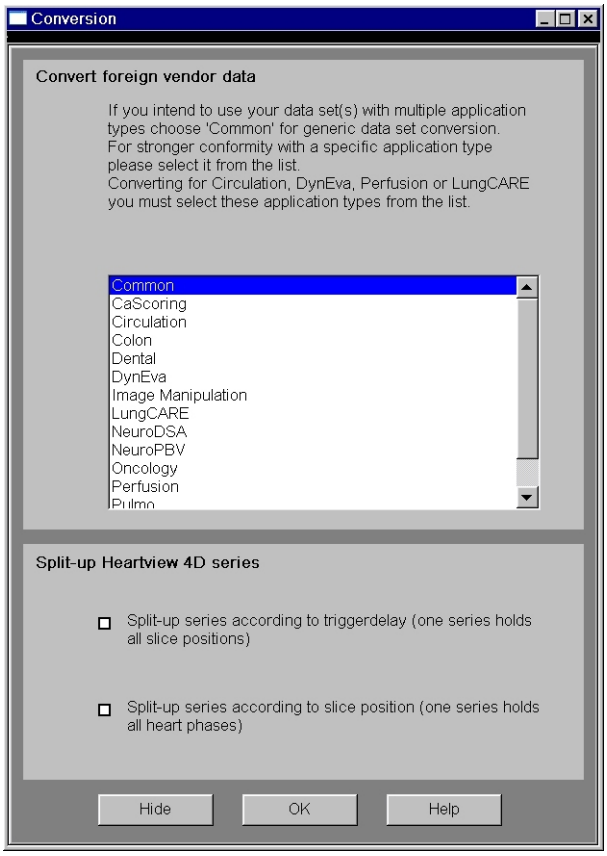
1 Call up the **Patient Browser** by selecting **Patient > Browser...** from the main menu.

2 Select one or more series of a study in the navigation or content area of the **Patient Browser**.

If you want to convert more series simultaneously, merge the series first. You can select all the series you want to convert, and drag-and-drop the selected series onto the remaining series. One series has to remain unselected.

3 Select **Applications > Conversion** from the menu of the **Patient Browser**.

The **Conversion** dialog box opens.



4 Select **Common**, if you intend to use the converted series for more than one application type.

- or -

Select a specific application from the list for which you want to convert the data, e.g., **DynEva**, or **Perfusion**.

5 Click **OK** to start the conversion.

You are informed of the status of conversion on the status bar, where any conversion risks are indicated by error messages.

Splitting-up Heartview 4D series

You can split-up the Heartview 4D series. On the **Conversion** dialog box, the following options are possible.

1 Select **Split-up series according to triggerdelay**, to split-up the series of multi-phase heart reconstruction according to the different heart phases included.

- or -

Select **Split-up series according to slice position** to split-up the series according to the different slice positions it contains.



2 Click **Hide** if you want to put the dialog box into the background.

- or -

Click **OK** to start the conversion.

You are informed of the status of conversion on the status bar, where any conversion risks are indicated by error messages. The **Conversion** dialog box remains open in the background.



If you want to perform another conversion, select another series in the **Patient Browser** and start conversion. For more information, refer to: (→ Page 134 *Starting Data Set Conversion*)

Ending Data Set Conversion

- Select **Applications > Close Conversion** from the menu of the **Patient Browser** to quit **Data Set Conversion**.

1.8 File Browser

The **File Browser** provides a capability to access and to manage a well-defined part of the file system of **Somaris/7**.

The **File Browser** is used for the following procedures:

- Transferring DICOM images to the CDBurn folder
- Accessing generated reports and AVIs
- Transferring raw data

The following functionalities are described in the subsequent sections:

- Calling up the **File Browser**
- Opening Files and Directories
- Transferring Files and Directories

- Transferring CT Data
- External Accessing to a File Share
- Deleting, Cutting, Copying, and Pasting Files and Directories
- Renaming or Creating New Folders
- Closing the **File Browser**

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

1.8.1 Calling up the File Browser

◆ Select **Options > File Browser** from the main menu.

The **File Browser** opens.

You can call up only one instance of the **File Browser**.

1.8.2 Opening Files and Directories

◆ Select **File > Open** from the menu of the File Browser.

You cannot open files that would endanger the system (for example, executable files).

1.8.3 Transferring Files and Directories

1 Select the desired file or directory.

2 Select **File > Send to > Burn Folder** from the menu of the File Browser to copy the selected file or directory to the CDBurn folder.

- or -

Select **File > Send to > USB Storage Device** from the menu to copy the selected file or directory to a USB device.



3 Click the **USB** icon in the status bar to eject the USB device.

In case data is not available after a DICOM data transfer, you are recommended to read the actual DICOM conformance statement. There you find information on DICOM structures and features.

Please ensure that the data was completely written prior to removing the USB device.

1.8.4 Transferring CT Data

You can export or import CT data to or from a standard location of the file system. This standard location is the same directory used for import and export of the CT data.

1 Select **CT Data Transfer > Set as Export Root** from the menu of the File Browser.

The currently selected directory is defined as export directory. You may select any directory visible in the File Browser. Configure a suitable export directory before starting the export.

2 Select **CT Data Transfer > Raw Data Compression** from the menu of the File Browser to activate or deactivate the data compression.

3 Select **CT Data Transfer > Show Export Root** from the menu to unfold the file browser tree to show the marked export directory.

4 Select one or more "*.CTR", or "*.PTR" files and select **CT Data Transfer > Import** from the menu of the File Browser.

The names of the selected "*.CTR", or "*.PTR" files are sent to a job manager.

5 Select **CT Data Transfer > Anonymous Export** from the menu to enable or disable the anonymization of CT raw data sets during export.

1.8.5 External Accessing to a File Share

You can access a file share of your CT scanner from an external PC.

1 Open the Windows Explorer of the external PC.

2 Select **Tools > Map Network Drive...** from the main menu.

The dialog box **Map Network Drive** opens.

3 Select the letter you want to assign to the mapped drive from the **Drive** selection list.

4 Enter [Name of your CT scanner]/SiteData in the **Folder** entry field.

5 Click **Different user name**.

6 In the dialog box displayed, log in as meduser with meduser1 or with a password you selected.

7 Click **OK**.

8 Click **Finish**.

The file share appears in your Explorer and you can access the files.



You can only view the files, you cannot modify them.

1.8.6 Deleting, Cutting, Copying, and Pasting Files and Directories

You can delete, cut, copy, and paste files and directories in the **File Browser**. You can also move files and directories within the **File Browser** via drag-and-drop.



Be aware to delete only files with the extension “ptr”. To delete other files or folder may disrupt your external system.



You cannot delete, rename, or transfer directories and files installed by default.

- Right-click the selected file or directory and choose the desired option from the context menu:

  Click **cut** to relocate the selected file/directory.

Click **copy** to create a copy of the selected file/directory when pasting it.

Click **paste** to insert the file/directory into the selected directory.

Click **delete** to delete the selected file/directory after confirming a corresponding notice window.

Using the **File Browser** for deleting files or directories is only possible in the directory **H:\SiteData** and its subdirectories.

1.8.7 Renaming or Creating New Folders

- Select **File > Rename** or **New Folder** from the menu of the **File Browser**.

1.8.8 Closing the File Browser

- Select **File > Exit** from the menu of the **File Browser** to close the **File Browser**.

1.9 Camtasia

Camtasia is a separate software tool to film your desktop activities. Use it only for postprocessing.

You can save these recordings as AVI files for documentation and presentation purposes.

The recorder is available on both the *syngo* Acquisition Workplace and the *syngo* CT Workplace.

To ensure an accurate run of the single **Camtasia** functionality, only start one action at a time.

After the installation of the **Camtasia** software, new menu entries are added to the main menu of any task card and the **Patient Browser** menu.

You find additional information about the **Camtasia** recorder by clicking the **Help** button.

The following functionalities are described in the subsequent sections:

- Opening the Camtasia Recorder
- Capturing a Video
- Saving the Video File
- Workflow Example

Safety advice

CAUTION

Using results from Camtasia for diagnosis or reading!

Wrong diagnosis due to inadequate image quality.

- The results from Camtasia are only intended to be used for training and communication.

CAUTION

Due to Camtasia screen capturing, the data disk fills up!

Examination is no longer possible or examination may be aborted.

- Only use Camtasia for short recording sequences. Do not use Camtasia for recording in parallel to the acquisition.

1.9.1 Opening the Camtasia Recorder

First you open the **Camtasia Recorder** for capturing.

1 Select **Applications > Desktop > Camtasia Recorder**.

The **Camtasia Recorder** dialog box opens.



The entire **Camtasia Recorder** dialog box and the menu of the **Camtasia Recorder** dialog box is visible only if the **Standard** view is selected. By default **Minimal** is selected and only the title bar and the icon bar is displayed.

2 Click the **Toggle View** dropdown list and select **Standard**.

1.9.2 Capturing a Video

The following functionalities are described in the subsequent sections:

- Calling up the Camtasia Recorder
- Selecting the capture area
- Starting capturing
- Pausing capturing
- Stopping capturing
- Deleting the current video
- Adding annotations and effects during recording

Calling up the Camtasia Recorder

For capturing a video, call up the **Camtasia Recorder**.

◆ Select **Applications > Desktop > Camtasia Recorder**.

The **Camtasia Recorder** dialog box opens.

Selecting the capture area

You can select the capture area by clicking the arrow button next to the **Record** button.

1 Select **Screen** to capture the entire screen.



A bullet in the dropdown list shows you the currently selected capture area. When you pass over selectable areas they are highlighted.

- or -

Select **Window** to capture a selected object in the screen, e.g., a screen segment, dialog box, subtask card, etc.

2 After clicking the **Record** button, click into the selected object to capture it.

- or -

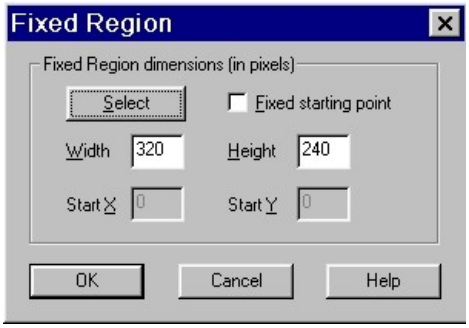
Select **Region** to capture a user-defined region.

3 After clicking the **Record** button, click and drag the mouse cursor over the area you want to capture.

- or -

Select **Fixed Region...** to capture a pre-defined region.

The **Fixed Region** dialog box is displayed.



4 Define the size of the fixed region using the options in the **Fixed Region** dialog box.

Starting capturing



1 Click the **Record** button in the toolbar after selecting the capture area to start capturing.

- or -

Press **F9**.

During recording process, the **Camtasia Recorder** dialog box is visible. You can move the dialog box as far as possible out of the region of interest to make sure that you do not capture it in the video.

2 Click the top of the dialog box, and keep the mouse button pressed while moving into another screen area.

If you selected either **Window** or **Region** as your capture area, click the **Record** button, and mark the area you want to capture.

Calling up the minimized Camtasia dialog box

If you minimized the **Camtasia** dialog box, you cannot reopen it as usual.

- Select **Applications** > **Desktop** > **Camtasia Recorder** to reopen Camtasia.

Pausing capturing

You can pause the capturing process.



- Click the **Pause** button in the toolbar to pause the capturing process.

  - or -

  Press **F9**.

Stopping capturing



- Click the **Stop** button in the toolbar to stop capturing.

  - or -

  Press **F10**.

Deleting the current video

You can delete the captured video.



- Click the **Delete** button in the toolbar to delete the currently captured video.

  The recording pauses and a message box is displayed.

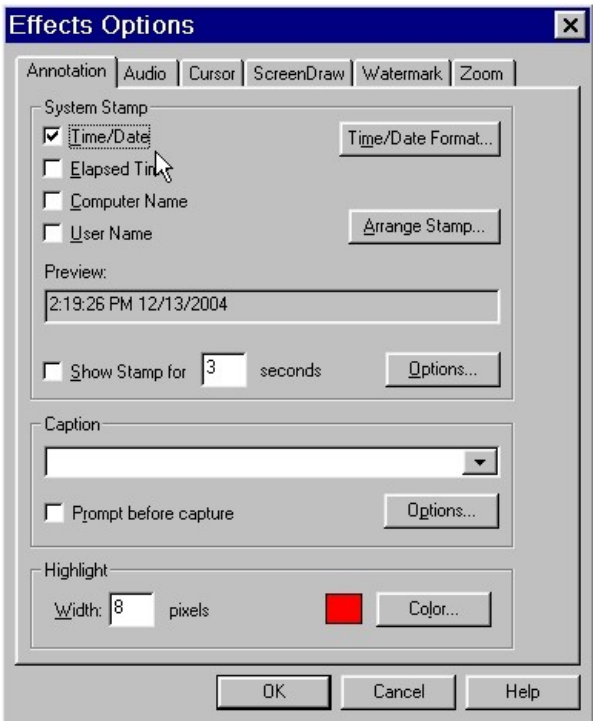
After confirming the message dialog box any captured frames are discarded.

Adding annotations and effects during recording

During AVI recording, you can add various annotations and effects to the file, which is being recorded.

1 Select **Effects > Options** to define several options.

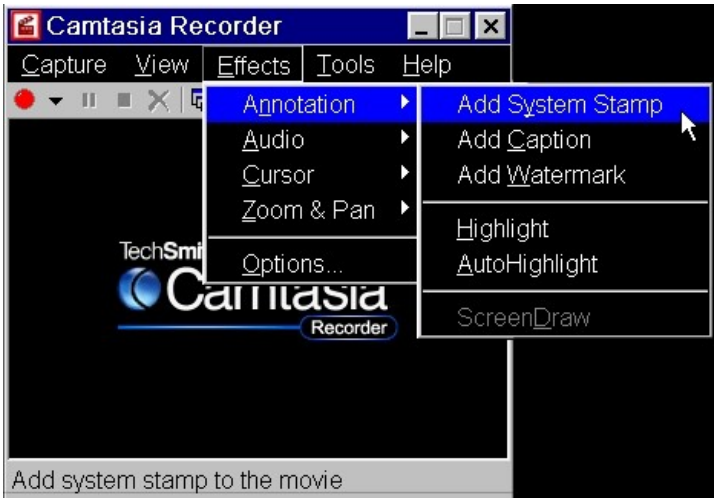
The **Effects Options** dialog box opens.



2 Add the features you want to be displayed in your video.

You can add following features to your video:

- Date and time
- Caption
- Watermarks
- Auto-/highlights
- Cursor effects
- Audio effects
- Zoom & pan effects



3 Select the corresponding menu entry in **Effects** to activate the features.

1.9.3 Saving the Video File

During recording, the video is stored as AVI file. It is stored automatically in your offline file system under **H:\SiteData**.

Safety advice

CAUTION

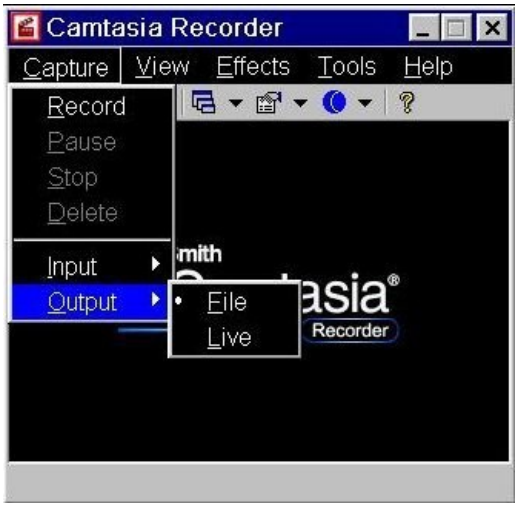
Using another directory for Camtasia data files!

Data disk is full and no further examination possible. You cannot delete files any more.

- Use only the configured directory for saving the Camtasia data files.

Defining the output options

You can define the output options of the captured video.



1 Select **Capture > Output > File** to save the captured video as AVI (video) file.

2 Select **Tools > Options > File** to set the name and the location of the video file to run automatically.

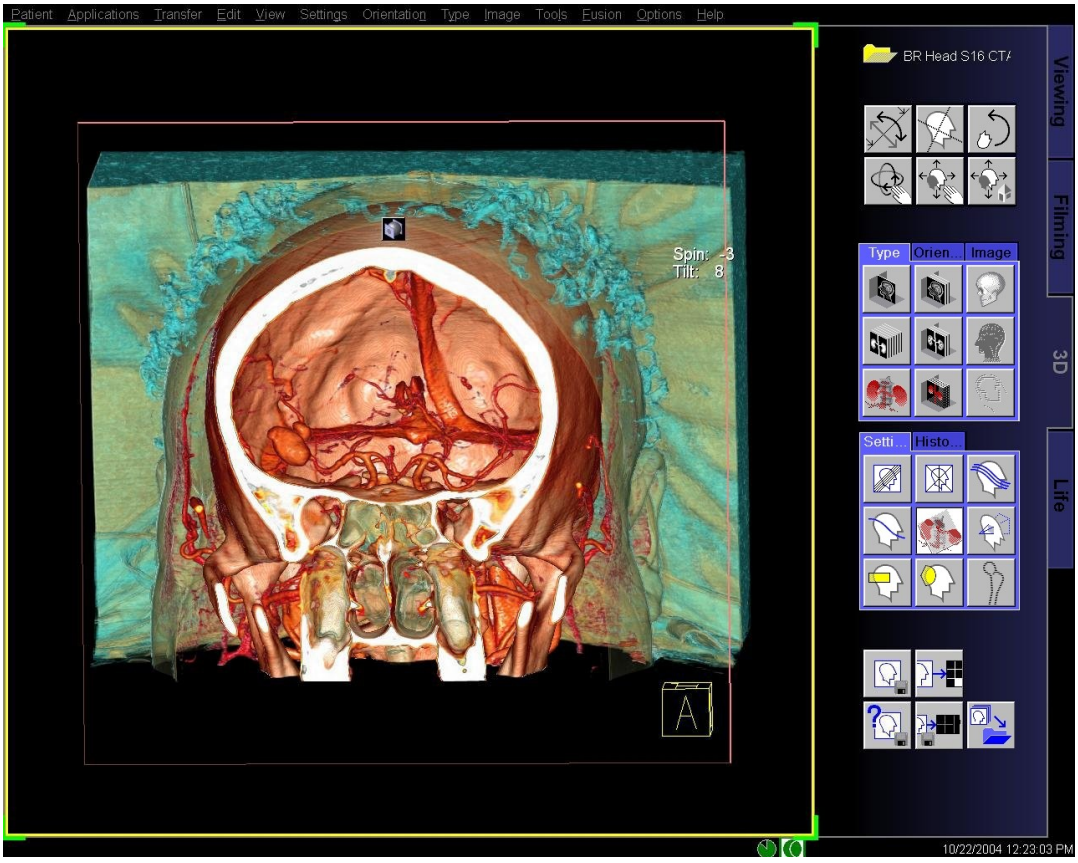
The AVI files you create, are imported, or edited in any third-party application that supports the AVI format.

1.9.4 Workflow Example

You can record your desktop activities on any application card.

1 Load a CT Head Angiography data set into the **3D** task card.

2 Apply a VRT preset on this data set.



3 Select **Applications > Desktop > Camtasia Recorder**.

The **Camtasia Recorder** dialog box opens.

4 Select the capture area.



5 Click the **Record** button in the toolbar.

6 Click into the segment you want to record your desktop activities in.

Recording starts.

7 Start working in this segment.



8 When you finished, click the **Stop** button in the toolbar to stop recording.

1.10 *syngo* Security Package

With the *syngo* Security Package (Health Insurance Portability and Accountability Act (HIPAA)), *syngo* provides competent user management and highly configurable access control. These features implement privacy, integrity, and consistency of patient data in health care, which may be required by country-specific regulations.

For security reasons, only authorized persons have access to sensitive data, such as diagnostic images, results, or reports. The system administrator notifies you about your user account and password.

syngo allows you to work only with the data and functions that you are authorized to use.

CAUTION

Behavior of secured systems. The hospital's security policy affects the behavior of the *syngo* system. For example, password strength requirements, enabled empty passwords, or locking of an account after a specific number of failed logins!

Inaccessible system or data.

- Establish a user model for your hospital and verify it before the security system is activated.
- Establish a proper procedure for emergency access.
- Note that if you enable an empty password for the emergency account, this is enabled for all other users as well. Nevertheless, instruct the users to use strong passwords.
- Always back up your system before enabling the security system and before any major changes.
- Inform all users about any changes and settings. Contact the administrator immediately in case of problems.

Pay attention to the storage capacity of the hard disk displayed by icons in the status bar of the task cards. If necessary, at the latest when the red icon occurs, inform your system administrator to archive the Audit Trail.

The Audit Trail logs your identity and all activities you perform on sensitive data.

If you configure the screen saver under **Options > Configuration...** a reboot is necessary afterwards so that it functions correctly.

The following functions are described in the subsequent sections:

- Logging On and Off
- Changing the Password
- Generating a Service Password for Local Access

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

1.10.1 Logging On and Off

The following functions are described in the subsequent sections:

- Logging on
- Sharing the workstation with other users
- Logging off temporarily
- Logging off

Safety advice

CAUTION

Switch user, shut down, logoff or restart without saving data!

Possible loss of unsaved changes.

- Save data before switching user, shutting down, or restarting the system.

CAUTION

Switching off the computer in Standby mode or without shutting down!

Possible loss of data, data corruption or system damage.

- Shut down the computer before switching off.

Logging on

Except for emergency access, you are only allowed to work with a *syngo* workstation if you are logged into your personal user account.

1 Type in your user name and password to log on to a workstation.

A warning message appears.

2 Read the message thoroughly.

3 Click the **OK** button.

After confirming the message box, you get access to the *syngo* application.

In emergency cases you can log on under the general emergency account, depending on the security configuration. The system administrator supplies you with account name and password.

Sharing the workstation with other users

You can share the workstation with other users.

1 Select **System > End** to open the **End Session** dialog box.



2 Click the **Log in Different User** icon to switch the user at your workstation.

If HIPAA is activated, you can view the privileges of the current user by selecting **Options > Security > View...** and then the **Privileges** tab card.

Logging off temporarily

You can log off for a longer period without quitting your session.

1 Select **System > End** to open the **End Session** dialog box.



2 Click the **Lock Computer** icon to lock your computer for a longer period without quitting your session.

Running tasks are completed in the background.

Logging off and on again to the *syngo* Acquisition Workplace is not possible during a patient examination.

Logging off

You can close all patient data, and all applications to ensure secure user management before logging off.

1 Select **System** > **End** to open the **End Session** dialog box.



2 Click the **Log off** [user name] icon to log off if you finished your work.

1.10.2 Changing the Password

You are recommended to change the password assigned by the administrator.

1 Select **System > End** to open the **End Session** dialog box.



2 Click the **Change Password** icon to change your password.

3 Enter the old password for authentication.

4 Type the new password and repeat the new password for verification.

1.10.3 Generating a Service Password for Local Access

To allow local service activities without a personal account, the system generates a temporary service password for the general **LocalServiceUser** account.

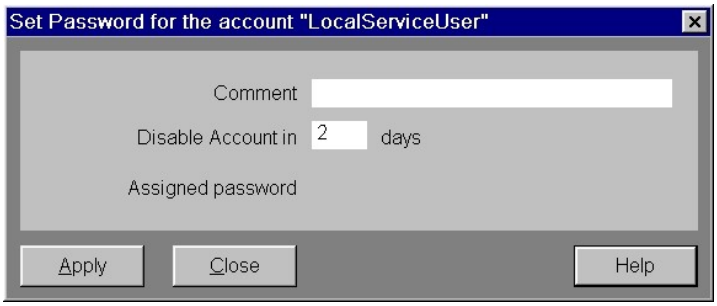
Using the temporary service password, a service technician can log on to the computer under the **LocalServiceUser** user account.

Generating a temporary password

You can generate a temporary password.

1 Select **Options > Service > Service Account** from the main menu of any task card.

The **Set Password for the account "LocalServiceUser"** window is displayed.



You need the privilege **EnableServiceAccount** to use the **Service User** menu item.

2 Enter the reason for a service access and the name of the service technician in the **Comment** field.

3 Enter the expire period in days.

4 Click the **Apply** button to generate the password.

The generated password is displayed next to **Assigned password**.

5 Note the password.

6 Click the **Close** button to end.

7 Keep the password confidential and pass it only to the service technician.

You can change the password with double-clicking on the **LocalServiceUser** account in the **syngo Security Configuration** window. The **syngo Security Configuration** window opens if you choose **Options** > **Configuration** from the main menu.

1.11 Software Remote Update Handling

Siemens has established a software remote update process to provide software updates as early as possible.

The software update package is transferred onto the CT system using the secure and certified Siemens Remote Service (SRS) infrastructure.

Make sure that your remote connection to the Siemens Remote Service infrastructure is always active and running. Otherwise your system will not receive the latest updates.

Depending on the content and the urgency of a software update, Siemens provides update packages that are executed during system operation and ones that are executed during system start-up:

- Updates executed during system operation
- Updates executed during system start-up

Updates executed during system operation



While the system is running, an icon is displayed in the status bar.

- The icon is used for updates to be installed during system operation to ensure that the update is executed in time (for example, virus pattern updates).
- The installation of the update is recommended between two patient examinations.
- Clicking the icon opens the **Software Distribution / Installation** dialog box.

Updates executed during system start-up

While the system is shutting down, a message box indicates a software update for the next system start-up.

- The message box informs you about the number of packages that will be installed and the time the installation will take.
- During the next system start-up, the **Software Distribution / Installation** dialog box will automatically be displayed.
(→ Page 155 *Installing the update package*)

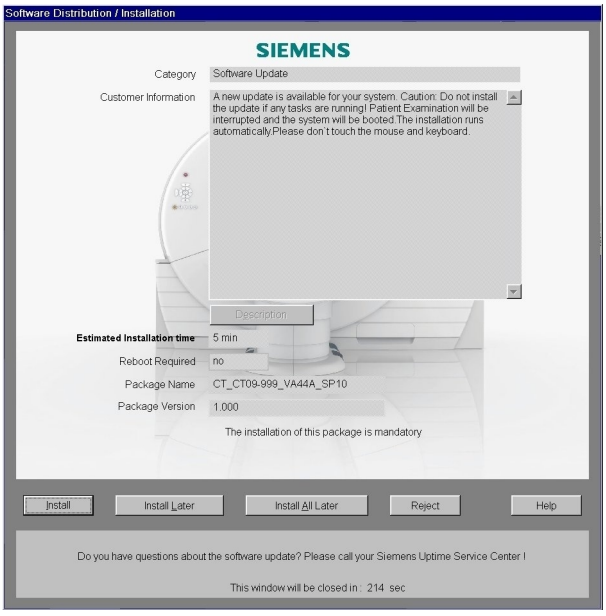
The following functionalities are described in the subsequent sections:

- (→ Page 155 *Installing the update package*)
- (→ Page 156 *Completing the installation*)
- (→ Page 157 *Deferring the installation*)

1.11.1 Installing the update package

The installation process of updates executed during system operation and updates executed during system start-up is the same.

The **Software Distribution / Installation** dialog box is displayed.



The **Customer information** field contains information on the new software package.

- Click **Install** to install the new update package immediately.

  Installation starts and its progress is displayed.

If you do not click any button in the **Software Distribution / Installation** dialog box, it is closed automatically after a certain time period. The time remaining is displayed in its lower area.

In case the scheduled update was missed during system start-up, a **Software Distribution / Installation** message box will be displayed after system start-up. It informs you that a new software update package will be available for installation during next system start-up.

1.11.2 Completing the installation

After completing the installation, you receive a corresponding message.

- Click **OK** to close the **Software Distribution / Installation** dialog box.

  The following icons indicate the installation result:

	Installation was successfully completed.
	Installation failed with successful software rollback. The system has not been updated but can be used for patient examination.
	Installation failed, and software rollback was not successful. The system cannot be used for patient examination.

If the installation did not complete successfully, contact your local service.

You can view the installed update packages as well as the update packages that are available for installation in the **Software Distribution** dialog box. You can open the dialog box by choosing **Options** > **Configuration** from the main menu and double-clicking the **Software Distribution** icon.

1.11.3 Deferring the installation

- Click **Install Later** if you do not want to install the new update package immediately.

  - or -

  Click **Install All Later** if you do not want to install any new update packages.

  The **Software Distribution / Installation** dialog box is closed without installation.

If the **Reject** button is displayed, you can reject the installation of the new update package. The **Software Distribution / Installation** dialog box is closed without installation. The update package will not be offered again.

1.12 Siemens Virus Protection

Siemens took preventive measures to keep computer viruses off your CT system.

Nevertheless, data transmission within the clinic network or from external data media (for example, CD-ROM) can lead to virus infections on your CT system.

The virus scanner is used to detect viruses as early as possible and thus avoid major damage.

The virus scanner continuously checks files on the system for known viruses.

As long as no virus is detected, it runs entirely in the background. Your clinical work on the SOMATOM CT scanner is not affected.

As soon as a virus is detected, a message pops up including information on how to proceed.

Please contact your local Siemens Service, if you wish to order Siemens Virus Protection. Before it can be applied, Siemens Service must activate and configure it.

The following functionalities are described in the subsequent sections:

- Virus Infection
- Update Handling

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

Safety advice

CAUTION

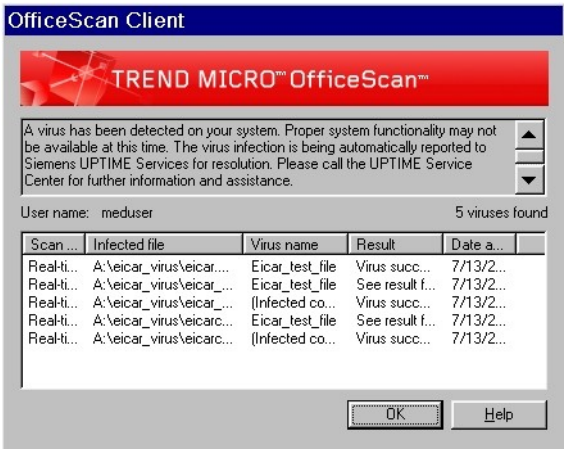
System infected by computer virus!

Manipulation of the software.

- *Never* use a data medium that could contain a computer virus, for example game CD.
- Check disks for viruses *before* using them.

1.12.1 Virus Infection

If the virus scanner detects a virus, a message window is displayed.



1 Click **OK** to close the message window.

2 Contact Siemens Uptime Services to receive all relevant information about this virus, before using your system again.

The information about the infection is automatically forwarded to Siemens Uptime Services.

1.12.2 Update Handling

The required updating of virus patterns and scan software is accomplished by remote updates.

Make sure that your remote connection to the Siemens Remote Service infrastructure is always active and running. Otherwise your system will not receive the latest updates.

The following functionalities are described in the subsequent sections:

- (→ Page 160 *Information about a new update package*)
- (→ Page 161 *Installing the update package*)
- (→ Page 162 *Failure of installation*)

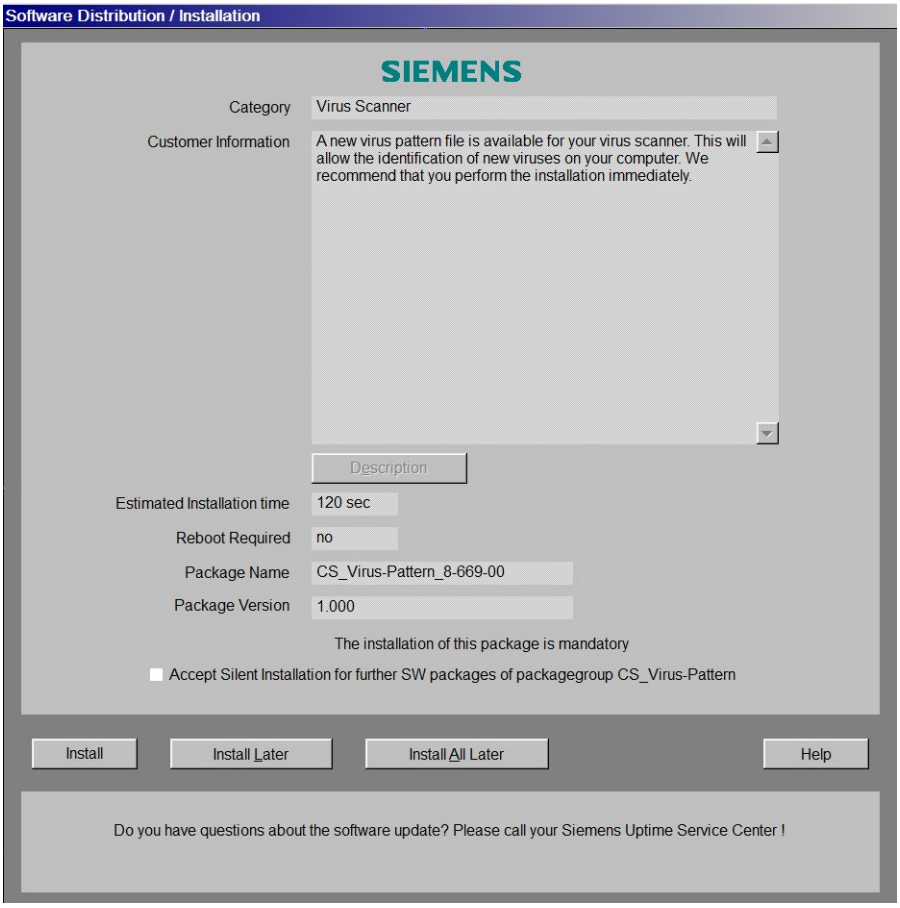
Information about a new update package

If a new virus pattern is downloaded, an icon occurs in the status bar of the screen. If a yellow exclamation mark is displayed next to the icon, we strongly recommended installing the update immediately after completing the current patient examination. For hotfix updates, the **Software Distribution / Installation** dialog box is displayed during system startup.



- Click the icon to install the update.

  The **Software Distribution / Installation** dialog box is displayed.



The upper part of the dialog box contains information on the new software package.

If you do not click any button in the **Software Distribution / Installation** dialog box, it is closed automatically after a certain time period. The time remaining is displayed in its lower area.

Installing the update package

You are recommended to carry out updates immediately after completing the current patient examination. If you have to postpone any updates, make sure that you catch up on them as soon as possible. Otherwise the virus scanner may not be able to detect new types of viruses. Hotfixes offer enhanced protection of your SOMATOM CT system.

If you want to install several new update packages, install them one by one.

As long as the new data is not installed yet, the icon in the status bar keeps blinking.

If you activate the **Accept Silent Installation for further SW packages of packagegroup...** option, all packages are installed silently.

1 Click **Install** to install the new update package immediately.

Installation starts and its progress is displayed.

If the installation was completed successfully, you receive a corresponding message.

2 Click **OK** to close the **Software Distribution / Installation** dialog box.

Deferring the installation

- Click **Install Later** if you do not want to install the new update package immediately.

  - or -

  Click **Install All Later** if you do not want to install any new update packages.

  The **Software Distribution / Installation** dialog box is closed without installation.

You can view the installed update packages as well as the update packages that are available for installation in the **Software Distribution** dialog box. You can open the dialog box by choosing **Options** > **Configuration** from the main menu and double-clicking the **Software Distribution** icon. In the **Software Distribution** dialog box, you can deactivate the silent installation.

Failure of installation

If the installation failed you receive a corresponding message.

Siemens Uptime Services search for the error cause and resolve the problem.

Nevertheless you can continue to use your CT system without restrictions.

1.13 SaveLog

For service purposes and better error investigation, the **SaveLog** function allows you to save relevant data.

Only Siemens Service has access to the file for evaluation purposes.

The generation of the savelog backup takes place in multiple stages.

1.13.1 Using the SaveLog Function

You can use the **SaveLog** function to save relevant data.

Generating a savelog backup file

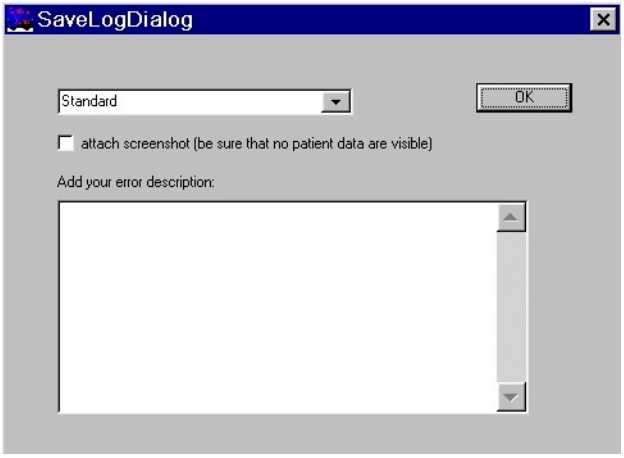
1 Press **Ctrl** + **Alt** + **s** to save all log files and information to a savelog backup file.

A dialog box is displayed.



A savelog file is generated in case the system is not responding anymore or a malfunction appears.

After the backup generation, the **SaveLogDialog** dialog box is displayed.



2 Depending on the files you want to add, select a category in the drop-down list.

You can select the following categories in the drop-down list of the **SaveLogDialog** dialog box:

- **Applications** (problems with applications)
- **HangUp of system** (after bluescreens or system hangup, also after rebooting)
- **SelfTest** (result files of the self-test)
- **Standard**(general problems)
- **UI freeze** (problems with the user interface)
- **Hardware** (obvious problems with the tube or other hardware components)
- **IRS** (problems with or during image reconstruction)
- **Service** (problems with the service program used by service technician)
- **Security** (files of the security system)

3 Check the **attach screenshot** checkbox to add a screenshot to the savelog backup. Make sure that no patient data is visible.

   A screenshot of the active screen is made when the checkbox is activated.

4 Add an error description in the text field if you want to.

5 Click the **OK** button to confirm your selection.

6 Notify the Siemens Service.

1.14 IRS RAID

Raw data are stored on a redundant array of independent disks (based on RAID level 4).



If one of the redundant disks of the RAID system is disabled, a message box informs you about it. Nevertheless, you can continue your work. Additionally an icon is displayed in the status bar on the *syngo* Acquisition Workplace showing a disabled disk.

After closing the message box, the icon is still displayed indicating the status of the disks.

The message box is displayed in the following case:

- After the examination, if a redundant disk is disabled the first time
- The Scan UI is restarted and a redundant disk is disabled
- No patient is loaded

If you have a pro-active remote connection, the Siemens Service is informed automatically about the decreased reliability.

Please contact the Siemens Service.

1.15 *syngo* Remote Assist

syngo Remote Assist allows the Siemens customer service to access and to control your *syngo* CT system from outside the network. The service technician or application specialist has access with a remote connection via Wide Area Network (WAN).

Service technicians or application specialists can support local users at any *syngo* Workplace, accessing the *syngo* Workplace remotely with a single-session password. It enables the simultaneous operation from the *syngo* Workplace as well as from the remote computer.

The software provides full-screen display and allows the remote user to use all *syngo* Workplace functionalities, for example:

- Viewing and filming images
- Exporting data
- 3D reconstruction
- Data processing

If the *syngo* Security Package is available, you can switch to a user account with fewer rights. Thus, you can ensure that your data is protected before you grant the remote user access to the *syngo* Workplace.

You can only establish either a *syngo* Remote Assist connection or a *syngo* Expert-i connection on your *syngo* Workplace at the same time.

The following functionalities are described in the subsequent sections:

- Establishing the connection
- Disconnecting remote assistance

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

1.15.1 Establishing the connection

If you need help or support from a Siemens service technician or application specialist, the technician can access the *syngo* Workplace via the secure Siemens Remote Service (SRS) environment.

The following functionalities are described in the subsequent sections:

- Activating a single connection
- Activating a multi-user access
- Granting full access
- Restricting access

Safety advice

CAUTION

Service session, for example, with limited access, running in parallel to data acquisition!

Dialog box may appear and cause confusion.

- Always close Service UI when work is done; do not minimize it.

CAUTION

Remote and uncontrolled patient movement!

Possible injury of the patient by moving parts.

- Do not leave the *syngo* Acquisition Workplace unattended if full access is enabled. Local user still has full responsibility for appropriate usage of system.

Activating a single connection

For remote access, the service technician or application specialist has to log in to the *syngo* Workplace. The service technician or application specialist generates a password for this purpose.

During the established remote connection in **Full Access** mode, the feed, the gantry tilt, and the table height icons are dimmed for the remote user. The table movement is only possible by pressing the **MOVE** key on the control box (also during Calibration).

If the *syngo* Security Package is available, the external access and the sessions are entered into the audit trail.

1 Notify the Siemens customer service that you need support.

If a remote connection via *syngo* Remote Assist is required, the service technician or application specialist generates a single-session password: the session number.

2 Select **Options** > **Service** > **syngo Remote Assist...** from the main menu at the *syngo* Workplace.

The **syngo Remote Assist** dialog box opens.

If there are sensitive data on your system, a corresponding message box is displayed, referring to privacy rules for these data.

3 Enter the session number in the **Session Number** entry field.

4 Click the **Login** button to activate the connection.



If remote assistance has been started successfully, the single connection tray icon appears in the status bar. The service technician or application specialist has access to your system in **View Only** mode. The service technician or application specialist can only point to items on the screen with a separate mouse cursor.



You can click the tray icon at any time to get all information on the current connection.



If a remote connection could not be established, a corresponding message box is displayed. In this case, contact your service technician or application specialist.

Activating a multi-user access

You can grant access to several service technicians or application specialists at the same time.

If another service technician or application specialist wants to access your system, the single connection tray icon in the status bar starts blinking.



1 Click the single connection tray icon in the status bar.

A corresponding request appears in the **syngo Remote Assist** dialog box.

2 Click the **OK** button if you agree to further access.

- or -

Click the **Cancel** button to cancel the dialog box and refuse the request.



If remote assistance is started successfully, the multiple connections tray icon is displayed in the status bar. Another service technician or application specialist has access to your system in **View Only** mode. The service technician or application specialist can only point to items on the screen with a separate mouse cursor.

Granting full access

You can grant access to your *syngo* Workplace either in **View Only** mode or in **Full Access** mode:

- **Full Access** mode: The whole screen is visible without restrictions. The service technician or application specialist can operate your system.
- **View Only** mode (default): The remote user is not able to perform keyboard or mouse actions. The remote user can only point to items on the screen with a separate mouse cursor.

If any technician wants to take over your system, the current remote assistance tray icon in the status bar starts blinking.

1 Click the tray icon in the status bar.

  A corresponding request appears in the **syngo Remote Assist** dialog box.

2 Click the **OK** button if you agree to grant full access.

  - or -

  Click the **Cancel** button to cancel the dialog box and refuse the request.

  If transferring control access is started successfully, the remote user can operate the system. Only one remote user can operate the system at the same time. If you allow a remote user to operate the system, another remote user who is operating the system will lose control automatically.



If dual monitor mode is activated, only one of the monitors may be displayed on the remote computer.

To switch between the primary and the secondary monitor in **Full access** mode, press **Ctrl** + **Shift** + **U** either on the CT system or on the remote computer. In **View only** mode, you can switch between the two monitors on the CT system only.

Restricting access

You can switch back to the **View Only** mode at any time during the session.

1 Click the tray icon in the status bar.

The **syngo Remote Assist** dialog box opens.

2 Click the **View Only** button.

- or -

Press **Ctrl** + **Alt** + **Backspace** on your keyboard.

The service technician or application specialist has **View Only** access to your system.

1.15.2 Disconnecting remote assistance

You can terminate the remote session at any time. If the connection is inactive for a certain time, the connection is canceled automatically.

Safety advice

CAUTION

Terminating remote service without consultation with the service engineers!

Terminating the remote service ends all service processes and may cause system malfunctions.

- Always coordinate termination with the service engineer before terminating the remote service.

1 Click the remote assistance tray icon in the status bar to open the **syngo Remote Assist** dialog box.

2 Click the **Disconnect** button.

- or -

Press **Ctrl** + **Alt** + **Del** on your keyboard to terminate the connection immediately.

- or -

Press **Ctrl** + **Alt** + **Backspace** on your keyboard to terminate the connection immediately.

Because this shortcut also switches from **Full Access** mode back to **View Only** mode, you have to press this shortcut twice if you are in **Full Access** mode.

The connection to the service technician or application specialist is disconnected, and the remote assistance tray icon disappears.

The service technicians or application specialists can also disconnect the remote assistance. If you have established a multiple connection, and one of the remote users disconnects, the tray icon changes to the single connection tray icon.

1.16 Known Issues and Solutions

Known Issues and Solutions provides you with additional information on examinations, applications and your system.

The following functionalities are described in the subsequent sections:

- General Hints
- Workflow Relevant Information
- Reporting
- Storing and Networking
- Applications
- Additional Information for Operation
- Native Language Support

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

1.16.1 General Hints

In this chapter, you will find information on the common *syngo* applications.

The following functionalities are described in the subsequent sections:

- Patient Browser
- Viewing
- Filming
- 3D

Patient Browser

On the following pages, you will find additional information on the **Patient Browser** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 172 *Loading a series to a task card*)

Correcting the patient position

If a series has been sent to the PACS, changing the patient position with **Edit** > **Correct Patient Position** leads to data inconsistencies.

Do not change the patient position after sending a series to the PACS.

Using the function Correct & Rearrange

Do not use the **Total injection dose** entry field on series and image level. The values are not taken into account correctly by the system.

Loading images in Dual Monitor mode

If the **Patient Browser** is opened on the second monitor, it is only possible to load the images via drag-and-drop on the primary monitor. You can also move the dialog box of the **Patient Browser** to the first monitor and load the images via double-click.

Loading a series to a task card

If you perform the following procedures, it may happen that a series is not loaded in any task card or the series is loaded in two task cards:

- You have selected the option **Close after loading**.
- You load a series via doubleclick from the **Patient Browser** into a task card.
- You change the task card fast afterwards.

◆ Do not change to another task card right after loading a series.

Viewing

On the following pages, you will find additional information on **Viewing** together with workarounds, if possible.

For more information on the available workarounds, refer to:
(→ Page 173 *Changing image text configuration*)

Configuring windowing values

If more than 50 organ windowing values are configured, the scroll down icon is not visible at the bottom of the list of the **Windowing** menu.

Changing image text configuration

1 Do not load additional images into **Viewing** after changing the image text configuration (for example, from **Customized Text** to **All Text**) if you are using the 1:1 layout.

The image text displayed in **Viewing** might be a mixture of **Customized Text** and **All Text**. The images are correctly displayed on the film sheet or in the PACS.

2 Close the patient and reload all images if you want to view further images in the 1:1 layout after changing the image text configuration.

You can also select the whole series in **Viewing** and then the desired text configuration.

Interrupting 2D Viewing tool operations

Tool operations, which need more mouse clicks, for example, **Angle**, **Freehand ROI**, are not interruptible by mouse operation.

- Use the **Esc** key on your keyboard.

  After finishing these kinds of operations, you can select another tool or switch off the tool.

Filming

On the following pages, you will find additional information on **Filming** together with workarounds, if possible.

For more information on the available workarounds, refer to:
(→ Page 174 *Display of the Window Center value*)

Histogram

The shape of the histogram of a ROI and the notation of the axis in the 2D viewer, e.g., **Viewing**, is different when copied to the virtual film sheet.

Changing the film layout

It is not possible to change the film layout of film sheets with different layouts at the same time. You can only change the film layout for selected images or series if they have the same layout. Otherwise, you have to unify the layout of the selected images first before changing the layout.

Display of layout names

In the Layout list box, layout names with more than 10 characters are displayed incompletely.

Display of the Window Center value

If you perform a 3D calculation, and send the images from **3D** to **Filming**, it may occur that the Window Center value on the film sheet is automatically changed to 0.

- Reload the images to **Filming**.

Sending images with evaluation text to the film sheet

If you add image text or perform measurements close to the image segment border, both might not be visible anymore after sending to the film sheet.

- Reposition the evaluation and the image text, or change the image zoom.

3D

On the following pages, you will find additional information on **3D** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 175 *Dilating objects*)

Changing the Slice Thickness

The slice thickness can be selected in the range dialog boxes (parallel, radial, curve) and the filter thickness dialog boxes, for example MPR. You can select it with the precision of one decimal place. In some cases, the calculation of the planar slices is more precise. The slice thickness in the image segment is displayed with two decimal places.

Undoing steps during Bone Removal

During step 2 of bone removal, you can define additional structures as bone or non-bone.

If a **3D: Warning** dialog box pops up and you confirmed with **OK**, it is not possible to return to the starting point by clicking the **Undo** or **Undo All** icon. Therefore, it is not possible to undo a reprocessing of data.

Dilating objects

If you start calculation via **Settings** > **Editor Region Growing**, **Editor Object Punching**, or **Editor Morphological Operations** from the main menu, it may occur that calculation stops. The progress bar pauses, and a warning message is displayed: **Not enough memory available, please try closing other applications or unloading some images.**

1 Confirm the dialog with **OK**.

2 In case the progress bar still pauses, select **Settings** > **Editor Region Growing**, **Editor Object Punching**, or **Editor Morphological Operations** again from the main menu.

The progress bar disappears and calculation continues.

Copying images to the film sheet without reference lines

If you copy images to the film sheet, the reference lines displayed within the reference image may not be correct. All reference lines of all slices may be displayed.

If you want to get a film sheet without reference lines, you need to disable the configuration options.

1 Select **Options** > **Configuration...** from the main menu.

2 Double-click the **3D** icon.

3 Select the **Ranges** tab card and disable the options **Include the reference image when saving ranges or curved cuts** and **Include the reference image when filming ranges or curved cuts**.

4 Click the **OK** button.

Setting up parallel ranges

If the **Constant number of images** icon is deactivated, it may occur that the **Distance between images** value will be changed by the system after clicking the **Start** button.

1 Enable the **Constant number of images** icon.

2 Set the **Distance between images** value.

3 Click the **Start** button.

4 Disable the **Constant number of images** icon and click the **Start** button again.

1.16.2 Workflow Relevant Information

Herein, you find further information on registering, positioning, and examining a patient.

The following functionalities are described in the subsequent sections:

- Patient Registration
- Patient Positioning
- Preparations
- Examination
- CARE Contrast CT

Patient Registration

On the following pages, you will find additional information on patient registration together with workarounds, if possible.



For more information on the available workarounds, refer to: (→ Page 176 *Radiology Information System (RIS)*)

Chinese and Japanese Patient Registration

When registering patients in Chinese or Japanese language, the latin alphabet without special characters (ASCII) must be used for technical reasons.

Radiology Information System (RIS)

Some manufacturers of Radiology Information Systems (RIS) do not support the **Requested Procedure Description** and **Scheduled Procedure Step Description** in the **Modality Worklist**. In these instances, no information about the kind of procedure is shown in the worklist.

- Contact your RIS manufacturer for support.

DICOM worklist

Registration by DICOM worklist provides the **Scheduled Procedure Step** description. It will be mapped to an existing scan protocol.

If mapping does not exist yet, the study item on the registration card is empty.

- Select a scan protocol now to keep the mapping in future.

Patient Positioning

On the following pages, you will find additional information on patient positioning together with workarounds, if possible.

Moving the patient table

If the error message **Table position is rejected** occurs when moving the patient table, make sure that nothing obstructs the space between gantry and patient table.

Preparations

Here you will find additional information on preparation together with workarounds, if possible.

Using API texts

After restoring the system, check the language of the API description on the **Scan** parameter card. If it is wrong, change the system language in the **Regional and Language Options** dialog box to the correct language.

1 Select **Options** > **Configuration...** to open the **Somaris/7 – Configuration Panel**.

2 Double-click the **Regional and Language Options** button in the **Somaris/7 – Configuration Panel** to open the **Regional and Language Options** dialog box.

3 Select the language you desire in the standards and formats area.

4 Click the **OK** button to confirm the new language.

5 Confirm with **OK** again to restart *syngo* with the new language.

Examination

On the following pages, you will find additional information on **Examination** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 178 *Using the HeartView demo mode*)

Creating graphical objects during scan or reconstruction

During the scan or reconstruction process, the functions Distance, Circle, ROI, Annotation, Angle, Pixel Lens, and Crosshair are unapplicable in the segment in which the new images appear. The corresponding icons are undimmed.

Cardiac sequences

For cardiac sequences, the **Examination Overview** dialog box shows the minimum duration. The effective duration depends on the heart rate of the patient.

R-peak detection

The R-peak detection functionality of CT ECG boards might not be able to handle all irregular/arrhythmic ECG curves. The reliability of the R-peak detection has to be checked after the scan on the **Trigger** parameter card carefully.

Reconstructing with Cardio BestPhase

The best phase is displayed on the **Trigger** parameter card. After the reconstruction is finished, the recon boxes will be set to the right phase.

Reconstructing multiphase images

If you reconstruct multiphase images of previous versions, it could happen that fewer images are reconstructed than shown in **No. of images**. In most cases, only the last image is concerned. In this case, the raw data has to be sent to your local service support for reconstruction.

Using the HeartView demo mode

If you select the ECG triggered scan protocols before activating the demo mode, error messages are displayed. They are displayed in the status bar when loading the topogram, e.g., that the topogram was canceled. When using the demo mode, proceed as described below to avoid that the topogram is canceled.

1 Register the patient.

2 Select **Options** > **Heartview** > **Demomode**, and click the **Apply** button and the **OK** button to switch on the demo mode.

The demo mode is not activated immediately. You will be informed about the status of the demo mode on the **Trigger** subtask card.

3 Select the scan protocol.

Reconstructing with kernel B26

The performance of the Advanced Smoothing Algorithm with kernel B26 is reduced for reconstructed FoVs smaller than 180 mm.

- Use a FoV larger than 180 mm for a reconstruction with kernel B26 to reduce image noise.

Mapping of examined body parts in the dose report

The **Body part examined** list on the **Auto Tasking** parameter card is filtered and mapped to the entries in the dose report. The **Body part examined list** in the **Scan Protocol Assistant** is not filtered. All entries that are additional to those on the **Auto Tasking** parameter card are mapped to **Whole Body** in the dose report.

- To ensure correct mapping, select the body part on the **Auto Tasking** parameter card.

CARE Contrast CT

On the following pages, you will find additional information on CARE Contrast CT together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 179 *Restarting the system using a MEDRAD injector*)

Restarting the system using a MEDRAD injector

After a system restart, the MEDRAD injector may not be able to communicate with the CT system. In this case, the injector icon is not displayed in the status bar.

1 Switch off the injector console.

2 Switch off the injector interface, which is labeled as ISI.

3 Switch on both the injector console and the injector interface.

After 25 seconds the injector is reconnected and the blue injector icon is displayed in the status bar.

Restarting the system using a NEMOTO injector

After a system restart or a connection loss, the NEMOTO injector may not be able to communicate with the CT system. In this case, the injector icon is not displayed in the status bar.

1 Switch off the injector console.

2 Switch off the injector interface.

3 Switch on both the injector console and the injector interface.

After a few seconds, the injector is reconnected and the blue injector icon is displayed in the status bar.

1.16.3 Reporting

On the following pages, you will find additional information on reporting together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 180 *Opening reports*)

Opening the SR Viewer

If you call up the SR Viewer for data sets created by **Calcium Scoring**, **Circulation**, **LungCARE**, or **Oncology**, automatically the associated style sheet is used. For other data sets, the SR Viewer uses a generic style sheet.

Modifying flags

If a field (flag) has been modified, select another field with the cursor before saving. Otherwise, the changes will not be saved.

Opening reports

- Double-click the report in the **Patient Browser** to open it.

If you double-click a series, the series may be loaded into the active task card application.

Importing images

In the report configuration only logos with three letter file extensions (*.jpg, *.png and *.bmp) can be imported. Logos with the file extension *.jpeg cannot be imported.

- Rename *.jpeg files accordingly before importing them.

Printing Structured Reports (SR)

It is not recommended to use the **File** > **Export** > **PDF** menu entry to print out structured reports in the SR Viewer.

- Select **File** > **Print...** from the main menu.

1.16.4 Storing and Networking

On the following pages, you will find additional information on storing and networking together with workarounds, if possible.

For more information on the available workarounds, refer to: (→ Page 182 *Sending a report to a network node*)

Transferring data to a non-*syngo* system

If you transfer data sets from a *syngo* to a non-*syngo* remote node, information that had been added to the data in **Viewing** may not be displayed on the non-*syngo* system.

Import from DVD

The import of data from a DVD may be slower than from CD-R if the DVD is filled only with a few data. When saving small volumes of data, it is recommended to use a CD-R. If the DVD is filled up with more data than the capacity of a CD-R, the import performance of a DVD is good, too.

Exporting images

For reasons of data protection, it is recommended not to create folders under the patient name in offline directories when exporting images.

Sending lossy compressed images to a network node

If lossy compressed images are sent to a network node, and the same instances are already stored uncompressed on that network node, the newly sent images will appear as duplicates in the database.

Archiving data

The saving of patient and examination data to local exchangeable data media via the **Archive to...** function is not possible anymore. It is still possible to save data to a data medium with the **Export to...** function.

Loading patients from PACS

If you load another patient from PACS, you have to wait until the first loading process has been finished. Meanwhile, you can choose **stop import**.

It is not possible to select another patient for retrieving (importing). Also it is not possible to select two or more patients for importing at once.

Storage commitment

Storage Commitment within a standard *syngo* configuration means storage on a hard disk.

Be aware of the fact that any end user can delete these objects.

Sending data to a network node

Avoid using duplicated node names during network configuration.

Sending or exporting data to DICOM node

When sending or exporting new large series (> 2000 images), and the series remains selected in the **Patient Browser**, the system can freeze for 5 s to 20 s. To avoid this, the study or the patient has to be selected in the **Patient Browser**. It is not sufficient to close the **Patient Browser**.

Transfer of compressed images

With fast network connections, the transfer of compressed images takes significantly longer than uncompressed. To assure full performance, you can deactivate the image compression.

Restarting an application

Before restarting an application while an **Archnet** job is active, delete the completed jobs in the **Local Job Status** dialog box.

Restrictions related to DVD-R

Note the following restrictions:

- Maximum number of sessions is limited to 30.
- The time of finalizing a DVD depends on the amount of data on the DVD. If the amount of essential data is less than 1 GB, the time to finalize may be several minutes.

Sending a report to a network node

If you send an SR-series to network node with images copied to the report before, it may occur that the images are not transferred.

- Also send the series including the images copied to report, to display the report correctly.

Importing images

If you try to import more than 10 000 images via DICOM, the import job is aborted. A misleading message is displayed in the status bar that the network job has been completed successfully. But if you look in the history of the status bar, you can see that the network job was aborted.

1 Do not import more than 10 000 images at the same time.

2 Check the history of the status bar to ensure that all images have been imported.

3 Import the missing images, if necessary.

CD Burn

When selecting **Record Off-line Files** to export images from the **Patient Browser** to CD a dialog box pops up asking for the label although **Record Off-line Files** is running. The CD is invalid after starting the export jobs and the files from the **CDBurn** folder are removed, but not burned.

1 Make sure that no other processes are accessing to the CD drive, e.g., burning patient data automatically on CD.

2 Do not start DICOM export to CD when **Record Off-line Files** is used.

The process of burning offline data takes time. When the process is finished, a message appears in the status bar.

Chinese characters in patient names

The patient name is omitted in the naming of the exported file if the patient name contains Chinese characters and the images acquired with a former software version are exported via **Export to offline**.

1 Export a single patient only.

2 Select **Options** > **File Browser** from the main menu to open the **File Browser**.

3 Create a file folder as target folder for exported files to identify clearly the exported file.

4 Correct the patient name in the offline directory immediately.

Exporting data in a new directory

It can happen, that it is not possible to export data to offline into a newly created directory.

- Reboot the system.

  After reboot, the directory can be created and the images will be exported into this directory.

Exporting data before intervention examinations

Export jobs to DVD/CD which are started before an intervention examination may fail. They cannot be restarted from the **Local Job Status** dialog box.

- Perform a new export job after finishing the intervention examination.

No Medium inserted before auto job transfer

After an auto job transfer to DVD/CD was started when no medium was inserted, the **No Medium** dialog box pops up. The **Eject** buttons are dimmed.

1 Press the hardware button to open the DVD/CD drive.

2 Click the **OK** button in the **No Medium** dialog box.

Do not click the **Cancel** button because the job will go into error state.

Burning in Multisession mode

In Multisession mode, if you click the **Cancel** button in the **Medium full** dialog box, the job goes to failed state.

- Insert a new writeable CD and restart.

1.16.5 Applications

In this chapter, you will find further information on using the applications.

If you open any application while scanning, an error message may be shown which recommends to reboot the system. Although the application will not open, rebooting is not required. This behavior is intended not to disturb scanning.

While scanning, do not open applications on the *syngo* Acquisition Workplace.

The following functionalities are described in the subsequent sections:

- (→ Page 184 *syngo CaScoring*)
- (→ Page 185 *syngo InSpace 4D CT*)
- (→ Page 188 *syngo LungCARE CT*)
- (→ Page 189 *syngo Pulmo CT*)
- (→ Page 189 *syngo Circulation*)
- (→ Page 191 *syngo Dental CT*)
- (→ Page 191 *syngo Dual Energy*)
- (→ Page 192 *syngo Dynamic Evaluation*)
- (→ Page 192 *syngo Colonography CT*)
- (→ Page 193 *syngo Volume Perfusion CT – Neuro*)
- (→ Page 193 *syngo Volume Perfusion CT – Body*)

syngo CaScoring

On the following pages, you will find additional information on *syngo* **CaScoring** together with workarounds, if possible.



For more information on the available workarounds, refer to: (→ Page 185 *Changing Export Option*)

3D Edit

When using **3D Edit**, the **Sliding MIP Thickness** should only be changed in the dialog, not graphically in the lower left segment.

PROCAM risk calculation

The PROCAM risk calculation for men is based on the algorithm described in "International Task Force for Prevention of Coronary Heart Disease, Pocket Guide to Prevention of Coronary Heart Disease, Boerm Bruckmeier Verlag GmbH, 2003".

For women, newer statistical data is available. The absolute risk shows a ratio men : women = 4:1. In case of diabetes the ratio is 1:1. The PROCAM algorithm for women is implemented accordingly.

Reference: "Arzneimittelkommission der deutschen Aerzteschaft: Arterielle Hypertonie, 2. Auflage. Arzneiverordnung in der Praxis, 2004"

Limitations of DICOM structured reports

The PROCAM and the Framingham risk score and the corresponding additional risk factors are not included in the Dicom SR.

For safety reasons, results that are based on user-defined calibration factors, are not included in the Dicom structured report. (If the HU threshold is selected, the calcium mass is not exported, if the density threshold is selected, the **Calcium Scoring** results are not exported.)

Scoring in consortium mode

Scoring in consortium mode requires three calibration factors. This set of three calibration factors is not available for all scanner types. Currently, SOMATOM Definition scanners and SOMATOM Sensation (40 and 64 slice configuration) scanners are supported.

Changing Export Option

When creating a report with the List & Label software and changing the options for the export module, the application might crash and the system needs to be rebooted.

- Cancel with the **Cancel** button but never cancel this dialog with **Esc** key.

Using special characters in Report Wizard

If special country-specific characters are entered in the **Report Wizard** entry fields **History** or **Comment**, it is not possible to save the evaluation.

- Do not enter special characters in the **Report Wizard**.

Closing a patient

If you close a patient while the **Preview** window of the **Report Wizard** dialog box is still open, the **Preview** window of the next patient may still display the data of the previous patient.

- Close the **Preview** window before you close a patient.

  Otherwise the data of the previous patient may be redisplayed every time a **Preview** window is opened.

***syngo* InSpace 4D CT**

On the following pages, you will find additional information on *syngo* **InSpace 4D CT** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 187 *Changing task cards while loading*)

Loading data sets

The size of data sets for InSpace on an FX3500 graphical system without graphic acceleration (Volume Pro Hardware) is limited to 256 images. A larger number of images may lead to memory problems with the graphical device and the InSpace evaluation cannot be performed. To avoid such problems, reduce the number of images.

Deleting bookmark series

In case an **InSpace** bookmark series fails to be deleted, remove the **InSpace** bookmark instances. Once the bookmark series is empty, you will be able to delete it.

Switching to InSpace from any task card

When switching from any task card back to **InSpace**, the initial rendering of the image data might be defective. After interacting, e.g., rotating, the images will be displayed correctly.

Saving images

When saving images, in some cases the segments do not show the saved or filmed label. Nevertheless, the images are saved and filmed correctly.

Generating movies

While generating a range, input to the volume renderer is not allowed. This action is an exclusive action and it is not recommended to do anything while it is running by InSpace. Hence, if you changes the tab, InSpace stops generating the ranges.

Selecting image segments during Lung Parenchyma Analysis (LPA)

To select the image segments with tables and diagrams during LPA, click close to the segment border.

Performing Dual Energy Bone Removal

The Dual Energy Bone Removal algorithm might not work with Dual Energy data sets at 256 x 256 matrix.

Using Open Additional Volume for Parenchyma Analysis

If two volumes are loaded using the Open Additional Volume feature then the **Parenchyma** icon is disabled.

If Parenchyma is running on one volume and you try to load a second volume then you are asked to save the segmentation results. Afterwards, Parenchyma closes.

Setting trace points on a CPR

When setting trace points on a CPR, for example, to correct an already existing trace by Insert or to define a new trace by Trace, the click points will not be shown on the CPR. Nevertheless, the trace points are accepted by the application.

Changing task cards while loading

If you click another task card while loading images to the **InSpace** task card, the functionalities of the **InSpace** task card are not available.

1 Click again the task card that you have selected during the loading process.

2 Click the **InSpace** task card.

The InSpace functionalities are available again.

Bone removal

You can lower the detection threshold, if you are not satisfied with the result/behavior.

- Click **Step 1: Advanced Settings** and change the defined value.



The default detection threshold value is 175 HU. For older patients it is recommended to use lower threshold volumes, as osseous tissue in these cases might have lower HU.

Using large data sets for Bone Removal

If a very large (4D) data set is loaded, then the Bone Removal algorithm might take some time. The segments might appear black for a while before the results are displayed.

- Do not click other user interface elements until the algorithm result display finishes.

Performing a Lung Parenchyma Analysis

The Lung Parenchyma Analysis bookmark handling may disable the capability to save a report.

If your system has an FX3500 graphics card configuration, the Lung Parenchyma Analysis bookmark handling may also cause an error message saying that you have to reload a patient due to two plugins loaded at the same time.

- Ensure that the **Lung Parenchyma Analysis** dialog box is closed, while you load a patient.

Image impression of VRTs

The image impression of VRTs may differ when comparing it to older versions of InSpace.

To adjust the image impression, perform the following steps:

1 Right-click the **Advanced Lighting** icon to adjust the lighting.

2 Move the **Shading** slider to the right to increase shading.

3 Move the **Surface Enhancement** slider to the left to decrease the surface enhancement.

syngo LungCARE CT

On the following pages, you will find additional information on *syngo* **LungCARE CT** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 188 *Printing reports*)

Acquiring images for LungCare CT

LungCARE CT evaluation supports only CT images scanned with patient position “supine”.

Loading data sets

The center slice of the data set must contain the patient lung. Otherwise, automated calculations or counterpart finding may fail.

Using reports

The term **Location** in UI is the same as the term **Region** in a printed report or **Anatomic Region** in a DICOM SR report.

Printing reports

To use report templates for **LungCARE** from versions before *syngo* CT 2006G, the report templates have to be newly generated using the **Designer** dialog box.

1 Select **Options** > **Configuration** from the main menu and double-click the **Report Configuration** icon.

The **Report Configuration** dialog box opens.

2 Select **LungCare** from the **Application** selection list.

3 Click the **Select Basic Template** button.

4 Select the required template.

If a template, for example, from *syngo* CT Version B10, has been selected, an error message will be displayed. It indicates that the attributes and fields that have to be adapted.

5 Check and save the template after modification.

Changing Export Option

When creating a report with the List & Label software and changing the options for the export module the application might crash and the system needs to be rebooted.

- Never cancel this dialog with **Esc** key but cancel with the **Cancel** button.

syngo Pulmo CT

On the following pages, you will find additional information on *syngo* **Pulmo CT** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 189 *Drawing contours*)

Drawing contours

If you use the BOTH Lungside configuration, in some cases, the software finds a contour where no lung tissue is available. The left lung side is shorter than the right lung side, for example.

In such situation, when the software falsely interprets a contour as lung tissue, you cannot delete this contour explicitly. Therefore, you have to draw a small dummy contour.

- Click the **Draw Right Lung Contour** icon or the **Draw Left Lung Contour** icon and draw a dummy contour (for example, a line) into the former detected area.

syngo Circulation

On the following pages, you will find additional information on *syngo* **Circulation** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 190 *Performing a PE evaluation*)

Viewing reports

If you view reports created by older versions of **Circulation** with the DICOM SR Viewer, the layout may be displayed improperly, or the report may be displayed incomplete. A dialog box will inform you if the report is incomplete.

Loading volumes

In the **Circulation Series List** dialog box, the volumes are not sorted correctly if ms is used for reconstruction.

Keep it in mind if you do not want to load the complete range of phases.

Loading multiphase data sets

If absolute (minus) or relative (minus) reconstructed data sets are loaded to Circulation, ES and ED phases cannot be labeled automatically. Additionally, the sorting of the phases used for displaying the movie is not correct if positive and minus reconstructed data sets are loaded at the same time. If all data sets are reconstructed positive, there is no problem with labeling or with the movie.

Reconstruction of the coronaries

In the QCA function it is possible to reconstruct coronary arteries in the 3D volume by defining a path. With long coronaries and with long drawn paths in the reconstruction, the entire path is not displayed.

To see the entire path, navigate through the complete vessel. When the end of the path is reached, the "curved" window will switch to the next part of the curved view. Then it is ensured, that the complete vessel is evaluated.

Using the Heart Isolation function

The **Heart Isolation** function could lead to incorrect segmentation results if patient data was obtained with a third vendor scanner.

Setting markers

For QCA stenosis or plaque evaluation, always make sure to position boundary or reference markers (a, b) on opposite sides of the stenosis marker.

If a message box about misplacement is displayed, replace the current marker by a new marker with the boundaries set properly.

Loading Structured Reports

To use Structured Reports generated with Version Circulation 1 (VE21), load the original data set again. These results can be displayed with the SR Viewer and the Reporting functionality provided by Circulation. The old examination results can be displayed and printed there.

Using color lookup-tables

When using certain lookup-tables (CT Dual Energy (DE)), the Circulation Hybrid Results View shows black polar maps in the left column. Just the AHA 17-segment grid is visible. In this case, select an MPR segment and then pick a different lookup-table by right-clicking the color bar next to the MPR segments.

Performing a PE evaluation

In some cases (for example, if no bolus flag was set) it is necessary to change the series description of the data set to a specific form. Otherwise a Pulmonary Embolism evaluation is not possible. In such a case, you have to change the series description so it starts with the string **Tho** or with the string **Pe**.



For all the default protocols, e.g., the triple rule out protocol, this correction is not necessary.

- You first have to change the series description and then load the data set into Circulation to be able to make a PE evaluation.

Changing Export Option

When creating a report with the List & Label software and changing the options for the export module the application might crash and the system needs to be rebooted.

- Never cancel this dialog with **Esc** key but cancel with the **Cancel** button.

syngo Dental CT

On the following pages, you will find additional information on *syngo* **Dental CT** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 191 *Loading images into Dental*)

Displaying image text

In Dental, the **Customized Text** settings are interpreted as **All Text**. Therefore, if you deselect some checkboxes in the **Customized Text** settings, they will still not be displayed when you select **All Text**.

Loading images into Dental

Mouse cursor is blocked by a message box during loading of images into Dental by drag-and-drop.

- Use keyboard and press **Enter** or **Esc** to close message box.

syngo Dual Energy

On the following pages, you will find additional information on *syngo* **Circulation** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 191 *Optimizing the evaluation results*)

Improving performance

Calculation times in *syngo* Dual Energy can be reduced if the hardware has at least 6 GB of memory. You can also close other applications and terminate parallel activities like **Filming** to improve the performance.

In the **Dual Energy Configuration** dialog box, you can select the **Matrix Resolution (352 x 352)** option. Then the matrix will be reduced but the calculation time will speed up.

Optimizing the evaluation results

In some cases user interaction is necessary to obtain best results for a given set of reconstructed images.

- Use the advanced parameter dialog box to modify the standard calculation parameters, if the algorithm results are not as expected, i.e., too noisy, loss of fine details, or no visualizations of areas with exceptionally high/low CT-values.



- Increasing the parameter **Range** reduces noise.
- Fine details can be resolved by decreasing it.
- If areas of low CT-values are ignored, the threshold parameter **Minimum** should be lowered.
- If areas of high CT-values are ignored, the threshold parameter **Maximum** should be increased.

These changes will be kept until the patient is closed. Only in the configuration dialog box it is possible to change calculation parameters permanently.

More information for each application class is available in the online help.

syngo Dynamic Evaluation

Here you will find additional information on *syngo* **Dynamic Evaluation** together with workarounds, if possible.

Loading fused multi-slice images

When loading fused multi-slice images into *syngo* Dynamic Evaluation the kV value might incorrectly be displayed as zero.

syngo Colonography CT

On the following pages, you will find additional information on *syngo* **Circulation** together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 192 *Changing Export Option*)

Changing Export Option

When creating a report with the List & Label software and changing the options for the export module the application might crash and the system needs to be rebooted.

- Never cancel this dialog with **Esc** key but cancel with the **Cancel** button.

Loading data sets

With some **Colon** data sets, it can happen that the application hangs up during loading the images.

1 On the main menu, choose **Applications** > **Close Colon** to close the application.

It can take some time to close the application.

2 Select the images in the **Patient Browser** except slices 1-3 on caudal side.

3 Load the images into the **Colon** task card.

You can load the second series completely.

Loading an MR data set

- Before loading an MR data set, close *syngo* Colonography CT if a CT data set was loaded last.



Closing the application first avoids error messages when centering segments around a click point.

syngo Volume Perfusion CT – Neuro

Tilted consecutive spiral scans cannot be loaded into *syngo* Volume Perfusion CT – Neuro.

syngo Volume Perfusion CT – Body

Tilted consecutive spiral scans cannot be loaded into *syngo* Volume Perfusion CT – Body.

1.16.6 Additional Information for Operation

Here you will find additional information for operation together with workarounds, if possible.

The following functionalities are described in the subsequent sections:

- (→ Page 194 *USB devices*)
- (→ Page 195 *Online Help*)



For more information on the available workarounds, refer to: (→ Page 194 *Starting the Image Reconstruction System (IRS)*)

Changing the time settings

After changing the time and date settings, the system has to be shut down and restarted in order to ensure a correct synchronization between Image Reconstruction System (IRS) and *syngo* Acquisition Workplace.

Using the Siemens DICOM Viewer

The Siemens DICOM Viewer does not include a ROI tool. If you want to draw a ROI by using a DICOM viewer, you can download it via the following link: http://dicom.online.fr

Starting the Image Reconstruction System (IRS)

In some cases, when IRS is defective, the system may shut down immediately after start. Contact your Siemens local Customer Service.

- Disconnect IRS from Ethernet and power and restart the system to allow extraction of service relevant information from the event log.

USB devices

On the following pages, you will find additional information on USB devices together with workarounds, if possible.



For more information on the available workarounds, refer to:
(→ Page 195 *Ejecting the USB device*)

It is only possible to connect USB hard disk drives and USB flash drives, but no other devices.

Only the following types of devices are allowed:

- USB flash drives with one partition and without security features, for example, password protection
- USB hard disk drives with one partition and without security features, for example, password protection

Recommended USB hard disk drives

It is necessary to format your USB hard disk drive as NTFS file system to transfer raw data > 4 GB to your USB hard disk drive.

For more information on formatting the USB hard disk drive, refer to the Operator Manual of the **Life** task card.

Using USB devices during scanning

We do not recommend performing scans during data transfer to USB devices. Otherwise, the user interface maybe frozen while the transfer is running.

Using memory devices with enabled security features

The system does not support USB memory devices (USB flash drives, USB hard disk drives) having security features enabled (for example, password protection) and/or having multiple partitions.

The following types of devices are not allowed:

- Disk burner, for example, CD, DVD, Blu-ray
- USB floppy drives

- Cell phones
- MP3 players
- USB flash drives and hard disk drives with multiple partitions and enabled security features
- Card reader
- Printers with storing function

Do not use such devices with this system.

Ejecting the USB device



- Click the USB icon in the status bar to eject the USB device securely.

  Do not use USB devices during an examination, or unplug them in another way than mentioned above. You also should not remove the USB devices if they are busy or if you cannot remove them securely.

Exporting raw data to USB

- Use **Export to off-line...** to export raw data to the USB device.

  Do not export raw data by copy and paste, or by drag-and-drop.

  Do not start scans while exporting raw data to the USB device.

Online Help

On the following pages, you will find additional information on the Online Help together with workarounds, if possible.



For more information on the available workarounds, refer to: (→ Page 195 *Japanese installations*)

Chinese installations

If you use the **Search** function in the Chinese online help, some content may not be displayed correctly.

Japanese installations

To activate the **Search** function for Japanese installations:

- Select **Help** > **Contents and Index...** from the main menu.

1.16.7 Native Language Support

This section provides information on the native language support together with workarounds, if applicable.

Regional Settings

syngo Acquisition Workplace and *syngo* CT Workplace shall have the same regional language setting to avoid failures of automatic transfer of organ windows and film layouts.

Chinese and Japanese language

To change the language to Japanese or Chinese, contact SIEMENS Service.

The input fields do not accept Japanese or Chinese characters. Patient or examination entries are only possible using Latin characters.

2 Examination

2.1 Preparations

Before you can examine a patient with your system, register the patient. Registration means that you give your system all the information about a patient that it requires for an examination.

If a patient is admitted who is in a critical condition and must therefore be examined and treated immediately, call up emergency registration. It reduces the time before you can begin the examination to a minimum.



By default, no images will be automatically transferred to the PACS.

If you want to prepare the system to examine a patient at a later point in time, then you can preregister the patient.

For example, you can enter the data in the morning for all the patients to be examined during the day. When you want to begin an examination, simply call up this data via scheduler and edit it, if necessary. It saves time during the examinations.

The patient name is shown at the gantry display. If it is not desired to display the patient name, a service technician can modify the respective configuration.



If your system is linked to, licensed and registered for an HIS/RIS system (hospital and radiology information system), you can call up data for the patient to be examined.

When Security Package is activated, you can register a patient only if you are authorized to do so. InvokeRegistration is the privilege that allows you to open the registration form and perform registration.

The following functionalities are described in the subsequent sections:

- (→ Page 198 *Registering a Patient*)
- (→ Page 205 *Assigning Patients or Studies (Option)*)
- (→ Page 207 *Defining Examination Data*)

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

2.1.1 Registering a Patient

Before you can examine a patient with your system, register the patient. You can do that in one of the following ways:

- Entering the new patient with all the patient data
- Selecting known patients from the database

- Using scheduler for preregistered patients or patients from HIS/RIS
- Registering an emergency patient

If a current examination is not completed, a corresponding dialog box is displayed.

The following functionalities are described in the subsequent sections:

- (→ Page 200 *Registering a new patient*)
- (→ Page 202 *Searching a patient in the database*)
- (→ Page 202 *Performing an emergency registration*)
- (→ Page 204 *Performing a multi-study examination*)

Safety advice

CAUTION

The operating system may not support all characters for the received DICOM document!

The display of the name, for example, the patient name may be incomplete or misleading.

- *syngo* will not change the used characters, for example, minority characters, even if it cannot display them.
- Use other attributes for identification, if possible.

CAUTION

When working with several monitors, the patient name displayed in the folder of a task card belongs only to this task card. Any other visible task card may contain data from another patient!

Possible wrong diagnosis.

- Use patient demographics displayed in the image text for clear identification.

CAUTION

Automatic registration for compare layout is not sufficient!

Insufficient basis of diagnosis.

- Check registration and use manual registration functionality to re-adjust registration if automatic registration is not sufficient.

CAUTION

Wrong entry of patient sex or age!

Wrong basis for diagnosis.

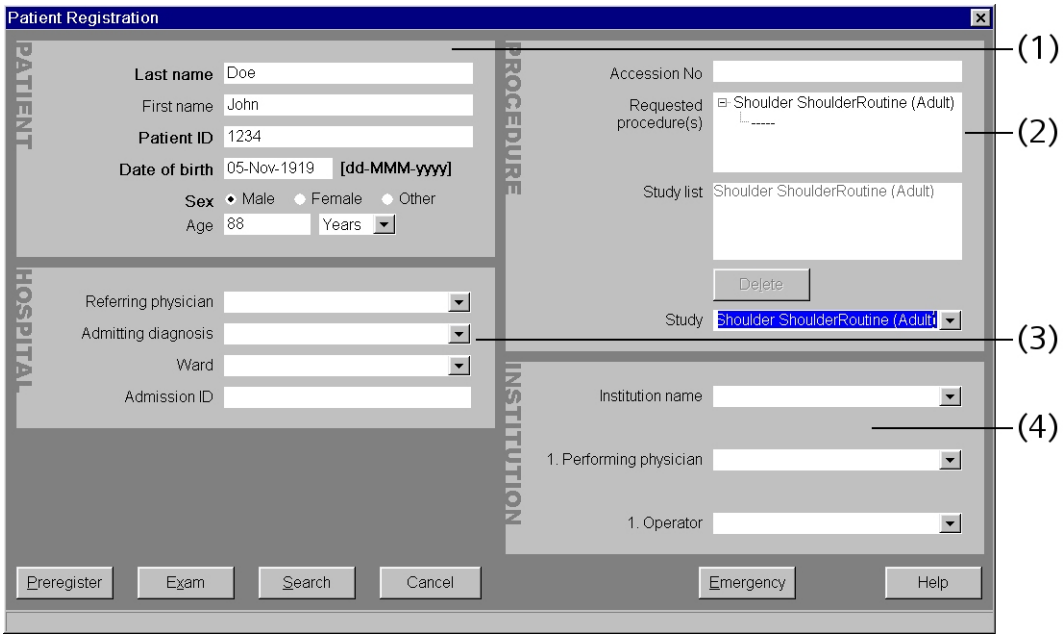
- Make sure that the patient sex and age are correct.

Registering a new patient

With the **Emergency** button in the **Patient Registration** dialog box, you can start emergency registration at any time.



1 Click the **Patient Registration** icon to open the **Patient Registration** dialog box.



(1) Personal data of the patient (PATIENT)

(2) Study-specific data (PROCEDURE)

(3) Referral data (HOSPITAL)

(4) Institution data (INSTITUTION)

2 Fill out at least the fields, which are displayed in boldface type.

3 Click the **Exam** button to examine the patient immediately.

- or -

Click the **Preregister** button.

The patient information is then saved for a later examination.

If you preregister a new patient (or there is a HIS/RIS), you only have to call up the patient data from the scheduler database when you perform the examination.

Searching a patient in the database

You can select the required patient in the **Patient Browser** and then call up the **Patient Registration** dialog box.

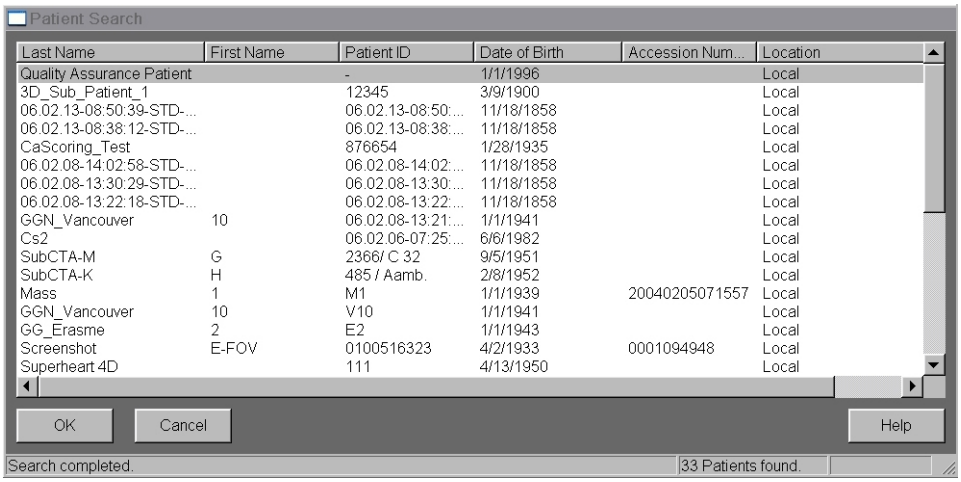


1 Click the **Patient Registration** icon in the **Patient Browser**.

2 Enter the patient data you want to search for into the corresponding entry fields.

With asterisk (*), you can speed up data entry.

3 Click the **Search** button to start a patient search in the databases.



4 Select the patient from the **Patient Search** list.

5 Click the **OK** button to accept the data.

6 Click the **Exam** button in the **Patient Registration** dialog box to examine the patient immediately.

Performing an emergency registration

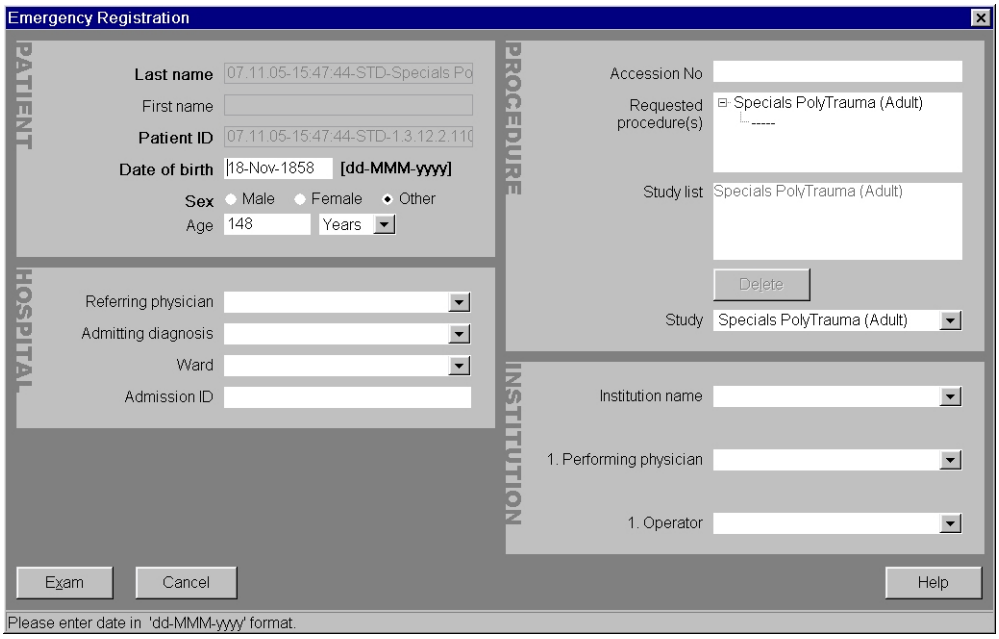
You can only change the name of an emergency patient prior to sending the corresponding MPPS to the RIS. (→ Page 345 *MPPS*)

You cannot change the name of an emergency patient before all raw data are reconstructed. By default, no images will be automatically transferred to the PACS.



1 Click the **Emergency Patient** icon in the **Patient Browser**.

2 Enter the date of birth and sex in the **Emergency Registration** dialog box.



- or -

Skip these data with the **Tab** key.

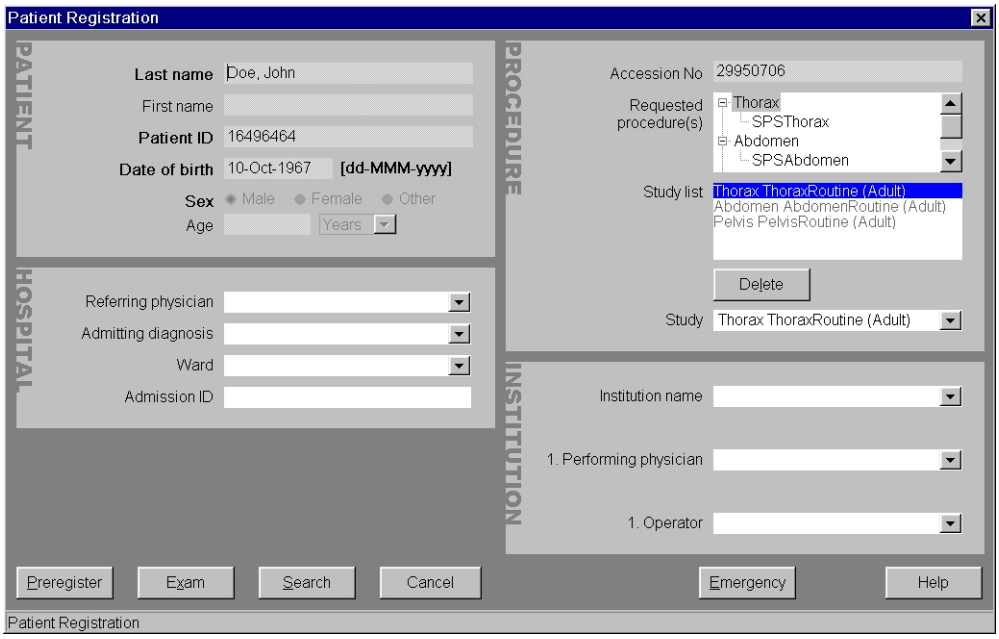
3 Click the **Exam** button.

Performing a multi-study examination

A multi-study examination is an examination based on multiple requested procedures (sent via RIS to the CT). For each requested procedure, an individual study will be created. In case of a multi-study examination, different areas, for example, thorax and abdomen, can be examined in one examination. Each individual study can be read and billed individually by different radiology departments.

1 In the **Scheduler** in the **Patient Browser**, select at least two requested procedures.

2 From the main menu, open the **Patient Registration** dialog box by selecting **Patient** > **Register**.



3 In the **Requested procedure(s)** field, select a requested procedure.

4 From the **Study** selection list, select a study.

5 Repeat these steps for all requested procedures.

The selected study is displayed in the **Study list** field and is linked to the previously selected requested procedure.

If you have already defined a combi scan-protocol, satisfying all requested procedures, only assign this single scan-protocol to the first requested procedure.

You can append additional studies that are not linked to any requested procedure. You can do so by clicking the **Add** button, which will add an empty entry "-----" into the **Study** list. You can then assign a study from the **Study** selection list.

6 Click the **Exam** button.

A preview is displayed in the tomo segment showing the assignment of recon jobs or series to the requested procedures or studies.

2.1.2 Assigning Patients or Studies (Option)

In the **Patient Registration** dialog box, you can modify the assignment of patient groups temporarily.

This information applies to users performing daily routine operations with patient data protected by the Security Package (HIPAA).

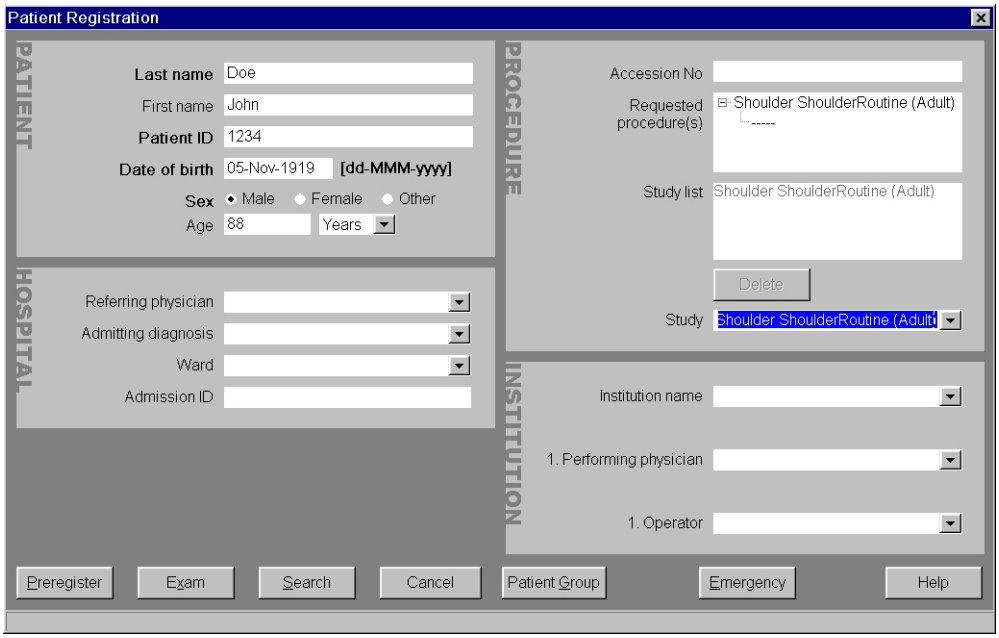
You need the privilege **Patient Registration** > **InvokeRegistration** to open the registration form and perform the registration.

Assigning new data

This modification of assignment of patient groups is valid until you log off.

1 Select **Patient** > **Register** from the main menu of any task card to call up the **Patient Registration** dialog box.

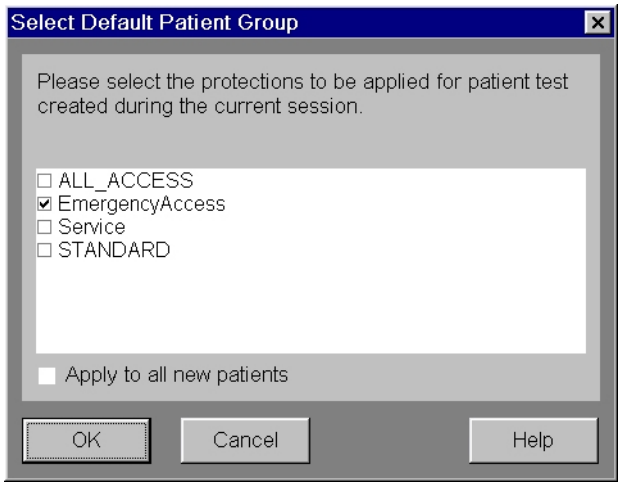
The **Patient Registration** dialog box is displayed.



2 Enter the patient data at least into the fields, which are displayed in boldface type.

3 Click the **Patient Group** button.

The **Select Default Patient Group** dialog box is displayed.



4 Check the group that you want the currently selected patient or study to be assigned to.

5 Confirm your selection with **OK**.

2.1.3 Defining Examination Data

For performance reasons, it is not recommended to set up a scan protocol containing more than 20 unscanned scan entries.

The following functionalities are described in the subsequent sections:

- (→ Page 208 *Calling up the Patient Model Dialog*)
- (→ Page 208 *Entering the patient examination data*)
- (→ Page 209 *Saving scan protocols*)
- (→ Page 211 *Using automatic functions*)
- (→ Page 214 *Inserting a control scan*)
- (→ Page 214 *Deleting an examination step*)
- (→ Page 214 *Moving an examination step*)

- (→ Page 214 *Copying an examination step*)
- (→ Page 214 *Repeating an examination step*)

Calling up the Patient Model Dialog

You can define the examination data in the **Patient Model Dialog**.

- Click the **Exam** button in the **Patient Registration** dialog box to call up the **Patient Model Dialog**.

Entering the patient examination data

The protocols are grouped by body regions. Further protocols are grouped in various categories: Dual Energy, Cardiac, Vascular, RT, Specials, or Private (depending on the available licenses).

Siemens default scan protocols provide an optimized set of parameters balancing image quality, scan time, and patient dose. They are defined to be applied directly to your examination after minor adaptions of, for example, the language of the Automatic Patient Instructions. Special clinical conditions and applications may require the adaption of the default recommendations. As the final diagnosis is the sole responsibility of the user, the user always has to make sure that the chosen scan protocol meets the requirements of the examination.

Safety advice

CAUTION

Wrong entry of patient position!

Wrong basis for diagnosis.

- Make sure that you enter the patient position correctly.

CAUTION

Wrong labeling of the sides when the patient is repositioned!

Operative intervention on the wrong side or other serious consequences.

- When the patient is repositioned, patient orientation must be corrected.

✓ If the local service established a configured *syngo*.via node on your CT system, the *syngo*.via icon as well as the **Workflow** field are displayed in the **Patient Model Dialog**.

1 Select the set of scan protocols by checking **Adult** or **Child**.

2 Select the desired scan protocol by moving the mouse cursor over the anatomical region you want to examine or to the non-anatomical regions on the right.

3 Select the protocol in the displayed selection list.

If a *syngo*.via workflow was defined for the selected scan protocol in the **Scan Protocol Assistant**, the defined workflow is displayed in the **Workflow** field of the **Patient Model Dialog**. To define a *syngo*.via workflow for a scan protocol, see (→ Page 362 *Mapping syngo.via workflow*).

4 Confirm the patient position.

5 Select if and how reference lines are applied to all tomogram recon jobs of the scan.

6 Select the API language.

7 Confirm your entries with the **OK** button.

Saving scan protocols

To handle and edit all changeable and visible parameters of scan protocols, you can use the Scan Protocol Assistant.
(→ Page 352 *Scan Protocol Assistant*)

1 Select **Edit** > **Save Scan Protocol** from the main menu whenever you want to save scan protocols during the examination.

Thus you can use the modifications of the protocol for future examinations.

If password protection is activated in the **Local Service** configuration, the **Save Scan Protocol** dialog box opens. See (→ Page 210 *Activating password protection*). Enter the configured password. Otherwise the scan protocol cannot be saved.

2 Enter the file name in the **File name** entry field.

It is important that you use only the following characters when entering the file name:

- Capitals: ABCDEFGHIJKLMNOPQRSTUVWXYZ
- Lower case letters: abcdefghijklmnopqrstuvwxyz
- Numbers: 0123456789
- Special characters: _

Don't use country-specific characters, or currency symbols, for example the Euro symbol, or blanks.

Don't change the directory path.

Saving a scan protocol is not possible when the **Dose Alert** notice window appears. (→ Page 420 *Handling the Dose Notification*)

Activating password protection

You can activate password protection to allow only authorized persons to save changes of a scan protocol.

By default, password protection is deactivated.

1 In the main menu choose **Options** > **Service** > **Local Service...** to open the **Local Service** configuration.

The **Authentication** window is displayed.

2 Delete all entries from the entry fields.

3 Click **OK**.

The **Service Software** window is displayed.

4 Click the **Configuration** button.

5 Select the **Application** option.

6 In the field **Scan Protocol Password**, enter a password.

7 Repeat the password in the field below.

8 Click **Save**.

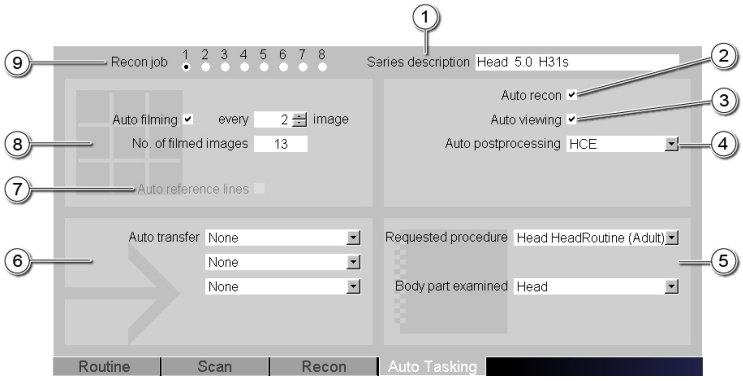
Password protection is activated. When saving a scan protocol, you must enter the configured password.

Using automatic functions

Your system provides several automatic functions for routine examinations:

- Automatic processing of consecutive acquisitions (**Auto Range**): Auto ranges are marked by brackets in the chronicle.
- Time-saving Real Time Display reconstruction of the images simultaneous with scanning (**RTD**)
- Automatic patient instruction system (API): This function is active if a patient instruction is selected on the **Scan** parameter card and the **API** icon is switched on.
- Automatic transferring of topograms and all images after reconstruction and automatic transferring of images and data to other applications for each Recon job (**Auto Tasking** parameter card)

You can make the following settings on the **Auto Tasking** parameter card.



(1) **Series description** for Auto Tasking definition

(2) **Auto recon**

(3) Automatic loading into **Viewing**

(4) **Auto postprocessing** functions

(5) **Requested procedure** and **Body part examined**

(6) Settings for automatic data transfer

(7) **Auto reference lines** for topograms or reference images

(8) Settings for automatic filming

(9) Selected **Recon job**

The length of the series description is limited to a maximum of 64 characters.

In case the range name contains an asterisk, equals sign, backslash or caret, the symbols are replaced by blanks in the series description.

If your local service established FastTransfer nodes (*syngo*.via, *syngo* WebSpace or MM WP), you can select one of these nodes in the **Auto transfer** area. The data transfer is performed for this node via FastTransfer. If the transfer is failing, DICOM transfer is used automatically instead.

If you select a configured *syngo*.via node from the **Auto transfer** selection list, the corresponding **Workflow** and **Data role** defined in the **Scan Protocol Assistant** will be displayed on the parameter card. See (→ Page 362 *Mapping syngo.via workflow*).

Defining API texts and languages

When API is switched on, sequence scans, except Adaptive Cardio Sequences, are automatically clustered according to the breathhold time which was entered in the **Examination Configuration** dialog box. The delay time covers the message time and can be increased accordingly.

1 Select **Setup** > **API / Comment** from the main menu to open the **API / Comment Setup** dialog box.

2 Select **New Entry** in the **API** selection list to define a new text.

3 Select **New Entry** in the **Language** selection list to define a new language.

Your text and language selection is transferred to the corresponding parameter cards.

You can also sort the languages by using the **Sort** button and pressing the **Move up** or **Move down** icon.

You can change the API language for unscanned ranges of the examination only in the **Patient Model Dialog**. If the system is ready for scanning, the **Patient Model Dialog** icon is dimmed. You have to cancel the scan to activate the icon to be able to change the language.

The API volume at the operator console can be changed with the **API User Console** slider. Additionally, you can change the noise suppression by using the corresponding slider.

Inserting a control scan

Memos and contrast medium pauses are inserted in the chronicle analogously.



Memos are reminders in the scan protocol, which are given during an examination.

1 Select the step of your scan protocol to be preceded by a control scan, for example, spiral and sequence scan.

2 Select the **Control Scan** menu entry from the context menu of the chronicle.

Now a control scan is included in the chronicle.

Deleting an examination step

1 Select the step in the chronicle.

2 Select the **Cut** menu entry from the context menu of the chronicle.

The selected examination step is deleted from the chronicle.

Moving an examination step

If you want to append the examination step at the end of the scan protocol, no entry should be selected in the chronicle.

1 Cut the step that you want to move.

2 Select the step in the chronicle to be preceded by the step you cut.

3 Select the **Paste** menu entry from the context menu of the chronicle.

Copying an examination step

1 Select the step that you want to copy.

2 Select the **Copy** menu entry from the context menu of the chronicle.

3 Select the step in the chronicle to be preceded by the step you copied.

4 Select the **Paste** menu entry from the context menu of the chronicle to insert the examination step.

Repeating an examination step

1 Select the step in the chronicle that you want to repeat.

2 Select the **Repeat** menu entry from the context menu of the chronicle.

In the chronicle, the same examination step is inserted after the selected step, or after the last scanned entry.

2.2 Scan

If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key afterwards.

In the chronicle. you may see a delay which is inserted between the scan ranges. The delays are automatically added to keep the X-ray tube from overheating. If the actual tube temperature after a scan is lower than that anticipated, the system will remove the delay before the next scan. This can occur, for example, because of a pause in between.

The following functionalities are described in the subsequent sections:

- (→ Page 216 *Acquiring a Topogram*)
- (→ Page 220 *Planning an Examination*)
- (→ Page 227 *Acquiring a Sequence*)
- (→ Page 232 *Acquiring a Multiscan*)
- (→ Page 233 *Acquiring a Spiral*)
- (→ Page 237 *Acquiring an Adaptive 4D Spiral*)
- (→ Page 241 *Acquiring a Single Source Dual Energy scan*)
- (→ Page 243 *Creating a Patient Protocol*)

syngo offers many possibilities to optimize the dose applied to a patient. For more information, see (→ Page 377 *Dose management and optimization*).

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

Safety advice

CAUTION

Scanning patients with implanted devices such as pacemakers or neuro stimulators!

Interferences may cause malfunctions of the implanted device.

- Observe the patient closely during examination.

CAUTION

Native Windows configuration dialog box does not disappear while radiation is started. The dialog box remains visible, as it is a dialog box displayed by "Windows" and not a *syngo* dialog box!

This may cause confusion.

- Avoid opening this dialog box while radiation can be applied. The computer and the *syngo* system should never be configured during an acquisition.

CAUTION

Superimposition by subfunctions (for example, SOMATOM life)!

Scan parameters are superimposed. Dose not as desired.

- Close subfunctions before scan start.

2.2.1 Acquiring a Topogram

The following functionalities are described in the subsequent sections:

- (→ Page 217 *Checking the topogram parameters*)
- (→ Page 217 *Starting the topogram scan*)

Checking the topogram parameters

If necessary, you can correct the **Topogram length**, and **Tube position**.

CAUTION

Scan abort due to wrong table speed scanning heavy load patients!

Additional dose of radiation.

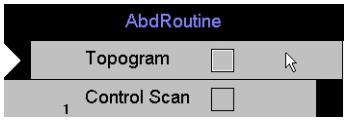
- Do not ignore warning messages about patient weight.
- Make sure to use only appropriate protocols.

CAUTION

Insufficient image information for RT planning caused by misaligned gantry tilt requires new CT scan after quality assurance!

Additional dose of radiation.

- Please check gantry tilt accuracy regularly according to this manual and national quality assurance regulations.
- In case of misalignment, please contact the Siemens customer service.



Starting the topogram scan

1 Select the topogram step of your scan protocol in the chronicle.

2 Check the topogram parameters set on the **Routine** parameter card.

If you have a scan room door observation, a yellow message bubble is displayed after you have loaded the scan protocol, and the door of the examination room is not closed.

When gantry tilt is not zero the message bubble **Press move to tilt** appears. You have to press **Move** or use the control panel to set the tilt to zero.

A transparent blue shutter is displayed on the topogram, which indicates the available FoV. It is shown when the corresponding tomogram scan entry is selected.

The area where image quality prevails is inside the blue shutter, and needs to be kept in mind for patient positioning:

- Head and UHR/zUHR: The blue shutter in the resulting topogram indicates the part that cannot be reconstructed.

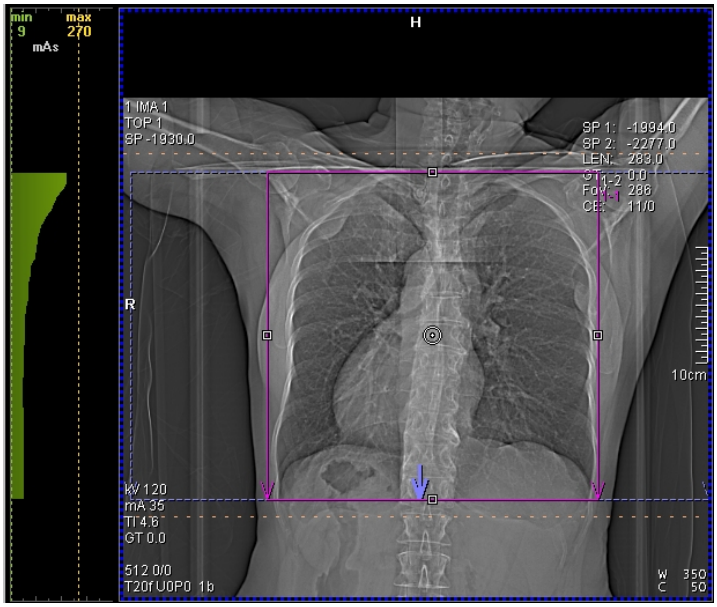
To achieve the required images, it is necessary to position the patient correctly.

1 Click the **Load** button to confirm the scan parameters.



2 Press the **START** key on the control box.

The topogram and the **CARE Profile** are displayed in the upper left segment of the **Examination** task card.



The **CARE Profile** shows the distribution of the dose to be applied along the z-axis of the patient for the selected scan range.

In the topogram, two dashed orange lines are displayed. These lines delimitate the area in which the patient may be exposed to radiation for the tomogram scan.

The topogram is displayed in real time. You can stop the scan with the **Suspend** button as soon as enough data is acquired.



3 On the **Routine** parameter card, adjust the table position stepwise, if necessary.

You have to pay special attention while moving the patient table to avoid any risk of injury to the patient.

2.2.2 Planning an Examination

When examining a patient, you have to perform the following workflow steps:

- Scan a topogram
- Plan scan and reconstruction jobs
- Scan a tomogram

syngo offers many possibilities to optimize the dose applied to a patient. For more information, see (→ Page 377 *Dose management and optimization*).

The following functionalities are described in the subsequent sections:

- (→ Page 221 *Using recon planning for spirals*)
- (→ Page 224 *Using scan planning for spirals*)
- (→ Page 225 *Using scan/recon planning for other scan modes*)
- (→ Page 226 *Performing a multi-study examination*)

There are two recon and scan planning modes, one for spirals and one for the other scan modes.

Safety advice

CAUTION

Wrong start delay!

X-ray not or only partially usable.

- For acquisition with contrast medium, select the flooding time of the contrast medium as the delay.

CAUTION

Artifacts affecting the diagnosis are evident or suspected in a patient image, or the patient may have moved during scanning!

Improper diagnosis possible.

- Scanning must, under all circumstances, be repeated with a slight shift in patient position.

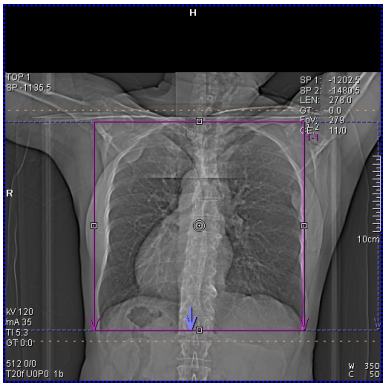
Using recon planning for spirals

You can plan and store different scan and reconstruction ranges for spiral examination directly after scanning the topogram, before scanning the tomogram.

After scanning the topogram, the recon planning is active whenever a recon job is selected. The recon range frame in the topo segment is displayed in magenta.

Recon planning before scanning allows you to do the following procedures:

- Plan and scan adjoining, overlapping recon ranges, and recon ranges with gaps in-between
- Predefine adjoining recon ranges, in one scan, for example, thorax and abdomen



The ranges are indicated as follows:

- Scan range in blue, blue dotted during recon planning
- Recon range in magenta

Detecting regions

FAST Planning positions the recon range and the scan range on regions specified in the scan protocol. After acquiring a topogram, you can detect further regions.

1 Select the **Recon** parameter card.

2 From the **Recon Region** drop-down list, select another region to be detected.

3 Select **Wide** to include soft tissue.

- or -

Select **Narrow** if you do not want soft tissue included.

The recon range is adapted.

Only for head examinations: If the head is not in the ISO center when loading the head range, you are prompted to move the patient table to achieve best image quality.

Only for head examinations:The FoV is adjusted to at least 200 mm.

Adapting FoV manually

1 Select the recon job using the **Recon** icon in the chronicle.

2 Check in the topo segment whether the position of the FoV in the tomogram is correct. If not, move the center.

3 Change the size of the FoV with the side handles to keep the manually adapted FoV.

When to FoV is adapted, the entry in the **Recon Region** drop-down list is set to None.

Performing the recon planning

Recon range planning is possible on selected parameter cards (**Routine**, **Recon**, **Auto Tasking**, **Intervention**, or **Trigger**), except for the **Scan** parameter card.

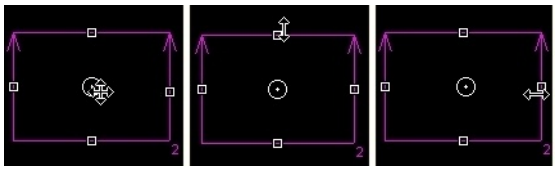
If a recon range manipulation causes one or more axial gaps, a message box is displayed informing you about it. This message box is displayed after saving a scan protocol or pressing the **LOAD** button.

The FoV is inherited if the recon jobs have the same FoV and center position, irrespective of their beginning or end position.

The recon jobs of a scan range define the length of the scan range. You can modify the length by the recon jobs. Resizing the scan range is possible with recon planning.

1 Select the recon job in the chronicle you want to edit.

2 Move the range or the cutlines by dragging the center.



3 Modify the length of the range by dragging one of the handles (upper/lower handle - range begin/end position handles) or the FoV of the range (side handles).

4 Set the tilt by grabbing and tilting a corner of the range in a lateral topogram.

5 To avoid modifications of the following ranges with the same FoV and the same center position, use the **Shift** key.

The parameters defining the reconstruction area are passed on from one recon job to another. The scan range size is adapted corresponding to the applied recon range operation.

6 Perform the spiral and subsequent reconstructions in the usual way. For how to proceed: (→ Page 235 *Performing spiral acquisition*)

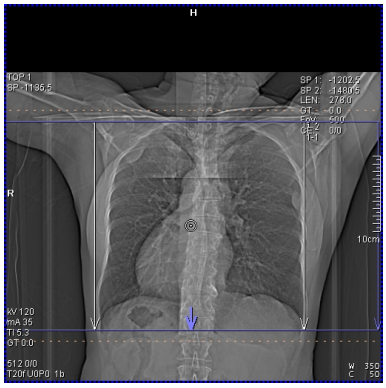
7 Select **Edit** > **Save Scan Protocol** in the main menu whenever you want to save the current scan protocols during the examination.

The scan protocol is saved. For more information, refer to: (→ Page 209 *Saving scan protocols*)

You can view the scan protocols and edit their parameters in the **Scan Protocol Assistant**.

Using scan planning for spirals

Scan range planning is possible on the **Scan** parameter card.



The ranges are indicated as follows:

- Scan range in blue
- Deselected scan ranges in gray
- Recon ranges in white

The scan range contains the recon ranges of the current scan. The chronicle entry is surrounded by a blue selection rectangle.

You cannot resize a scan range; you can move the scan range only vertically. You cannot adapt the FoV during the scan planning. You cannot tilt a scan range.

If you move a scan range, all recon ranges inside this scan range are moved.

When planning spiral scan ranges with very low pitch, e.g., Respiratory scans, it may happen that the recon range frame can only be moved in short steps in the topogram image. In that case, select the **Scan** parameter card before moving the scan range frame to the desired position in the topogram image directly.

Using scan/recon planning for other scan modes

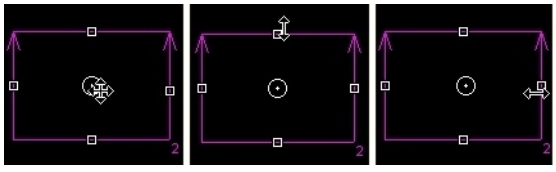
You can plan and store different scan and reconstruction ranges for examination directly after scanning the topogram.

The recon ranges always have the same length as the scan range, but the FoV of different recon ranges may differ. No partial or bordering recon ranges are possible before the scan was executed.

Performing the scan/recon planning

1 Select the scan/recon range in the chronicle you want to edit.

2 Move the range or the cutlines by dragging the center.



3 Modify the length of the range by dragging one of the handles (upper/lower handle - range begin/end position handles) or the FoV of the range (side handles).

The maximum scan range of the system must not be limited in Radiation Therapy Planning mode.



4 Set the gantry tilt by grabbing and tilting a corner of the range in a lateral topogram.

5 To avoid modifications of the following ranges with the same FoV and the same center position, use the **Shift** key.

The parameters defining the reconstruction area are passed on from one recon job to another. The scan range size is adapted corresponding to the applied recon range operation.

6 Perform the spiral and subsequent reconstructions in the usual way. For how to proceed: (→ Page 230 *Performing a sequence scan*)



When you plan a sequence with more than one scan without table feed, a message box appears to confirm this scan plan.



Whenever you want to save the current scan protocols during the examination, you can select **Edit** > **Save Scan Protocol** in the main menu. (→ Page 209 *Saving scan protocols*)

Saving a scan protocol is not possible when the **Dose Alert** message box appears. (→ Page 420 *Handling the Dose Notification*)



You can view the scan protocol and edit its parameters in the **Scan Protocol Assistant**.

Performing a multi-study examination

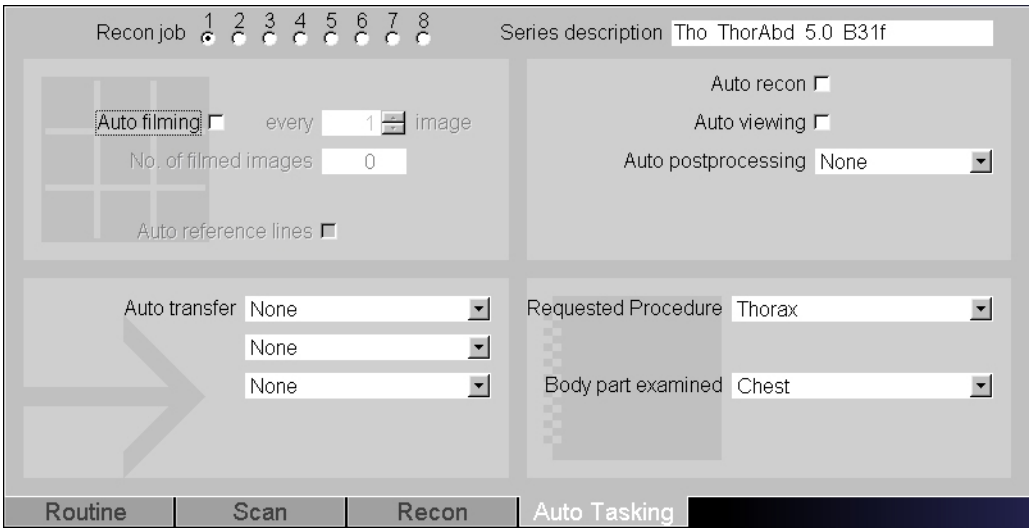
A multi-study examination consists of multiple requested procedures (sent via RIS to the CT). In case of a multi-study examination, different areas, for example, thorax and abdomen, can be examined in one examination. Each individual study can be read and billed individually by different radiology departments.

1 In the **Scheduler** in the **Patient Browser**, select a patient with at least two requested procedures.

2 From the main menu, select **Patient** > **Register** to open the **Patient Registration** dialog box and to register the patient.

3 Select a scan protocol.

4 Click the **Auto Tasking** parameter card.



5 In the **Requested Procedure** selection list, select the corresponding area separately for all recon jobs.

A preview of the expected examination results is updated in the tomo segment.

6 Perform the examination in the usual way. For how to proceed: (→ Page 235 *Performing spiral acquisition*)

The multiple studies are shown in the **Patient Browser**.

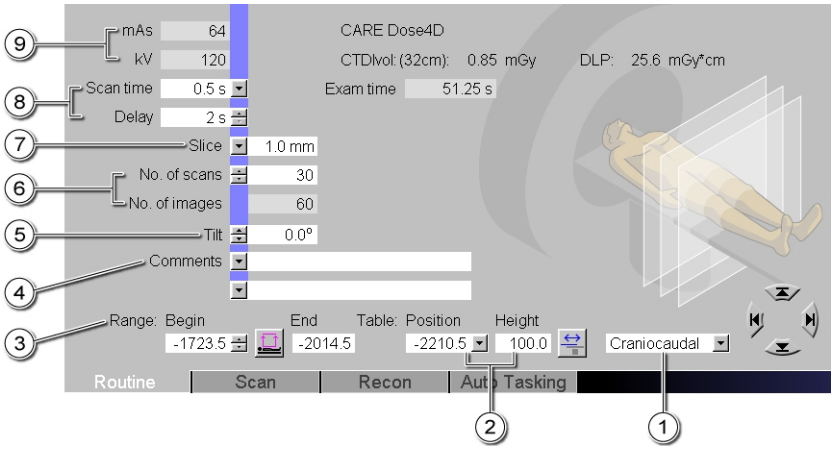


2.2.3 Acquiring a Sequence

The following functionalities are described in the subsequent sections:

- (→ Page 228 *Checking parameter settings*)
- (→ Page 230 *Performing a sequence scan*)
- (→ Page 231 *Canceling in an emergency*)

Checking parameter settings



(1) Examination direction

(2) Table position (horizontal/vertical)

(3) Examination range

(4) Comment lines

(5) Gantry tilt (optional)

(6) Number of scans and images

(7) Slice thickness

(8) Time settings

(9) Radiation parameters

The **Scan** parameter card contains further parameter settings for scanning.

CAUTION

Wrong entries!

Dose not as desired.

- Check scan parameters before scanning.

- On the **Routine** parameter card, check the default scan parameters, and adapt them if necessary.

Certain modes of operation allow selections of scan parameters that may lead to a peripheral $CTDI_{100}$ of more than 1 Gy. This dose may exceed the threshold for deterministic radiation effects on the patient's skin or eye lenses. For information on dose reduction techniques, see: (→ Page 377 *Dose management and optimization*). For general dose information on the CT system, see: *System Owner Manual*.

Optimizing the applied dose with CARE Dose4D and CARE kV

CARE Dose4D calculates optimized scan parameters from attenuation data of the topogram.

CARE kV optimizes the applied dose for the defined image quality level, and reduces influences due to technical limits of the system. To achieve this, **CARE kV** adapts the tube voltage and the tube current.

CAUTION

mA proposal of CARE Dose not adequate due to wrong attenuation data from topogram!

X-ray not or only partially usable.

- Check plausibility of the automatically selected scan parameters before scanning.

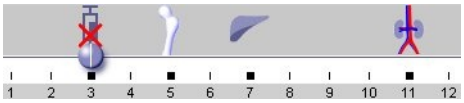
1 Select the **Scan** parameter card.

2 Select **CARE Dose4D** for the current scan.

3 From the **CARE kV** drop-down list, select **On** or **Semi**.



4 Click the dose settings icon.



5 Select an examination type with the slider.

The system optimizes the dose for the defined image quality. For more information, see (→ Page 382 *Dose optimization features*).

The CARE Profile and scan parameters are yellow.

A scan parameter conflict occurred.

- See (→ Page 415 *Handling parameter conflicts*).

Performing a sequence scan

After you changed scan parameters, you must confirm the new settings with **Load** before starting the scan.

If the sequence is part of an auto range and not all ranges have been selected at least once, a parameter overview is displayed. You can display this overview manually with **View** > **Examination Overview...**.

1 Click the **Load** button to confirm the scan parameters.

As soon as you click the **Load** button, the topogram is zoomed and moved in a way that the whole planned scan range is displayed.



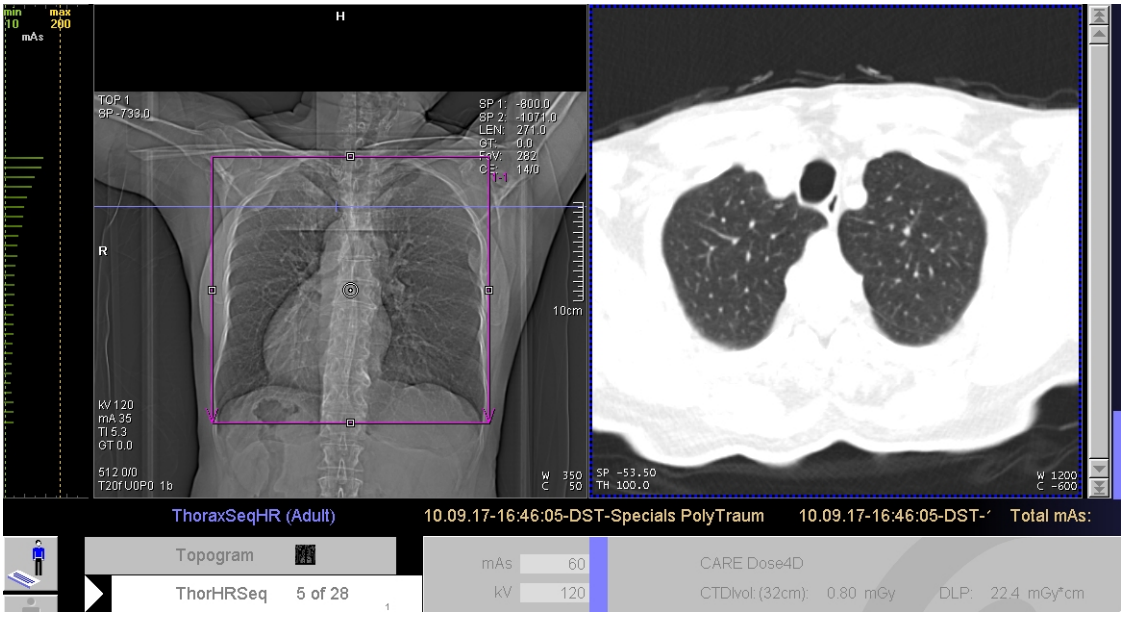
2 Press the **MOVE** key on the control box until table movement stops.

- or -

Click the **Cancel Move** button to begin the sequence at the current table position and gantry tilt.



3 Press the **START** key on the control box.



You can observe the progress of the sequence on the screen:

- In the chronicle, you can see the number of scans already acquired and the total number of scans to be performed.
- In the topogram, the current scan position is displayed.
- In the tomo segment, the calculated tomograms are displayed.

RTD (Real Time Display) images are reconstructed to observe the scan progress.

4 Reconstruct the scan series with full image quality at the end of scanning.

Canceling in an emergency

You can interrupt the scan at any time with the **Suspend** button or the **Suspend** key on the control box.

After pressing the **STOP** key while tilting, the stopping angle of the gantry can be up to 0.5°.



1 In an emergency press the **STOP** key on the control box.

Radiation is stopped immediately and the entire system is blocked. A message box is displayed.

2 Click the **Continue** button to enable the system again.

2.2.4 Acquiring a Multiscan

A Multiscan is a multiple-rotation scan without table feed. It allows reconstructions at variable points of time with the same table position.

If you want to perform Multiscan reconstruction jobs, 3D functions in the **Auto postprocessing** selection list on the **Auto Tasking** parameter card are not available.

1 On the **Routine** parameter card, check the default scan parameters, and adapt them if necessary.

Certain modes of operation allow selections of scan parameters that may lead to a peripheral $CTDI_{100}$ of more than 1 Gy. This dose may exceed the threshold for deterministic radiation effects on the patient's skin or eye lenses. For information on dose reduction techniques, see: (→ Page 377 *Dose management and optimization*). For general dose information on the CT system, see: *System Owner Manual*.

2 Perform a Multiscan and subsequent reconstructions in the usual way. (→ Page 233 *Acquiring a Spiral*)

2.2.5 Acquiring a Spiral

The following functionalities are described in the subsequent sections:

- (→ Page 233 *Checking parameter settings*)
- (→ Page 235 *Performing spiral acquisition*)
- (→ Page 231 *Canceling in an emergency*)

Checking parameter settings

Spiral scans with tilted gantry are optional.

The **Scan** parameter card contains further parameter settings for scanning.

We recommend a small relation (quotient) of **Slice Width Effective** and **Slice Width Collimated** when applied to minimized spiral scan length.

When the gantry tilt is not equal to 0, the table feed increases compared to a scan without gantry tilt.

CAUTION

Wrong entries!

Dose not as desired.

- Check scan parameters before scanning.

- On the **Routine** parameter card, check the default scan parameters, and adapt them if necessary.

Certain modes of operation allow selections of scan parameters that may lead to a peripheral $CTDI_{100}$ of more than 1 Gy. This dose may exceed the threshold for deterministic radiation effects on the patient's skin or eye lenses. For information on dose reduction techniques, see: (→ Page 377 *Dose management and optimization*). For general dose information on the CT system, see: *System Owner Manual*.

Optimizing the applied dose with CARE Dose4D and CARE kV

CARE Dose4D calculates optimized scan parameters from attenuation data of the topogram.

CARE kV optimizes the applied dose for the defined image quality level, and reduces influences due to technical limits of the system. To achieve this, **CARE kV** adapts the tube voltage and the tube current.

CAUTION

mA proposal of CARE Dose not adequate due to wrong attenuation data from topogram!

X-ray not or only partially usable.

- Check plausibility of the automatically selected scan parameters before scanning.

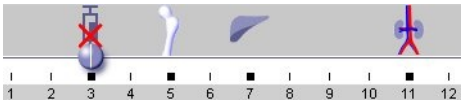
1 Select the **Scan** parameter card.

2 Select **CARE Dose4D** for the current scan.

3 From the **CARE kV** drop-down list, select **On** or **Semi**.



4 Click the dose settings icon.



5 Select an examination type with the slider.

The system optimizes the dose for the defined image quality. For more information, see (→ Page 382 *Dose optimization features*).

The CARE Profile and scan parameters are yellow.

A scan parameter conflict occurred.

- See (→ Page 415 *Handling parameter conflicts*).

Performing spiral acquisition

After you changed scan parameters, you must confirm the new settings with **Load** before starting the scan.

If the spiral is part of an auto range and not all ranges have been selected at least once, a parameter overview is displayed. You can display this overview manually with **View** > **Examination Overview...**.

1 Click the **Load** button to confirm the scan parameters.

As soon as you click the **Load** button, the topogram is zoomed and moved in a way that the whole planned scan range is displayed.



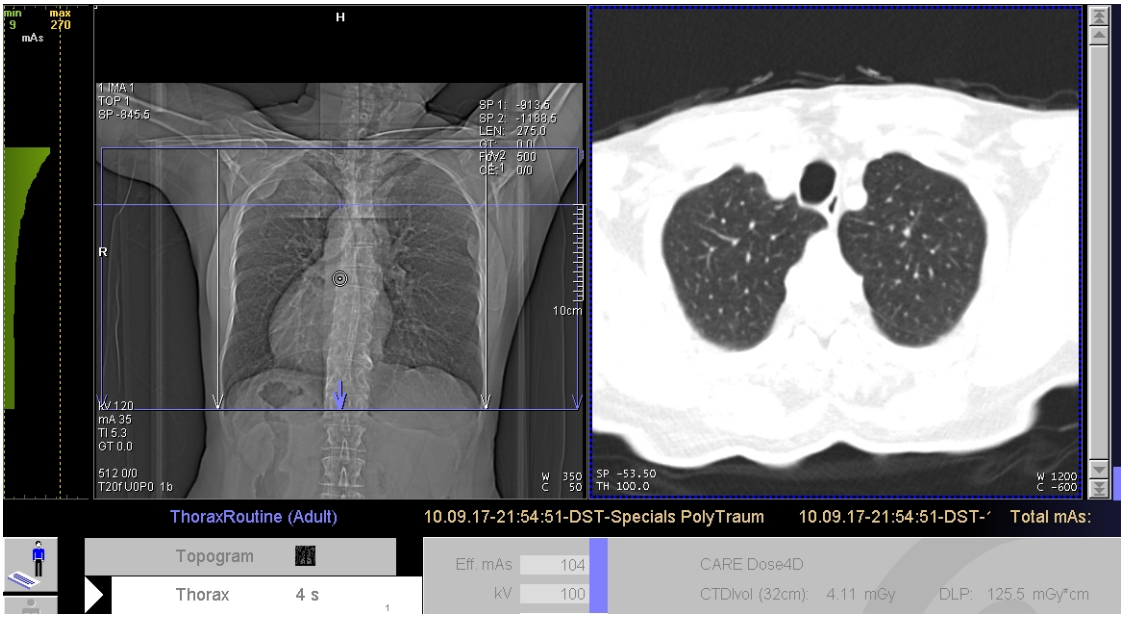
2 Press the **MOVE** key on the control box until table movement stops.

- or -

Click the **Cancel Move** button to begin the spiral at the current table position and gantry tilt.



3 Press the **START** key on the control box.



You can observe the progress of your scan on the screen:

- In the chronicle, you can see the remaining scan time.
- In the topogram, the current scan position is displayed.
- In the tomo segment, the calculated tomograms are displayed.

RTD (Real Time Display) images are reconstructed to observe the scan progress.

4 Use the **MOVE** key to move to the starting position of the next range.

5 Begin with the next scan.

- or -

Reconstruct the scan series with full image quality.

6 Conclude the examination by creating a topographic image. For how to proceed: (→ Page 245 *Reconstruction*), (→ Page 264 *Concluding an Examination*)

Canceling in an emergency

You can interrupt the scan at any time with the **Suspend** button or the **Suspend** key on the control box.

After pressing the **STOP** key while tilting, the stopping angle of the gantry can be up to 0.5°.



1 In an emergency press the **STOP** key on the control box.

Radiation is stopped immediately and the entire system is blocked. A message box is displayed.

2 Click the **Continue** button to enable the system again.

2.2.6 Acquiring an Adaptive 4D Spiral

Adaptive 4D spiral scans are spiral scans with continual table movement back and forth. They allow you to scan a volume larger than the detector length and allow image reconstruction at variable points in time. You can use it for example for measuring the extension of an infarcted area.

The following functionalities are described in the subsequent sections:

- (→ Page 237 *Checking parameter settings*)
- (→ Page 238 *Setting special parameters*)
- (→ Page 239 *Performing acquisition*)
- (→ Page 231 *Canceling in an emergency*)

Checking parameter settings

The **Scan** parameter card contains further parameter settings for scanning.

The **4D Range** entry shows the scan range length and the corresponding time. You cannot modify it graphically.

The complete examination time on the **Scan** parameter card displays more than the total scan time for the adaptive 4D spiral scan. The patient table movement contributes to the total examination time.

CAUTION

Wrong entries!

Dose not as desired.

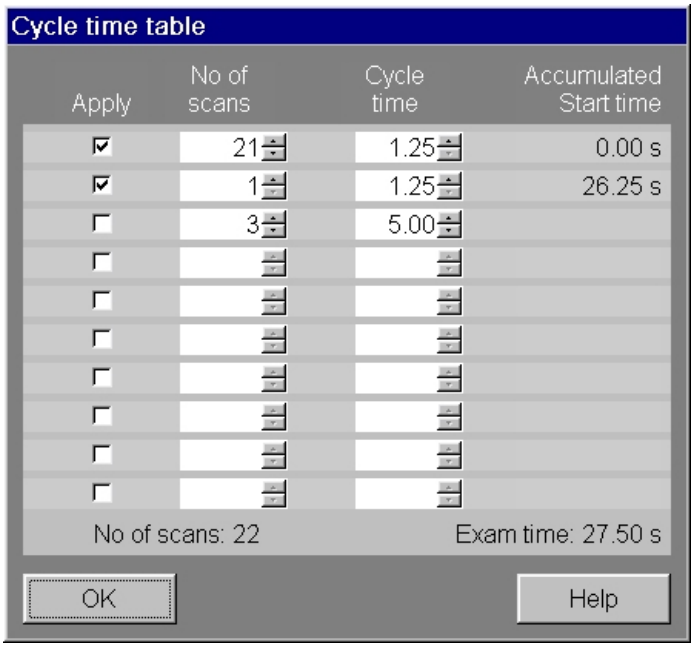
- Check scan parameters before scanning.

- On the **Routine** parameter card, check the default scan parameters, and adapt them if necessary.

Certain modes of operation allow selections of scan parameters that may lead to a peripheral $CTDI_{100}$ of more than 1 Gy. This dose may exceed the threshold for deterministic radiation effects on the patient's skin or eye lenses. For information on dose reduction techniques, see: (→ Page 377 *Dose management and optimization*). For general dose information on the CT system, see: *System Owner Manual*.

Setting special parameters

You can define different cycle times for an Adaptive 4D Spiral using the **Cycle Time** entry in the **Cycle time table** dialog box.



You can use the Cycle time table also for certain scan protocols without table feed.

1 Click the **Activate cycle time table** icon on the **Scan** parameter card.

The **Cycle time** entry changes to **Multiple**.

2 Right-click the same icon to display the **Cycle time table** dialog box.

3 Enter the desired cycle times and numbers of scans and select the cycles you want to scan.

Performing acquisition

After you changed scan parameters, you must confirm the new settings with **Load** before starting the scan.

1 Click the **Load** button to confirm the scan parameters.

As soon as you click the **Load** button, the topogram is zoomed and moved in a way that the whole planned scan range is displayed.



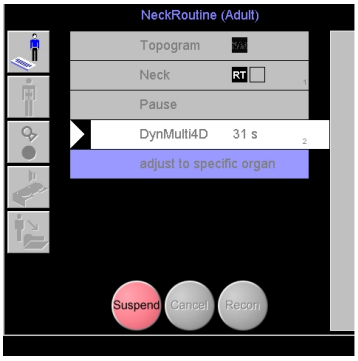
2 Press the **MOVE** key on the control box until table movement stops.

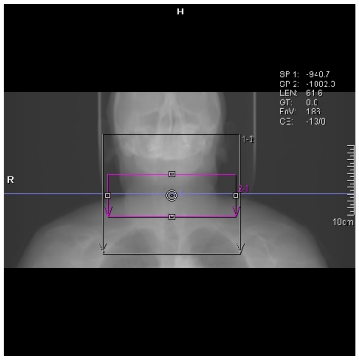
- or -

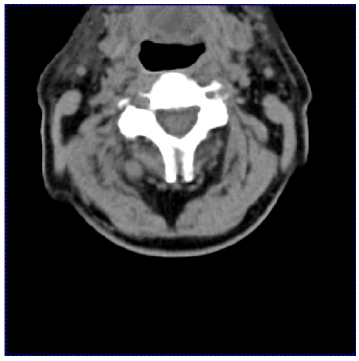
Click the **Cancel Move** button to begin the spiral at the current table position.



3 Press the **START** key on the control box.







You can observe the progress of your scan on the screen:

- In the chronicle, you can see the remaining scan time.
- In the topogram, the current scan position is displayed.
- In the tomo segment, the calculated tomograms are displayed.

RTD (Real Time Display) images are reconstructed to observe the scan progress.

4 Reconstruct the scan series with full image quality at the end of scanning.

5 Conclude the examination by creating a topographic image. For how to proceed: (→ Page 245 *Reconstruction*), (→ Page 264 *Concluding an Examination*)

Canceling in an emergency

You can interrupt the scan at any time with the **Suspend** button or the **Suspend** key on the control box.

After pressing the **STOP** key while tilting, the stopping angle of the gantry can be up to 0.5°.



1 In an emergency press the **STOP** key on the control box.

Radiation is stopped immediately and the entire system is blocked. A message box is displayed.

2 Click the **Continue** button to enable the system again.

2.2.7 Acquiring a Single Source Dual Energy scan

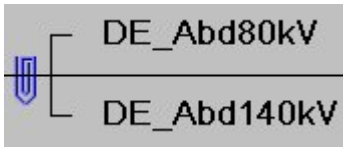
Single Source Dual Energy supports Dual Energy scan protocols for single tube systems.

A Single Source Dual Energy scan protocol consists of a special kind of auto range with two spirals of different voltages:

- First spiral: 80 kV
- Second spiral: 140 kV

Both scans must be performed with the same table height and patient orientation.

Remove user-defined scan protocols for Single Source Dual Energy of a previous software version.



In the chronicle, a Dual Energy auto range is indicated by a paper clip symbol.

You cannot split an auto range, and you cannot insert additional scan ranges into an auto range.

In an auto range, gantry tilt, Bolus Tracking, kV and CARE kV cannot be edited or applied.

1 Edit the parameters for the first spiral.

2 Set the values for table position and table height only for the first spiral.

The parameters of the second spiral are inherited from the parameters of the first spiral. You cannot edit the parameters of the second spiral.

3 Instead of using the API functionality, give the patient instruction directly.

For abdominal scans, perform both spirals while the patient is holding their breath.

It is not recommended to apply iodine contrast medium for a Single Source Dual Energy scan.

If the **Recon job type** is set to **3D** for the first spiral, the parameters of the **Recon** and **Autotasking** parameter card are not inherited to the corresponding recon job of the second spiral. You can edit these parameters for the first and the second spiral.

In the **Scan Protocol Assistant**, the parameters of both spirals are displayed on the grid. On the corresponding tab cards below, you can display and edit the parameters of the first spiral only.

4 Perform the spiral acquisition in the usual way.
(→ Page 233 *Acquiring a Spiral*)

You cannot load 3D and FAST Spine reconstruction series into *syngo* Dual Energy.

2.2.8 Creating a Patient Protocol

The Patient Protocol summarizes examination data. Therefore you can use it to document examinations.

The Patient Protocol can be displayed on the **Viewing** task card. They can also be filmed, and sent, for example, from the **Patient Browser**.

A Patient Protocol contains the following information:

- Patient data, e.g., name and ID
- Administrative data, like referring physician and ward
- Examination scan data, like patient position
- Contrast data, like media quantity and injection parameters, if entered
- Range name for each scan
- Dose parameters, like $CTDI_{vol}$ and DLP

Total DLP	DLP value of the entire examination
Total mAs	accumulated mAs value for the entire examination
Scan	serial number of the scans
kV	tube voltage (kilo Volt)
mAs	averaged applied mAs, eff. mAs or mAs/rot. of the range depending on the scan mode
ref. mAs	quality ref. mAs or quality ref. mAs/rot. of the range (if CARE Dose4D is activated)

CTDIvol (Volume CT Dose Index)	average dose value in mGy (milliGray) for the selected scan range ■ L: reference phantom with 32 cm in diameter ■ S: reference phantom with 16 cm in diameter
DLP	Dose Length Product in mGy x cm
TI	■ Rotation time in s: Spiral, i-Spiral, Multi-scan ■ Scan Time in s: Topogram, Heart Perfusion, Sequence, i-Sequence ■ Scan time in one rotation in s: i-Fluoro ■ Scan time for one image in s: Adaptive 4D Spiral
cSL	collimated slice width in mm

If configured, the system creates the Patient Protocol at the end of an examination. They cannot be modified. For more information, refer to: *Online Help*.

For the scan mode **Sequence** and **Adaptive 4D Spiral**, the displayed scan number indicates the first scan of a range. Additionally, the last scan number is displayed below the corresponding scan entry, if no other scan entry follows.

The values displayed in one line are valid for all scans of this scan range. They also can specify the average of parameters (dose and mAs) for the scan series. For interventional scans, one line for each scan with a different set of scan parameter settings is inserted.

Configuring the automatic creation of a Patient Protocol

1 On the **Processing** tab card of the **Examination Configuration** dialog box, select the **Patient protocol** check box.

The Patient Protocol is created at the end of an examination.

2 Select the check boxes **Auto film patient protocol** and **Auto transfer patient protocol** for further automatic functions.

2.3 Reconstruction

Before performing a reconstruction, you can plan the recon jobs (if you did not plan them before scanning).

When the system is switched off, the jobs are stopped and their current state is saved. After restart the execution of the reconstruction jobs continues.

Adapting the FoV before starting the reconstruction allows an appropriate spatial resolution for the resulting reconstructed image.

If you reconstruct multiphase images of previous versions, it could happen that fewer images are reconstructed than shown in **No. of images**. In most cases, only the last image is concerned. In this case, the raw data has to be sent to your local service support for reconstruction.

If **Auto transfer** is activated, the export of the data to the DVD drive only begins if all Recon jobs of a patient are finished and the patient is closed (Exam card). There is one session per study created on the DVD instead of one session per series. The number of burn sessions on one DVD is limited to 30 sessions.

If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key.

The following functionalities are described in the subsequent sections:

- (→ Page 246 *Checking reconstruction parameters*)
- (→ Page 247 *Defining the reconstruction target*)
- (→ Page 249 *Performing 3D reconstruction*)
- (→ Page 250 *Performing a FAST Spine reconstruction*)
- (→ Page 255 *Performing a sinogram affirmed iterative reconstruction (SAFIRE)*)

- (→ Page 258 *Performing an iterative reconstruction (SAFIRE Excel)*)
- (→ Page 259 *Optimizing the image display*)
- (→ Page 261 *Starting reconstruction*)
- (→ Page 261 *Interrupting and resuming reconstruction*)
- (→ Page 262 *Creating new reconstruction jobs*)
- (→ Page 262 *Copying and replacing reconstruction range*)
- (→ Page 262 *Deleting reconstruction jobs*)
- (→ Page 263 *Reconstructing Asynchronously*)
- (→ Page 263 *Performing retrospective reconstruction*)
- (→ Page 264 *Using Automatic Post-Processing*)
- (→ Page 264 *Concluding an Examination*)
- (→ Page 265 *Reconstructing on the syngo CT Workplace*)



If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

2.3.1 Checking reconstruction parameters

You can create new jobs for further calculations at any time. For more information, refer to: (→ Page 262 *Creating new reconstruction jobs*)

For adaptive 4D spirals, all reconstructed images of one recon job belong to the same series unless you activate **Series Splitting**. If **Series Splitting** is active, the images are arranged into multiple series, each series containing the images of one scan of the adaptive 4D spiral range.

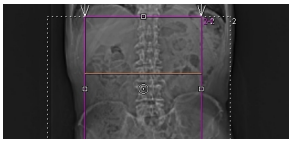


When you change the gantry tilt by entering a numeric value, the graphical representation of the selected scan entry is updated and vice versa. The corresponding scan range or cutline is rotated, using the center of the selected axial recon job, and not the isocenter of the gantry. For an oblique recon job, the isocenter of the gantry is used.

1 In the chronicle, select the recon job icon of an unreconstructed recon job for processing.

2 Check the default parameters on the **Recon** parameter card and adapt them, if necessary.

2.3.2 Defining the reconstruction target



An amber line represents the position of the currently displayed tomo image movements, and displays interactively the corresponding tomo image.

The following functionalities are described in the subsequent sections:

- (→ Page 247 *Adapting the FoV manually*)
- (→ Page 247 *Reconstructing images with Extended FoV and HD FoV*)

Adapting the FoV manually

You can adapt the FoV (Field of View) manually by using the mouse.

- Adapt the FoV (Field of View) in the tomo segment to the region of interest using the mouse. See (→ Page 222 *Adapting FoV manually*).

Reconstructing images with Extended FoV and HD FoV

The **Extended FoV** reconstruction and the **HD FoV** reconstruction provide a FoV of up to 78 cm (80 cm for SOMATOM Definition AS Open) including the area outside of the FoM (Field of Measurement).

If you have activated the **HD FoV** checkbox, the patient contour is estimated automatically outside the field of measurement. To ensure the required HU stability, an algorithm reduces artifacts in the range of 50 - 65 cm. The **HD FoV** function is especially useful for radiation therapy planning (RTP). A precise calculation of dose distribution for RTP to different organs is necessary in order to increase the dose delivered to the tumor and reduce the dose applied to healthy tissue. For that reason, the patient contour must be known and a high stability of the HU values within the image must be given.

The images contain a dotted red circle to indicate where the area of the regular FoV ends.

CAUTION

Reduced image quality caused by extended field of view!

Wrong diagnosis caused by wrong image information.

- For diagnosis, do not use the image area outside the regular field of view. It has reduced quality and may contain artifacts.

- On the **Recon** parameter card, select the **Extended FoV** checkbox.

  - or -

  On the **Recon** parameter card, select the **HD FoV** checkbox.

Depending on your system configuration and the selected scan mode, the **Extended FoV** and the **HD FoV** option may not be available.

2.3.3 Metal artifact reduction

Metal objects, such as metal implants or metal markers, can cause beam hardening artifacts. Depending on density and size, these artifacts can lead to a total absorption of the radiation resulting in strong black or white streaks or in star-shaped artifacts.

By means of the metal artifact reduction in image space (MARIS) reconstruction kernels, effects of metal artifacts can be reduced. MARIS kernels are marked by the character “M”, for example, M30s or M30f. For reconstructions with SAFIRE, the corresponding kernels are marked by the character “N”. MARIS kernels are available for all body regions and are located in the list of kernels at **Soft Tissues** > **Specials**.

Regarding the kernels M30 to M34 and N30 to N34, the correction strength increases with the increase of the second number of the kernel value.

The usage of MARIS kernels is bound to the following restrictions:

- MARIS kernels in conjunction with the SAFIRE option (“N”) cannot be used for intervention. General restrictions regarding SAFIRE are also valid when using MARIS kernels. (→ Page 255 *Performing a sinogram affirmed iterative reconstruction (SAFIRE)*), (→ Page 258 *Performing an iterative reconstruction (SAFIRE Excel)*)
- MARIS kernels cannot be used in combination with the **HD FoV** function.
- If the **Extended CT scale** option is selected on the **Recon** parameter card, the automatic reduction of beam hardening artifacts will be internally turned off.

2.3.4 Performing 3D reconstruction

You can start the 3D recon jobs on the **Examination** task card and on the **Recon** task card directly after spiral scanning. The axial images created during scanning are used as a planning base (3D GRP base).

1 Select **3D** as recon job type in the **Recon** parameter card after scanning.

  The three 3D Recon segments (coronal, axial, sagittal) are displayed instead of the standard tomo segment and topo segment.

  Each 3D segment shows one plane of the image volume (default: coronal, axial, sagittal). The coordinate axes are perpendicular to each other. You cannot change the angles between the axes.

2 Optimize the image display by interacting in the three segments.

3 Click the **Recon** button to start reconstruction.

  The system returns to the standard display if you start the reconstruction of the 3D recon job. The reconstructed images are displayed in the tomo segment, the reference image in the topo segment.

If a 3D reconstructed series is sent to a 3D application, the reference image will not be sent.

2.3.5 Performing a FAST Spine reconstruction

FAST Spine provides different modes that automatically create anatomically orientated spine reconstructions based on a 3D volume.

The FAST Spine function automatically detects the spinal canal, and labels the vertebrae.

All parameters needed for optimized oblique spine reconstructions, or parts of it, are provided by the system. You can also request an oblique reconstruction whereby all the images are orthogonal to the spinal canal. This results in a series of images that do not have to be parallel.

FAST Spine offers a flexible reconstruction increment to make sure that at least one slice is placed at the following positions:

- At the top of each vertebra
- In the middle of each vertebra
- At the bottom of each vertebra
- In the middle of each disc

The following functionalities are described in the subsequent sections:

- (→ Page 250 *Starting the detection*)
- (→ Page 251 *Editing the detection results*)
- (→ Page 254 *Confirming the spine detection*)
- (→ Page 254 *Selecting the reconstruction target*)

Starting the detection

The recon jobs are adjusted depending on the selected recon axis:

Recon axis	Adjustment of the recon job
spine oblique	The recon range contains the whole detected spine and is tilted according to the curvature of the spinal column.
spine disc	The recon range contains the specified disc (default: median of detected discs) and the two halves of the adjacent vertebrae.
spine vertebra	The recon range contains the specified vertebra (default: median of detected vertebrae) and the two halves of the adjacent vertebrae.

Recon axis	Adjustment of the recon job
spine multi	Each image to be reconstructed is tilted orthogonal to the curvature of the spinal column. ■ If the **Flexible** option is activated, there is one image for each disc. But there are at least three images (top, bottom, and center plane) for each vertebra. Depending on the increment, images in-between these slices are reconstructed. ■ If the **Flexible** option is deactivated, the images are equidistant along the whole detected spine region with the defined increment.

✓ You have performed a spiral scan of the spine.

1 On the **Recon** parameter card, select **3D** as **Recon Job Type**.

2 From the **Recon axis** selection list, select one of the spine options to start the spine detection after scanning.

If you have already performed the scan, the spine detection is done immediately.



In the chronicle, the **Detecting** recon job icon informs you that the spine detection is running.



If you load a scan protocol for scanning, the spine detection is interrupted.

Editing the detection results

You can adapt the results of the automatic detection in the spine edit mode.

You can edit the axial, sagittal, and coronal image.

In the sagittal and the coronal segment, the spine discs are indicated by magenta lines, and the detected vertebrae are displayed as annotations, for example, T11. In the axial segment, the FoV is displayed, indicated by a magenta frame.



If you have selected a recon job in the status **Confirmation required**, the spine edit mode is automatically activated by the system.

If you have confirmed the spine detection, you can enter the spine edit mode again later.

As soon as you change anything, the automatically applied labels will be recalculated.

All changes in the spine edit mode affect the detection results and all spine recon jobs if they are not reconstructed yet.

Entering the spine edit mode



- On the toolbar, click the **Spine Edit Mode** icon.

When you choose **Save Key Image** or **Save all displayed images as key images** from the context menu, reference lines and graphics will also be saved with the images.

Rotating a spine disc line

- Drag the end of the spine disc line in the desired direction.

Moving a spine disc line

- Drag the center of the spine disc line to the desired position.

Adding a new disc line



1. On the toolbar, click the **Add Disc** icon.
2. Click into the coronal or sagittal segment to define the new disc position.

Deleting a disc line



1. On the toolbar, click the **Delete Disc** icon.
2. Select the spine disc line to delete it.

Changing the FoV

- In the axial segment, resize the FoV by dragging the edges of the magenta frame.

  The FoV size is displayed at the lower right corner of the frame.

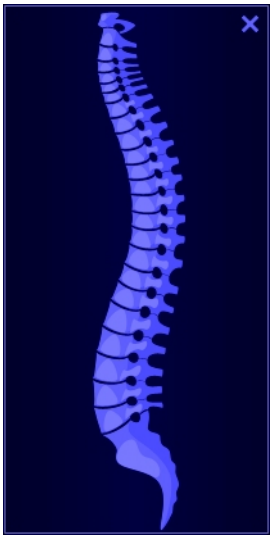
As soon as you confirm the spine detection, the FoV is applied to the recon jobs. The change of the FoV affects the size of the spine recon ranges.

If you change the FoV after confirming the spine detection, the system leaves the FAST Spine mode. If you have selected the **spine multi** recon axis, you can only change the FoV when reentering the edit mode.

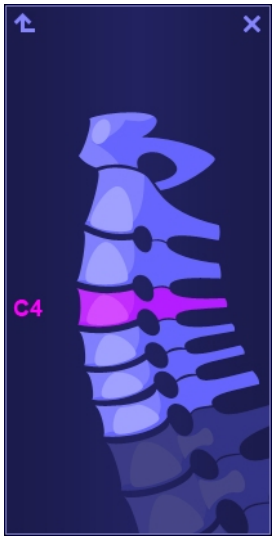
Applying new vertebra labels



1 On the toolbar, click the **Apply Vertebra Label** icon to open the spine selection dialog box next to the axial segment.



2 In the spine selection dialog box, select the partition of the spinal column to open a dialog box which shows the vertebrae of the selected spine partition.



3 In the dialog box, select the new vertebra label.

4 In the coronal or sagittal segment, select a vertebra to reassign it.

Confirming the spine detection

After you have edited the results of the spine detection, you must confirm the changes.



In the chronicle, the **Confirmation required** recon job icon informs you if you have to confirm the spine detection.



- Click the **Undo** icon to discard the changes and to remain in the spine edit mode.

  - or -



On the toolbar, click the **Confirm Spine** icon to apply the changes.

Selecting the reconstruction target

In the sagittal and the coronal segment, you can select the reconstruction target, if you have selected the **spine disc** or the **spine vertebra** recon axis.

- In the sagittal or the coronal segment, click the spine disc or the vertebra that you want to reconstruct.

  The recon box moves to this position.

You can now start the reconstruction of the spine recon jobs.
(→ Page 261 *Starting reconstruction*)

2.3.6 Performing a sinogram affirmed iterative reconstruction (SAFIRE)

The sinogram affirmed iterative reconstruction (SAFIRE) allows you to use low-dose images to reconstruct images with less noise and increased image sharpness.

The SAFIRE is recommended for scans with an **Effective Slice Width** ≤ 5 mm and a **FoV** > 150 mm.

The image impression of images which are reconstructed with SAFIRE can differ from the images which are reconstructed with a conventional method.

Compare the SAFIRE images with the conventional images side-by-side using comparable kernels.

syngo offers many possibilities to optimize the dose applied to a patient. For more information, see (→ Page 377 *Dose management and optimization*).

SAFIRE is available for the recon jobs of most modes except for the following modes:

- Interventional examination
- PreMonitoring
- Monitoring
- Topogram
- Adaptive 4D Spiral scans
- Heart Perfusion scans
- Multiscans
- All 2D sequences
- Dynamic Serio scans

Do not load images which were reconstructed with the SAFIRE algorithm into *syngo* Osteo CT and *syngo* Calcium Scoring.

Activating SAFIRE

The **Kernel** selection list on the **Recon** parameter card changes to the **Algorithm** selection list if you activate the **SAFIRE** checkbox.

The algorithms are marked by the characters "I", "J", "N", or "Q", for example, I30f, I30s, J30f, J30s, N30s, N30f, Q40f, Q40s:

- Algorithm "I" corresponds to kernel "B".
- Algorithm "J" corresponds to kernel "H".
- Algorithm "N" corresponds to kernel "M".
- Algorithm "Q" corresponds to kernel "D".

1 On the **Recon** parameter card, select the **SAFIRE** checkbox to activate the sinogram affirmed iterative reconstruction.



The **Recon job** number is marked in blue.

2 From the **Algorithm** selection list, select an algorithm depending on the body region you want to examine.

3 In the **Strength** entry field, enter a value (between 1 and 5).

The reconstructed images become more artificial the higher the **Strength** value is.

Displaying preview images

You can perform a preview reconstruction to evaluate the images done with different algorithms and **Strength** values.

The preview is not possible in the following cases:

- Scan range is unscanned
- Recon job is performed
- Recon job is oblique
- Multiphase recon job



1 On the **Recon** parameter card, click the **Open SAFIRE Preview** icon to open the toolbar.

The 3-segment preview layout is displayed and the lower part of the monitor is inactive. The selected strength is indicated by a magenta colored frame in the toolbar. After starting the preview, the magenta frame is also shown in the images.

2 Use the dog ear of the series to select the position of the preview images.

3 Click the segment to select the image of the desired position.

4 Click a **Strength** number to define the strength value for the selected algorithm.

The selected **Strength** values are displayed with a black background color.

The strength number is displayed in the image comment area of the preview images.



5 Click the **Start SAFIRE Preview** icon to start the preview reconstruction.

The images of the preview reconstruction are stored into one series. If you have selected more than three **Strength** values, you can use the scrollbar to see all the images.

You can perform a preview reconstruction as often as necessary.



6 Click the **Accept** icon to confirm the current settings.

On the **Recon** parameter card, the values are updated.

You can now start the reconstruction. See (→ Page 261 *Starting reconstruction*).

If you perform a 3D reconstruction using SAFIRE, the 3D reference image is reconstructed with a standard kernel. Therefore, use the images which have been reconstructed with SAFIRE for diagnosis.

- or -



Click the **Cancel** icon to discard the changes.

2.3.7 Performing an iterative reconstruction (SAFIRE Excel)

The image impression of images which are reconstructed with SAFIRE Excel can differ from the images which are reconstructed with a conventional method.

Compare the SAFIRE Excel images with the conventional images side-by-side using comparable kernels.

SAFIRE Excel is available for the recon jobs of most modes, except for the following:

- Interventional examination
- PreMonitoring
- Monitoring
- UHR
- zUHR
- Topogram
- Adaptive 4D Spiral scans
- Heart Perfusion scans
- Multiscans
- All 2D sequences
- Dynamic Serio scans

You cannot perform an iterative reconstruction if you use **Extended FoV** or **Extended CT scale** to avoid artifacts.

Do not load images which were reconstructed with the SAFIRE Excel algorithm into Osteo and CaScoring.

1 Select the **SAFIRE Excel** checkbox on the **Recon** parameter card to activate the iterative reconstruction.

The **Kernel** selection list on the **Recon** parameter card changes to the **Algorithm** selection list.

The algorithms are marked by the characters “I”, “J”, “N”, or “Q”, e.g., I30f, I30s, J30f, J30s, N30f, N30s, Q40f, Q40s.

Algorithm “I” corresponds to kernel “B”.

Algorithm “J” corresponds to kernel “H”.

Algorithm “N” corresponds to kernel “M”.

Algorithm “Q” corresponds to kernel “D”.

If you switch between the standard reconstruction and the iterative reconstruction, you have to select a correct algorithm from the selection list as the kernels become invalid.

2 Select the desired algorithm from the **Algorithm** selection list.

3 Start the reconstruction. (→ Page 261 *Starting reconstruction*)

If you perform a 3D reconstruction by using SAFIRE Excel, the 3D reference image is reconstructed with a standard kernel. Use the images which have been reconstructed with SAFIRE Excel for diagnosis.

2.3.8 Optimizing the image display

Image series requirements for the 3D GRP Base are:

✓ Extended FoV is off

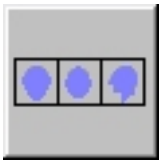
✓ Center X, Center Y, and FoV are the same for all images of the series

1 Select a segment.

2 Click the following icons from the tool bar on the **Examination** or on the **Recon** task card.



3 Click the **Free Mode** icon if you want to rotate the axes in any segment.



4 Click the **Default Orientation** icon if you want to set the orientation of the 3D Recon segments to their defaults.

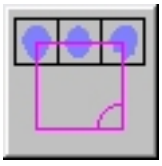


5 Click the **Hide Reference Lines** icon if you want to suppress the cutlines in the 3D Recon segments.

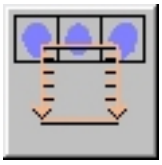


6 Click the **MPR Thick** and **MIP Thin** icons if you want to select the image type for the 3D GRP Base.





7 Click the **Set FoV Segment** icon if you want to define the active 3D Recon segment as new FoV segment.



8 Click the **Set Reference Segment** icon if you want to define the active segment as new segment for the reference image. Zoom, pan, and window the image.



9 Click the **Preview Image** icon if you want to check whether the reconstruction parameters you set are suitable.

10 Select an existing 3D GRP Base from the Planning base selection list for the current and the following 3D recon jobs.

11 Select one of three different FoV matrices for the 3D reconstruction of spiral scans.

You can choose between the following matrices:

- 512 square: The FoV is quadratic (512 x 512 pixel).
- 512 non-square: You can adjust the FoV as a rectangle according to your needs.
- 256 non-square: You can adjust the FoV as a rectangle according to your needs with a lower matrix size.

If you use the non-square matrix and extend the side length of your FoV to more than the maximum ratio, the shorter side is stretched so that the maximum ratio applies again.

12 From the **Planning base** selection list, select an existing image series for the oblique recon jobs.

2.3.9 Starting reconstruction

The bar display on the right-hand edge indicates the progress of reconstruction.

- Click the **Recon** button to start reconstruction of the currently selected recon job.

  In the tomo segment, all the images calculated are displayed one after the other.

2.3.10 Interrupting and resuming reconstruction

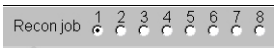
You can interrupt and resume the reconstruction, for example to correct the FoV.

1 Click the **Hold Recon** button, for example, to correct the FoV.

2 Click the **Recon** button to resume reconstruction.

2.3.11 Creating new reconstruction jobs

1 Select the acquisition series that you want to reconstruct again in the chronicle.



2 Click the second radio button on the **Recon** parameter card to plan a second recon job.

2.3.12 Copying and replacing reconstruction range

Copying and replacing the reconstruction parameters is only possible from a 2D to a 2D, from a 3D to a 3D, and from a Cardio to a Cardio recon job.

The following parameters are copied:

- Length parameters: **Begin position** and **End position**
- Cross section parameters of all recon jobs: **FoV**
- Cross section parameters of axial recon jobs: **Center X** and **Center Y**
- Cross section parameters of oblique recon jobs: **Recon axis**

1 Click the **Reconstruction** icon in the scan protocol entry.

2 Right-click to call up the recon job context menu.

3 Select the **Copy Recon Range** menu entry from the recon job context menu.

4 Click the **Reconstruction** icon in the designated scan protocol entry.

5 Select the **Replace Recon Range** menu entry from the recon job context menu.

2.3.13 Deleting reconstruction jobs

If you delete a completely or partially executed recon job, the images created with it are not deleted. It is only possible to delete images in the **Patient Browser**.

1 Select a recon job in the chronicle.

2 Select the **Delete Recon Job** menu entry in the context menu of the chronicle.

2.3.14 Reconstructing Asynchronously

The asynchronous reconstruction is performed in the background without blocking the **Examination** task card or the **Reconstruction** task card.

Reconstructing during start delay

An asynchronous reconstruction is also possible during the start delay.

The moment the delay reaches just before the start, all functions are disabled and the system is ready for scanning. The reconstruction is suspended.

Looking at the examination job status

- Select **Patient** > **Examination Job Status** from the main menu to display the **Examination Job Status** dialog box.

2.3.15 Performing retrospective reconstruction

You can reconstruct the images of an examination after the examination is closed as long as the raw data was not deleted.

Depending on the detector system of your scanner, the reconstruction of raw data acquired at a different detector system may not be possible.

1 Select the required study or series of the patient for image reconstruction.

2 Choose **Patient > Reconstruction** to transfer the selected data to the **Examination** or **Recon** task card.

- or -



On the tool bar of the **Patient Browser**, click the **Reconstruction** icon.

3 Start the unprocessed reconstruction jobs or define new ones.

By activating **Patient > Mode Reference Lines**, you can document the scans as ranges and cutlines in the topogram even after completing an examination.

2.3.16 Using Automatic Post-Processing

On the **Auto Tasking** parameter card, you define in which way a reconstructed series is automatically post-processed. Depending on the type of scan, not all options may be available.

Auto Tasking parameters are set individually for each recon job.

- Define on the **Auto Tasking** parameter card in which way you want to post-process the reconstructed series.

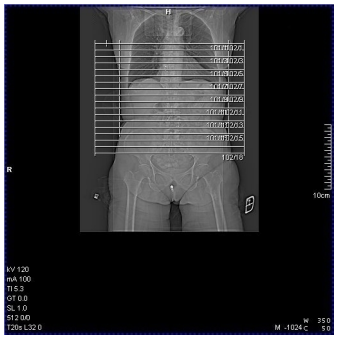
2.3.17 Concluding an Examination

You can create **Auto reference lines** for a specific tomogram recon job. To do so, activate the checkbox in the **Patient Model Dialog** and on the **Auto Tasking** parameter card.

Getting an examination overview

1. Select a topogram in the chronicle.
2. Select the recon icon of a reconstructed series in the chronicle.
3. Drag the recon icon to the topo segment and drop it onto the topogram.

   The images of the recon job are drawn in and saved as cutlines in the topogram.



Ending the examination



- Click the **Close current patient** icon.

  If configured, the E-Logbook is displayed.

Continuing an examination

You can continue the examination after closing the patient.

- Select a study in the **Patient Browser** and select **Patient** > **Register** from the menu to open the **Patient Registration** to register the patient for scanning.

  - or -

  Select a new scheduled procedure step from the **Scheduler**.

  You can continue the examination.

2.3.18 Reconstructing on the *syngo* CT Workplace

As satellite console, the *syngo* CT Workplace is the primary site for image viewing, filming, exporting data, 2D and 3D reconstruction, and data postprocessing. To have access to the raw data, connect it to the *syngo* Acquisition Workplace.

It supports the *syngo* Acquisition Workplace that mainly controls the data acquisition of the scanner.

At the same time, undisturbed further patient data evaluation is possible on the virtually independent *syngo* CT Workplace.

When you have closed a patient on the *syngo* Acquisition Workplace, we recommend waiting approximately 10 s before loading a data set for reconstruction again on the *syngo* CT Workplace. This time is required to finish updating and writing all data including the protocol to the database after ending the examination on the *syngo* Acquisition Workplace.

- To start additional reconstruction load the required raw data into the **Recon** task card.

The reconstruction workflow on the *syngo* CT Workplace is identical to the one on the *syngo* Acquisition Workplace.

2.4 Cardiac CT

The HeartView option uses an ECG as a trigger for capturing images at the same heart phase. It reduces or even suppresses motion artifacts.

The image data is synchronized to the heart cycle. To achieve the synchronization, several methods are available, which belong to the mode of data acquisition:

- For prospective triggering sequences are employed. The ECG signal is used to trigger a CT scan at the appropriate heart phase. It is triggered with a certain delay after the R-wave.
- For ECG mode spirals are employed. The ECG and the CT raw data are recorded simultaneously. Then retrospective gating selects only a portion of the spiral data to reconstruct images of the selected heart phase.



If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key afterwards.

The following functionalities are described in the subsequent sections:

- (→ Page 267 *Preparing the Acquisition*)
- (→ Page 268 *Acquiring an ECG-Gated Spiral*)
- (→ Page 278 *Acquiring an ECG-Triggered Sequence*)

syngo offers many possibilities to optimize the dose applied to a patient. For more information, see (→ Page 377 *Dose management and optimization*).

For a dose optimized cardiac workflow, see (→ Page 440 *Considerations for Cardiac CT*).



If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

Safety advice

CAUTION

Missing ECG-Sync due to the disconnection of the patient's ECG-electrodes!

X-ray not or only partially usable.

- A contrast enhanced scan should not be aborted but operated with synthetic ECG-data.

2.4.1 Preparing the Acquisition

In addition to the usual preparations in the examination room and on the console, some actions specific to Cardiac CT are required.

If you register the patient for a Cardiac CT examination and the ECG electrodes have not been connected yet, a dialog box is displayed. Connect the ECG electrodes, and then click the **Try again** button.

For scans with contrast medium, always activate the synthetic trigger so that a scan does not stop if problems arise with the ECG signal. (→ Page 269 *Setting gating parameters*), (→ Page 278 *Setting trigger parameters*)

The ECG cables shall be applied outside the heart region to avoid artifacts.

1 Position the patient on the patient table.

2 Immobilize the patient using the positioning aids, if necessary.

CAUTION

Wrong ECG signal detection!

Undesired radiation

- Check the correct position of the ECG electrodes before scan start.

3 Apply the electrodes for the electrocardiogram (ECG) and connect the ECG cable to the socket at the bottom end of the table. *SOMATOM Operator Manual*

4 Select the required **Cardiac** scan protocol in the **Patient Model Dialog** and register the patient for examination.

5 Scan a topogram and define the ranges for the spiral or sequence.

6 Prepare for scanning with contrast medium, if applicable.

2.4.2 Acquiring an ECG-Gated Spiral

If an image is marked in the comment line with "RQ, ..." the image was reconstructed with projections from low dose window and may show increased image noise.

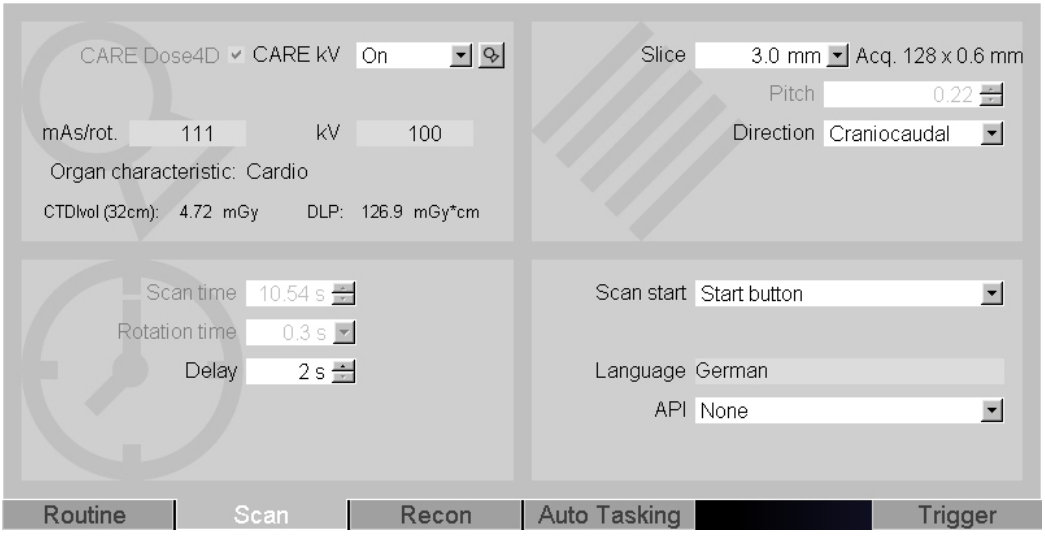
The following functionalities are described in the subsequent sections:

- (→ Page 269 *Setting scan parameters*)
- (→ Page 269 *Setting gating parameters*)
- (→ Page 270 *Adapting the pitch*)
- (→ Page 271 *Selecting ECG channels*)
- (→ Page 271 *Scanning with ECG Pulsing*)
- (→ Page 272 *Using MinDose*)
- (→ Page 273 *Acquiring the spiral*)
- (→ Page 273 *Reconstructing*)
- (→ Page 273 *Reconstructing with Cardio BestPhase*)
- (→ Page 274 *Reducing the image resolution*)

- (→ Page 274 *Reconstructing a Multiphase series*)
- (→ Page 275 *Selecting phases for Multiphase reconstruction*)
- (→ Page 275 *Modifying Multiphase parameters*)
- (→ Page 276 *Performing a TrueStack reconstruction*)
- (→ Page 276 *Using the Direct Viewer*)

Setting scan parameters

You cannot modify the **Scan time** and the **Pitch** on the **Scan** parameter card.



- Check the scan parameters preset in the scan protocol on the **Routine** and the **Scan** parameter card and adapt them, if necessary.

Setting gating parameters

A positive value in the **Phase Start** field means a delay after the R wave. A negative value means that the starting point of the scan window is before the next estimated R wave.



1 Select **Options** > **Configuration** from the main menu.

2 Double-click the **HeartView** button.

3 Select the **ECG Synthetic Trigger / Sync** check box, and click the **OK** button to activate the synthetic sync for examinations with contrast medium in particular.

You can activate the **ECG Synthetic Trigger / Sync** check box in an examination with ECG pulsing. If the system detects a missing ECG signal during measurement, the ECG pulsing will be switched off automatically. At that time, the mAs (tube current) will be set back to 100% of the initially adjusted value.

4 From the **Unit** selection box, select **ms** (absolute delay) or **%** (relative delay) as the trigger unit.

5 Set the recon delay in the **Phase Start** field.

Adapting the pitch

To reduce the dose, it is possible to adapt the pitch automatically or manually according to the heart rate of the patient.

The heart rate is monitored during at least 10 heart cycles to achieve a stable heart rate overview.

By clicking the **LOAD** button, the current heart rate and the estimated heart rate is compared. If the estimated heart rate setting exceeds the actual heart rate, a message box opens:

- By clicking the **Start** button, the scan is continued without pitch adaptation
- By clicking the **Reload** button, the system adapts the estimated heart rate automatically
- By clicking the **Cancel** button, the mode is canceled

1 Select the estimated heart rate of the patient from the **Est. HR** selection list on the **Trigger** parameter card to activate the manual pitch adaptation.

2 Select **auto** to activate the automatic pitch adaption.

Based on the last 10 heart cycles, the pitch is calculated.

Selecting ECG channels



The heart symbol and the channel numbers I-III on the **Trigger** parameter card below the diagram show the currently selected ECG recording channel. It is also indicated on the gantry display.

◆ Toggle through the different channels to find the optimal channel.

The second ECG channel with the best amplitude enables high-quality scan data.

Scanning with ECG Pulsing

Scanning with ECG Pulsing offers you the option to activate a dose modulation mechanism. With ECG Pulsing, you can reduce the dose beyond the high dose plateau. (→ Page 393 *ECG Pulsing and MinDose*)

Heart examinations are a typical application of ECG Pulsing where one of the following points is required:

- Functional analysis is desired
- A functional image impression based on a reduced dose level is acceptable

If ECG Pulsing is enabled, the dose value on the **Routine** parameter card is adapted to the actual ECG pulsing dose reduction potential.

Only data acquired in the scan window can be reconstructed with high image quality if ECG Pulsing is activated.



You can modify the predefined values of the configuration by clicking the **ECG Pulsing configuration** icon on the **Trigger** parameter card. The **HeartView** configuration dialog box opens, and you can make your modifications for each heart rate.

1 Select **manual** in the **Pulsing** selection list on the **Trigger** parameter card to activate dose modulation for reducing dose during scanning.

CAUTION

Wrong setting in display!

Ionizing radiation

- Set the ECG pulsing window to clinically relevant value.

2 Modify the start and end point of the high dose plateau in the entry fields on the **Trigger** parameter card.

- or -

Select **auto** in the **Pulsing** selection list on the **Trigger** parameter card to use the predefined values of the configuration depending on the heart rate.

Using MinDose

The scanning with the **MinDose** option provides you the ability to activate an enforced dose modulation mechanism. In this way, you can reduce the dose beyond the high dose plateau down to a minimum of 4%.

A typical application of MinDose are heart examinations where the functional analysis is not desired. Reconstructions outside the high dose plateau are possible but images do not have sufficient image quality for reporting or functional imaging.

Images obtained beyond the high dose plateau are of reduced image quality. Postprocessing applications may not accept these images.

You can modify the start and the end point of the high dose plateau also for the **MinDose** option.

The **MinDose** option is not supported for ECG gated multiscan modes.

1 On the **Trigger** parameter card, use the **Pulsing** selection list to switch between standard dose and **MinDose**.

2 Select **MinDose - manual** to activate the manual dose modulation for reducing the dose beyond the high dose plateau.

- or -

Select **MinDose - auto** to activate the automatic dose modulation for reducing the dose beyond the high dose plateau.

3 Load the mode.

A message box is displayed to inform you that the image quality for diagnostic purposes is not guaranteed.

Acquiring the spiral

You can synchronize an ECG-gated spiral with application of the contrast medium.

- Perform the spiral acquisition in the usual way.
(→ Page 233 *Acquiring a Spiral*)

Reconstructing

The values you can select depend on the current scan protocol. In case of cardio obese mode (XXLCoronaryCTA), select one of the offered temporal resolution values (for example, 165 ms) to enhance signal-to-noise. The selected value is indicated in the comment line of the second image.



1 Select a reconstruction job in the chronicle.

2 Change the **Phase Start** on the **Trigger** parameter card to move the recon window to the required position.

3 Select the temporal resolution you need (in ms) in the **Recon** selection list on the **Trigger** parameter card.

4 Define the further reconstruction parameters where necessary and then start reconstruction.

With **Original ECG**, you can switch between the original and the modified ECG signal (ECG editing).

Reconstructing with Cardio BestPhase

Cardio BestPhase enables you to minimize the heart motion effects and to choose the most appropriate heart phase for postprocessing.

The determined best phase represents optimal image quality within the high dose plateau in systolic phase (0-50% RR) or in diastolic phase (50-100% RR).

Use Cardio BestPhase to reconstruct the images automatically irrespective of the heart motion.

As the system software defines the phase start for Cardio BestPhase reconstruction automatically, the Phase Start settings are dimmed. The **Multiphase** and **Test series** buttons are inactive. This phase is updated after the recon finished.

- Select **BestSyst** in the **BestPhase** selection list of the **Trigger** parameter card for automatic systole mapping and start the reconstruction.

  - or -

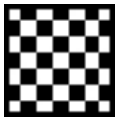
  Select **BestDiast** in the **BestPhase** selection list of the **Trigger** parameter card for automatic diastole mapping and start the reconstruction.

  The reconstruction is performed based on the delay value of the determined phase.

  The best phase is displayed on the **Trigger** parameter card. After the reconstruction is finished, the recon boxes will be set to the right phase.

Reducing the image resolution

To achieve a faster performance in transfer, loading and processing, it is possible to reduce the image resolution for axial spiral cardio reconstruction.



Recon jobs performed with reduced image resolution are marked with a **Reduced Matrix** icon in the chronicle.

- Select the **256 Matrix** option on the **Recon** parameter card.

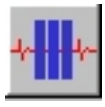
Reconstructing a Multiphase series

With multiphase, it is possible to reconstruct up to 24 different heart phases within one recon job.



With the **Preview Series** icon, you can reconstruct images at a scan position with different delays to optimize the phase start setting (configurable).

1. Set the reconstruction parameters as desired on the **Recon** parameter card.



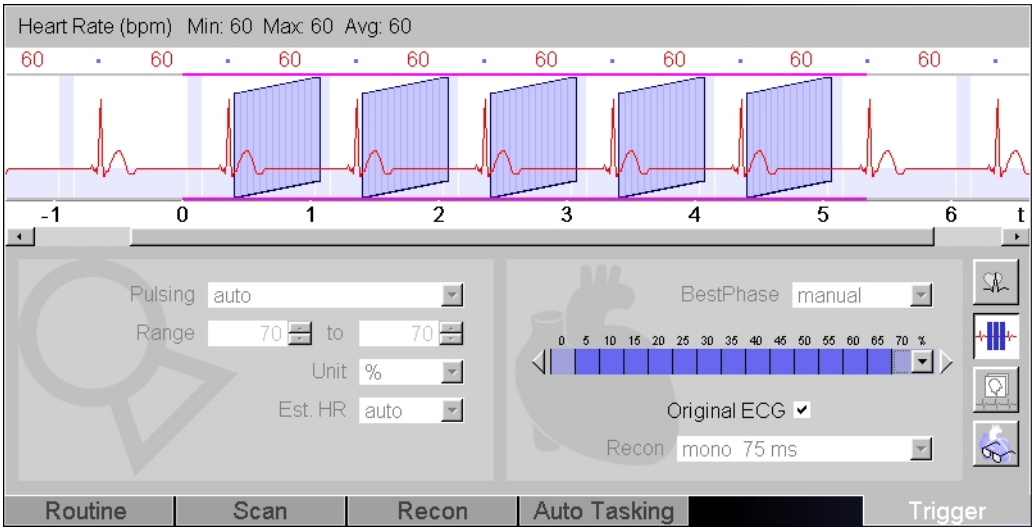
2. Click the **Multiphase** icon on the **Trigger** parameter card.
3. Click the **Recon** button to start reconstruction.

   The images are reconstructed and stored in one series.

   The ECG data of the spiral acquisition is stored together with the raw data to the local database.

Selecting phases for Multiphase reconstruction

For Multiphase reconstruction, select the desired phases first.



- Select single phases in the range 0% to 100% or -2000 ms to 2000 ms in the list on the **Trigger** parameter card.

  - or -

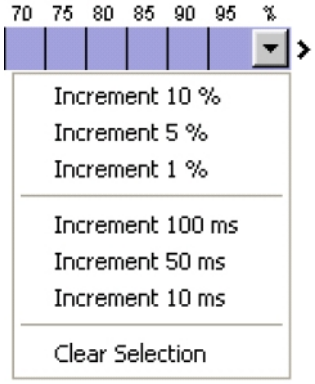
  Select a range of phases by clicking and dragging the mouse in the blue bar.

If you have not selected a phase, it changes to yellow.

- or -

Scroll through the list of phases if too many phases are displayed.

Modifying Multiphase parameters



You can change the parameters for Multiphase reconstruction according to your needs.

1 Click the dropdown icon next to the multiphase list on the **Trigger** parameter card.

2 Change the increment and unit via the selection list.

Performing a TrueStack reconstruction

With TrueStack reconstruction, the individual cardiac cycles are displayed without data overlap. By performing a reconstruction with TrueStack, you can create a reconstruction without stack mixing, generating an image set with sharp boundaries.

- Select the desired **TrueStack** item in the **Recon** selection list on the **Trigger** parameter card to perform a reconstruction without stack overlapping.

Using the Direct Viewer

The Direct Viewer is intended to complete the workflow of best phase finding. It provides you with direct viewing in 3D and supports you in finding the most suitable heart phase for reconstruction. It also supports you in easy checking the quality of the phase determined by the Cardio BestPhase algorithm.

The Direct Viewer is only available for already scanned cardio spirals.

1 Reconstruct a recon job.

2 Select a not executed recon job in the chronicle.



3 Click the **Direct Viewer** icon on the **Trigger** parameter card.

The **Direct Viewer** floating toolbar is displayed.

4 Select the already reconstructed series from the selection list as a planning base.

The selected series is displayed as VRT in the topo segment. A MIP projection is displayed in the tomo segment.



5 Click the **Phase Viewer Heart Isolation** icon to activate the Heart Isolation function.



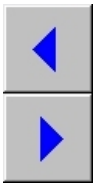
6 Click the **VRT rotation** icon to rotate the VRT images.

If you deselect the **VRT rotation** icon and click on the VRT image, a **MIP Thin** image is displayed in the right segment.



7 Click the **Phase Viewer Gallery** icon to open the **VRT Gallery** dialog box and modify the settings, if necessary.

If the loaded recon series is a multiphase series, you can navigate between the different phases.



8 Click these icons to navigate backward or forward to the different phases.

The topo and tomo segments with the VRT and MIP projections are updated accordingly.

For facilitating the best phase selection, you can rotate both projections freely.

9 Select the best heart phase.

The selected phase is considered as Phase Start.

10 Click the **Recon** button to start reconstruction.

You can also perform the phase selection by starting the **Direct Viewer** immediately for a reconstructed job. You perform the same steps, but the selected phase is not considered as Phase Start.

2.4.3 Acquiring an ECG-Triggered Sequence

The following functionalities are described in the subsequent sections:

- (→ Page 278 *Setting scan parameters*)
- (→ Page 278 *Setting trigger parameters*)
- (→ Page 279 *Acquiring the sequence*)
- (→ Page 279 *Acquiring an Adaptive Cardio Sequence*)

Setting scan parameters

When scanning with API, sequence scans are clustered (except Adaptive Cardio Sequences), and scan pauses are inserted correspondingly.

Check the correct setting of the breathhold time via **Options** > **Configuration** > **Examination** > **Patient** from the main menu.

If necessary, you can modify the parameters of the sequence after a control scan, and check them with a second control scan.

- Check the default scan parameters on the **Routine** and **Scan** parameter card, and change them, if necessary.
  (→ Page 228 *Checking parameter settings*)

Setting trigger parameters

If **Synthetic Trigger** is activated, the scans are continued in case of ECG signal loss.

1. Select **Options** > **Configuration** from the main menu.
2. Double-click the **HeartView** button.
3. Select the **ECG Synthetic Trigger / Sync** check box, and click the **OK** button to activate the synthetic sync for examinations with contrast medium in particular.

You can activate the **ECG Synthetic Trigger / Sync** check box in an examination with ECG pulsing. If the system detects a missing ECG signal during measurement, the ECG pulsing will be switched off automatically. At that time, the mAs (tube current) will be set back to 100% of the initially adjusted value.

4 Select **ms** (absolute delay) or **%** (relative delay) as the trigger unit in the selection box on the **Trigger** parameter card.

5 Change the Phase Start on the **Trigger** parameter card to move the recon window to the desired position.

Acquiring the sequence

After you started the scan, the scan windows are marked with magenta lines. It is then no longer possible to change the trigger delay time.

- Perform the sequence and subsequent reconstructions in the usual way. (→ Page 227 *Acquiring a Sequence*)

Acquiring an Adaptive Cardio Sequence

The Adaptive Cardio Sequence is a special scan mode, which monitors the ECG of the patient while the scan is performed. It is able to detect irregular heartbeats and repeat scans at a certain z-position, if necessary. It also allows scanning more than one phase of the heart cycle.

You can adapt the scan range within two R-peaks according to your needs. You can find the most appropriate heart phase by retrospectively selecting the phase start from the final scan.

You can use the Adaptive Cardio Sequence mode for all cardio sequences and also for Calcium Scoring and Coronary CT Angiography examinations. You can use it together with Arrhythmia Compensation and FlexPadding.

syngo 3D, *syngo* Circulation, and *syngo* InSpace 4D CT can postprocess the images scanned with Adaptive Cardio Sequence.

If during scanning no R-peak is detected for more than 3 s and you have activated the **Synthetic Trigger** option, the scan will be continued. If you have not activated **Synthetic Trigger**, the scan will be aborted after 3 s.

Activating the Adaptive Cardio Sequence mode

1 Select the **Adaptive Cardio Seq.** check box on the **Trigger** parameter card to activate the Adaptive Cardio Sequence mode (activated by default).

2 Select **Flex** from the **Rotation time** selection list on the **Scan** parameter card to enable FlexPadding, if necessary.

Defining the scan range

If you have enabled FlexPadding, you can define the start and end phase of the scan. The valid phase values reach from 0% to 100% and from -2000 ms to 2000 ms.

- Enter the desired values in the **Scan** entry fields on the **Trigger** parameter card.

Defining the ECG pulsing window

1 Select the **Trigger** parameter card.

2 From the **Pulsing** selection list, select **auto** to automatically set the ECG pulsing window.

- or -

From the **Pulsing** selection list, select **manual** to manually set the ECG pulsing window.

3 In the **Range** entry fields, enter the ECG pulsing window range in 1% or 1-ms steps.



If you enter a positive value in ms, the scan window and the pulsing window stay constant. In case of a lower heart rate, a variance does not lead to an extension of the scan window nor the pulsing window.

A preview of the current scan range and ECG pulsing window will be displayed.

Acquiring the sequence

- Perform the sequence in the usual way. (→ Page 227 *Acquiring a Sequence*)

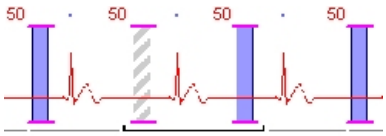
If irregular heartbeats are detected, a status bar message is displayed to inform you about the detected arrhythmia, and that the scan will be repeated.

The system repeats the scan automatically at the same z-position.

Choosing the reconstruction phase

If FlexPadding is enabled, you can find the most appropriate heart phase by retrospectively selecting the phase start from the final scan.

If there are repeated scans (arrhythmia), the first scan will be disabled by default. It is displayed in gray striped pattern. The second scan is reconstructed by default.

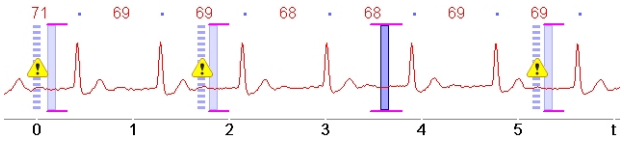


We recommend viewing both scans with the same z-position to decide which of them is more appropriate for reconstruction.

You can enable exactly one scan for every z-position by right-clicking the recon bar and selecting the **Enable Sync** menu entry. The state of the other scanbox at the same z-position is adapted automatically.

If a phase start exceeds the reconstructable range, the display changes as follows:

- The corresponding recon window is displayed as a horizontally striped bar with an attention sign above.
- A second light blue bar is displayed at the actually used reconstruction phase within the performed scan represented by the magenta lines.



You can also use Auto Recon.

For Adaptive Cardio Sequences, clustering is not possible.

You cannot scan the Adaptive Cardio Sequence with the feed set to zero.

If **Flex** was selected from the **Scan time** selection list on the **Scan** parameter card, you can change the recon window.

- Change the Phase Start on the **Trigger** parameter card to move the recon window to the required position.

Reconstructing with Cardio BestPhase

The reconstruction of Adaptive Cardio Sequences with Cardio BestPhase is only performed on the scanned phases.



For more information on reconstructing with Cardio BestPhase, refer to: (→ Page 273 *Reconstructing with Cardio BestPhase*)

- Perform the reconstruction with Cardio BestPhase in the usual way.

Reconstructing a multiphase series

You can only select those phases for reconstruction, which are common to all scans of the mode. If the Adaptive Cardio Sequence range has no common phases, the multiphase reconstruction is not possible.



For more information on reconstructing a multiphase series, refer to: (→ Page 274 *Reconstructing a Multiphase series*), (→ Page 275 *Selecting phases for Multiphase reconstruction*), and (→ Page 275 *Modifying Multiphase parameters*)

- Perform the multiphase reconstruction in the usual way.

Performing a TrueStack reconstruction



For more information on performing a reconstruction with TrueStack, refer to: (→ Page 276 *Performing a TrueStack reconstruction*)

- Perform the TrueStack reconstruction in the usual way.

2.5 Respiratory Gating

Respiratory Gating provides respiration correlated scans for radiation therapy evaluation.

These scans enable you to separate tumor contours according to the tumor motion. Therefore, you can plan the radiation therapy more reliably.

For information on the Respiratory Gating System, see: *ANZAI Medical User's Manual*.

The image data are synchronized to the respiratory cycle. To achieve this synchronization, two methods are available which belong to the data acquisition mode:

- In Prospective Triggering, the respiratory signal is used to trigger a CT scan at the appropriate phase of the respiratory cycle.
- In Retrospective Gating, the respiratory curve and the CT raw data are recorded simultaneously. Retrospective gating allows to reconstruct images from any predefined phase of the respiratory cycle.

If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key.

The following functionalities are described in the subsequent sections:

- (→ Page 283 *Preparing the Acquisition*)
- (→ Page 285 *Acquiring with Prospective Triggering*)
- (→ Page 285 *Acquiring with Retrospective Gating*)

If you are not familiar with the basic functionalities of the *syngo* software, see: (→ Page 13 *Basic Functionalities*)

2.5.1 Preparing the Acquisition

In addition to the usual preparations in the examination room and on the console, some actions which are specific to Respiratory Gating are required.

If you register the patient for Respiratory Gating examination and the pressure sensor has not yet been connected, a corresponding dialog box is displayed. Connect the pressure sensor and then click the **Try again** button.

The following functionalities are described in the subsequent sections:

- (→ Page 284 *Preparing Prospective Triggering*)
- (→ Page 284 *Preparing Retrospective Gating*)

Preparing Prospective Triggering

1. Switch your ANZAI system to the trigger mode.
2. Position the patient on the patient table.
3. If necessary, immobilize the patient by using the positioning accessories.
4. Apply the respiration belt with the pressure sensor.
5. Connect the cable to the sensor port.
6. Register the patient for the examination.
7. Select the required **Prospective Triggering** scan protocol in the **Patient Model Dialog**.
8. Scan a topogram.
9. Define the ranges that you want to scan.

Preparing Retrospective Gating

1. Switch your ANZAI system to the gating mode.
2. Position the patient on the patient table.
3. If necessary, immobilize the patient using the positioning accessories.
4. Apply the respiration belt with the pressure sensor.
5. Connect the cable to the sensor port.
6. Register the patient for the examination.
7. In the **Patient Model Dialog**, select the appropriate respiratory scan protocol.

Scan patients with breathing rates below or equal 12 rpm (respirations per minute) with the **RespLowBreathRate** scan protocol, that is, 1 s rotation time. To reduce dose, you can scan patients with breath rates above 12 rpm with the scan protocol **Resp**, that is, 0.5 s rotation time.

8 Scan a topogram and define the ranges for the spiral.

2.5.2 Acquiring with Prospective Triggering

You can perform a scan by using prospective triggering.

Setting trigger parameters

If you want to acquire a Respiratory Sequence, you have to set the trigger parameters on the ANZAI laptop.

- For how to set the trigger parameters, see: *ANZAI Medical User's Manual, Respiratory Gating System*.

Acquiring a control scan

For the control scan, the scan and trigger parameters of the following sequence scan are acquired. You can modify the parameters of the sequence afterwards and check them with a second control scan.

- Perform a control scan to check the scan and trigger parameters.

Acquiring the sequence

- For how to perform the sequence and subsequent reconstructions, see: (→ Page 227 *Acquiring a Sequence*)

2.5.3 Acquiring with Retrospective Gating

The following functionalities are described in the subsequent sections:

- (→ Page 286 *Setting scan parameters*)
- (→ Page 286 *Setting gating parameters*)
- (→ Page 287 *Scaling the respiratory curve manually*)
- (→ Page 288 *Acquiring the spiral*)
- (→ Page 288 *Using the Open Interface mode*)
- (→ Page 290 *Reconstructing*)
- (→ Page 292 *Reconstructing Multiphase series*)

Setting scan parameters

On the **Routine** and the **Scan** parameter card, you can change the scan parameters.

Scan with low pitch to cover the entire breathing cycle.

If the scan should continue in case of respiration signal loss, you must activate the **Synthetic Sync** option. Consider the usage of this option, especially for scans with a contrast medium.

1 Check the scan parameters in the scan protocol on the **Routine** and the **Scan** parameter card.

2 Activate **Synthetic Sync** for examinations with contrast medium.

You can activate or deactivate the **Synthetic Sync** option by selecting the corresponding checkbox in the **Respiratory Gating** configuration dialog box. (→ Page 288 *Activating the Open Interface mode*)

3 If necessary, adapt the scan parameters.

Setting gating parameters

It is possible to define all recon jobs before the scan has been started or after the scan.

In the **Unit** selection list of the **Trigger** parameter card, you can choose between different modes for the reconstruction:

- **%In**: Gating based on the local amplitude
- **%Ex**: Gating based on the local amplitude
- **%Pi**: Gating based on the respiratory phase (only available in the Open Interface mode, see (→ Page 288 *Using the Open Interface mode*))
- **%**: Gating based on the breathing cycle time

1 In the **Unit** selection list, select **% In** (inspiration), **% Ex** (expiration), **% Pi** (phase-based reconstruction), or **%** (time-based reconstruction).

2 In the spin box in the **Phase Start** field, set the percentage of inspiration or expiration.

By setting the percentage, you determine the time slice which you want to reconstruct.

To use the **DEMO MODE**, you have to connect an ANZAI Respiratory Gating device.

To configure the **Respiratory Gating Demo Mode**, see *Online Help*.

Scaling the respiratory curve manually

In addition to an automatic mechanism (default), you can adjust the available respiratory curve manually before the examination.

If you choose the manual waveform setup, automatic adjustment is switched off until the examination is ended.

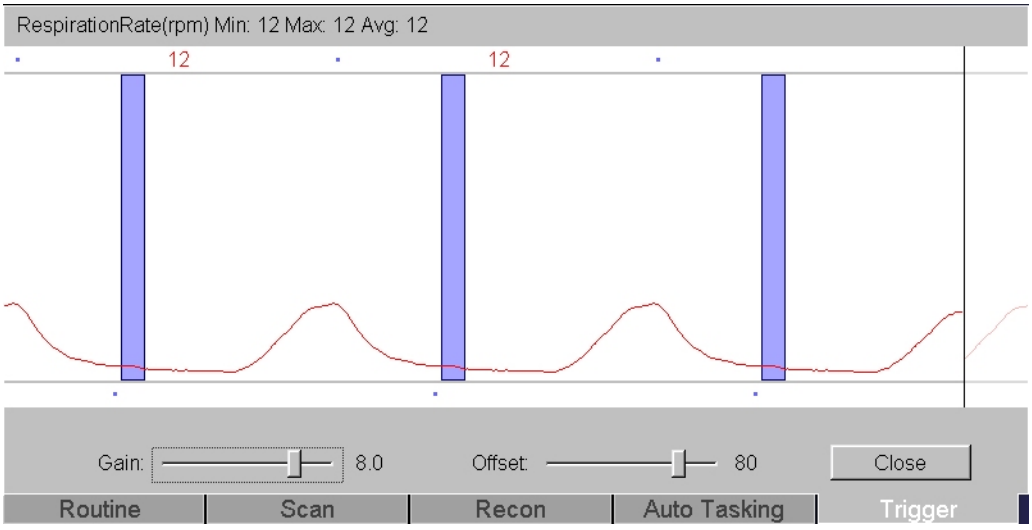
The curve setup is only possible when using ANZAI as respiratory gating device.

1 Select the **Trigger** parameter card.



2 Click the **Curve Setup** icon on the **Trigger** parameter card.

The **Gain** and the **Offset** sliders are displayed.



3 Move the **Gain** slider to modify the curve amplitude.

4 Move the **Offset** slider to shift the entire curve along the y-axis until the requested value and the respective position are reached.

5 Click the **Close** button to switch back to the normal display mode.

Acquiring the spiral

In parallel to the spiral acquisition, the respiratory curve is acquired.

◆ Perform the spiral acquisition the usual way. (➔ Page 233 *Acquiring a Spiral*)

Using the Open Interface mode

Instead of the ANZAI Respiratory Gating device, you can connect other respiratory gating devices, for example, Varian Real-time Position Management (RPM).

In addition to the amplitude information, the Varian respiratory file can contain information about the respiratory phase (**% Pi**). Only if the file contains this information, you can perform a phase-based reconstruction.

Activating the Open Interface mode

✓ The external device provides the breathing information as a persistent file in the Varian file format.

1 Connect the external device to the CT system.

2 Select **Options** > **Configuration** from the main menu.

The **Somaris/7 – Configuration Panel** is displayed.

3 Double-click the **Respiratory Gating** icon.

The **Respiratory Gating** dialog box is displayed.

4 Select the **Open Interface** checkbox to activate the Open Interface mode.

5 Click the **OK** button.

Acquiring the scan

1 Load a Respiratory Gating spiral scan in the chronicle.

If an external device other than ANZAI is connected, a warning message is displayed.

2 Click the **Continue** button to continue with the Open Interface mode.

During the acquisition, the breathing curve is not displayed.

3 Start and complete the scan.

Importing the respiratory file

If you have completed the scan, the **Import Respiratory File** dialog box is displayed. You can select any respiratory file (*.vxp) from the local or connected network drives. The service technician can configure your system so that the respiratory files are saved in the folder H:\SiteData\OffLine by default.

✓ The imported files have at least Varian file version 1.6.

CAUTION

Assigning wrong respiratory data to the selected patient!

Wrong reconstruction result. Reconstruction has to be repeated.

- Ensure that respiratory and patient data match, for example, by defined naming.

1 Select the desired vxp-file.

If you select an unsuitable file or no file is available, the reconstruction is still possible, but it can provide images with artifacts. Do not use these images for diagnosis.

2 Click the **OK** button to import the breathing signal.

The breathing curve is displayed on the **Trigger** parameter card after a successful import. If the curve is not displayed, check if you have used the correct data format.



3 If necessary, click the **Import** icon on the **Trigger** parameter card to repeat the import of the respiratory file.

You can repeat the import at any time. You can also unload an imported file by right-clicking the **Import** icon.

Reconstructing

The respiratory curve contains a scroll bar after the scan which allows you to call up the respiratory progression. Therefore, you can optimize the position of the recon boxes for the entire spiral acquisition.

The respiratory data of the spiral acquisition is stored together with the raw data in the local database.

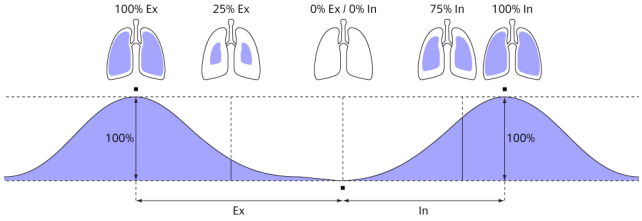
With **Original RESP**, you can switch back and forth between the original and the modified respiratory signal. Since no editing is possible for phase-based reconstruction, the **Original RESP** checkbox is activated by default and cannot be deselected.

If you activate the **Original RESP** checkbox after editing syncs, a message will inform you that the edited syncs will be reset to the original sync.

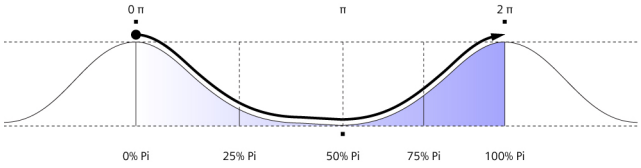
Unit	Reconstruction mode	Description	Example
%In	Gating based on the local amplitude	Defines timestamps as fractions of the local amplitude of each inspiration slope, but not relative to the temporal duration of the inspiration	20% In: Patient inhaled to 20% of the local breathing amplitude (20% of the inspiration is completed)
%Ex	Gating based on the local amplitude	Defines timestamps as fractions of the local amplitude of each expiration slope, but not relative to the temporal duration of the expiration	20% Ex: Patient exhaled to 20% of the local breathing amplitude (80% of the expiration is completed)
%Pi	Gating based on the respiratory phase	The respiratory phase is a parametrization of the breathing cycle where the full breathing cycle corresponds to 2π. The inspiration peak corresponds to 0 of the new breathing cycle and 2π of the preceding cycle. The expiration peak corresponds to π.	20% Pi: Patient completed 40% of the expiration phase

Unit	Reconstruction mode	Description	Example
%	Gating based on the breathing cycle time	The timestamps are calculated based on fractions of the total length of the breathing cycle.	20%: Patient completed 20% of one breathing cycle

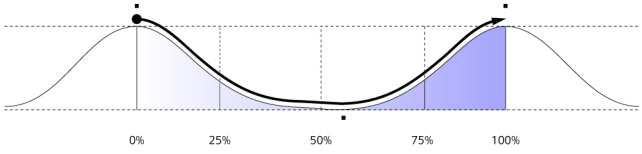
Amplitude-based reconstruction



Phase-based reconstruction



Time-based reconstruction





1 Select a reconstruction job in the chronicle.

2 If necessary, edit the signal by using the entries of the context menu for amplitude-based reconstruction.

3 Change the **Phase Start** on the **Trigger** parameter card to move the recon box to the required position.

4 Define the further reconstruction parameters, if necessary.

On the **Trigger** parameter card, you can select the **Average CT** checkbox to reconstruct the selected recon job as a standard spiral and not as a respiratory spiral.

The **Average CT** feature creates images, which contain raw data from at least one complete respiratory cycle to create an overview over the complete tumor motion within a respiratory cycle. To make sure that the full breathing cycle is represented within Average CT images, reconstruct the images with a sufficient slice width of at least 2 mm and with an “f” or “s” kernel.

5 Start the reconstruction.

Reconstructing Multiphase series

Using multiphase you can reconstruct up to 24 different phases within one recon job.

1 Set the reconstruction parameters as desired on the **Recon** parameter card.



2 Click the **Multiphase** icon on the **Trigger** parameter card.

3 Click the **Recon** button to start reconstruction.

The images are reconstructed and stored in one series.

For every respiration cycle and every selected phase, a blue colored recon box is displayed. Its width is determined by the temporal resolution of the images which are reconstructed at the corresponding z-position.

Selecting phases for Multiphase reconstruction

You can select single phases in a range from 0% through 100%.

- On the phase bar on the **Trigger** parameter card, select single phases.

  - or -

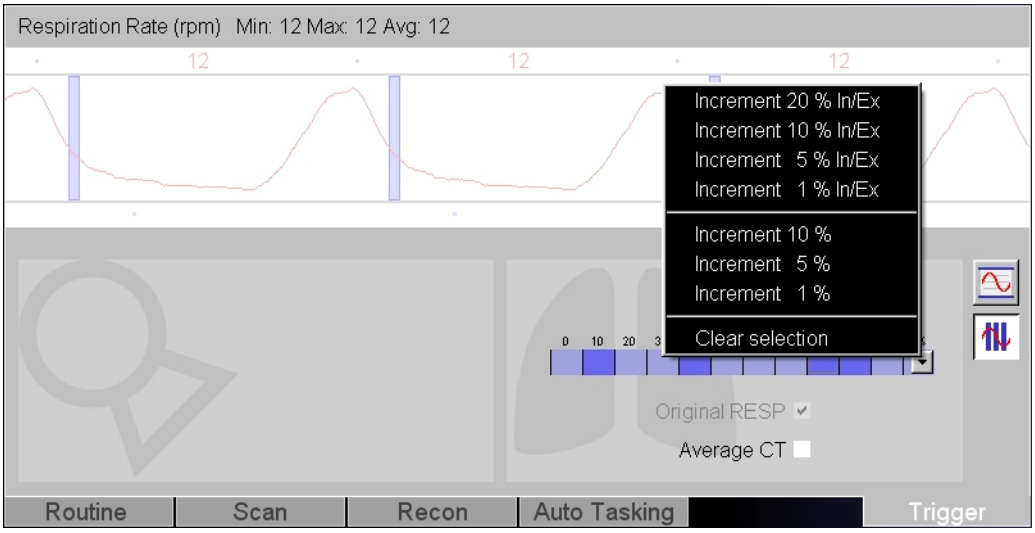
  Select a range of phases by clicking and dragging the mouse.

If too many phases are displayed, you can scroll through the list, and select the phases.

Modifying Multiphase parameters

1 Click the dropdown icon next to the multiphase list on the **Trigger** parameter card.

2 Change the phase increment via the selection list.



2.6 Adaptive 3D Intervention

Adaptive 3D Intervention is a special examination mode for interventions under CT control like biopsies or drainages. The examining physician can trigger individual scans in the examination room at a valid table position.

The **Examination** task card is displayed on a monitor inside the examination room. In that way, the examining physician can plan the movement of the surgical instrument precisely to avoid injuries of sensitive structures like vessels or nerves.

In an Adaptive 3D Intervention, you can use three different scan modes:

- i-Sequence
- i-Spiral
- i-Fluoro

In the i-Fluoro mode, images are continuously reconstructed. The examining physician can monitor the movement of the surgical instrument.

During a scan, you cannot load images into any task card.

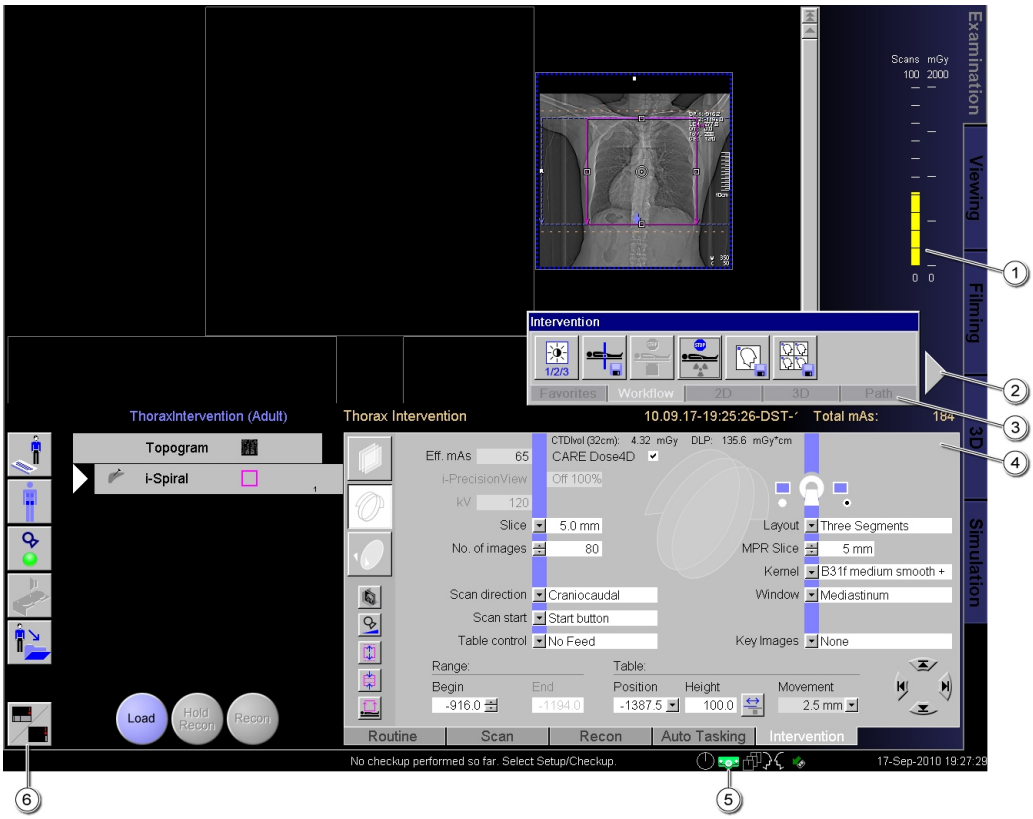
If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key afterwards.

The following functionalities are described in the subsequent sections:

- (→ Page 295 *Using Intervention Parameter Card and Tool Bar*)
- (→ Page 299 *Preparing Intervention*)
- (→ Page 300 *Selecting the Interventional Scan Mode*)
- (→ Page 300 *Setting the Parameters*)
- (→ Page 304 *Performing Scans*)
- (→ Page 312 *Using 3D Intervention*)
- (→ Page 319 *Saving Key Images*)
- (→ Page 320 *Ending Intervention*)
- (→ Page 320 *Defining Screen Layouts with the Layout Editor*)

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

2.6.1 Using Intervention Parameter Card and Tool Bar



(1) Dose display

(2) Show/Hide Intervention tool bar

(3) Intervention tool bar

(4) Intervention parameter card

(5) i-Control icon

(6) Show/Hide parameter card and chronicle

Functions of the Intervention tool bar

The **Intervention** tool bar consists of five tab cards:

- **Favorites** tab card
- **Workflow** tab card

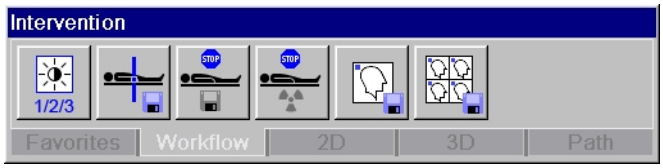
- **2D** tab card
- **3D** tab card
- **Path** tab card

Favorites tab card

On the **Favorites** tab card, which is empty at delivery, you can assemble frequently used icons from the other tab cards. For how to proceed: (→ Page 298 *Assembling frequently used icons (favorites)*)

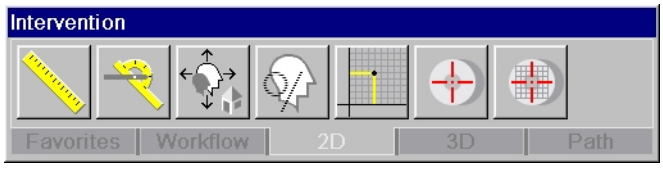
Workflow tab card

The **Workflow** tab card contains icons for windowing, autostopping table, and saving key images. For how to proceed:
(→ Page 304 *Performing Scans*), (→ Page 319 *Saving Key Images*)



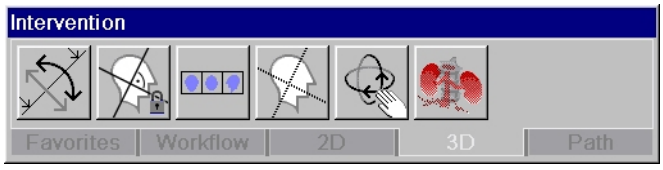
2D tab card

The **2D** tab card provides functions for the 2D evaluation of images. For how to proceed: (→ Page 298 *Using 2D tools*)



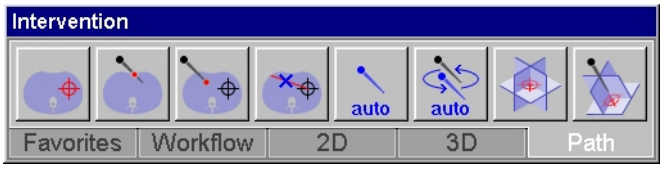
3D tab card

The **3D** tab card provides functions for the 3D intervention. For how to proceed: (→ Page 312 *Using 3D Intervention*)



Path tab card

Via the icons of the **Path** tab card, you can define the target point, the entry point, the needle path, activate needle detection, and select a 3D view mode. For how to proceed: (→ Page 315 *Planning the needle path*), (→ Page 318 *Detecting the needle*),
(→ Page 319 *Saving Key Images*)



The following functionalities are described in the subsequent sections:

- (→ Page 297 *Showing/hiding parameter card and tool bar*)
- (→ Page 298 *Assembling frequently used icons (favorites)*)
- (→ Page 298 *Using 2D tools*)

Showing/hiding parameter card and tool bar

Showing/hiding the Intervention tool bar



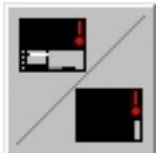
1 Click the **Intervention Toolbar Switch** icon to show the **Intervention** tool bar.



2 Click the **Intervention Toolbar Switch** icon to hide the **Intervention** tool bar.

Moving the chronicle and the parameter card in/out

The parameter cards and the chronicle can be hidden, what is beneficial if you select a screen layout with image segments in the lower screen area. With the scan start, the parameter cards and the chronicle are hidden automatically.



- Click the **Move Chronicle and STC out/in** icon to show or hide the chronicle and parameter cards manually.

If you have selected the **Intervention** parameter card, the icons on the left border always remain visible for a direct control.

Assembling frequently used icons (favorites)

Adding favorite icons

You can add an icon from the other tab cards of the **Intervention** tool bar to the **Favorites** tab card.

1 Right-click the icon you want to add.

2 Select **Add to Favorites** from the context menu.

Removing favorite icons

You can remove an icon from the **Favorites** tab card.

1 Right-click the icon you want to remove.

2 Select **Remove from Favorites** from the context menu.

Using 2D tools

The **2D** tab card of the **Intervention** tool bar provides functions for the 2D evaluation of images.

Measuring a distance



1 Click the **Distance** icon.

2 Drag out a line between two points in the image while holding the left mouse button down to display the distance in the image.

Measuring an angle



1 Click the **Angle** icon.

2 Drag out a line while holding the left mouse button down to define the first leg of the angle.

3 Draw another line for the second leg.

Restoring the zoom factor



- Click the **Home Zoom/Pan** icon.

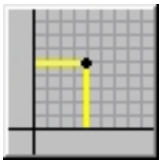
Hiding graphics



- Click the **Hide Graphics** icon.

Displaying a crosshair with scales

You can display a crosshair in the selected segment.



1 Click the **Crosshair** icon.

2 Click in the image to position the crosshair.

Displaying the laser crosshair

In axial segments, you can display a crosshair, which represents the lightmarker.



- Click the **Laser Crosshair** icon to display the crosshair of the lightmarker (without grid lines).

  - or -



Click the **Laser Grid** icon to display the crosshair of the lightmarker and grid lines.

2.6.2 Preparing Intervention

You activate Adaptive 3D Intervention by selecting an interventional scan protocol from the corresponding body region in the **Patient Model Dialog**.

1 Select the desired protocol.

2 Scan a topogram and define the examination ranges.

3 Perform a reference scan if necessary.

You can also use an i-Spiral as a reference scan.

2.6.3 Selecting the Interventional Scan Mode



1 On the **Intervention** parameter card, click the **i-Sequence** icon.

- or -



On the **Intervention** parameter card, click the **i-Spiral** icon.

- or -



On the **Intervention** parameter card, click the **i-Fluoro** icon.

The parameters of the selected scan mode are displayed on the **Intervention** parameter card.

2 Check the settings and modify them, if necessary.
(→ Page 300 *Setting the Parameters*)

In the i-Sequence mode and i-Spiral mode, the raw data of the last scan is saved. You can reconstruct additional images after you have completed the Adaptive 3D Intervention.

2.6.4 Setting the Parameters

You can change the parameters at any time. The **Intervention** parameter card displays the parameters for the selected scan mode.

Three scan modes are available:

- i-Sequence
- i-Spiral
- i-Fluoro

The following functionalities are described in the subsequent sections:

- (→ Page 301 *Displaying and setting the parameters*)
- (→ Page 302 *Defining the table movement*)
- (→ Page 303 *Defining the table repositioning*)
- (→ Page 303 *Defining the image order*)
- (→ Page 304 *Selecting the default screen layout*)
- (→ Page 304 *Selecting the default window settings*)

Displaying and setting the parameters

You can change the parameters on the **Intervention** parameter card.

Displaying the parameters

1 Click the **Intervention** protocol step in the chronicle.

The **Intervention** parameter card and tool bar are displayed.

You can display the parameters of the respective interventional scan mode.



Certain modes of operation allow selections of scan parameters that may lead to a peripheral $CTDI_{100}$ of more than 1 Gy. This dose may exceed the threshold for deterministic radiation effects on the patient's skin or eye lenses. For information on dose reduction techniques, see: (→ Page 377 *Dose management and optimization*). For general dose information on the CT system, see: *System Owner Manual*.

2 Click the icon of the respective interventional scan mode on the **Intervention** parameter card. (→ Page 300 *Selecting the Interventional Scan Mode*)

Setting the parameters

1 Set the parameters on the **Intervention** parameter card.

Only for Definition Edge and Definition AS 128-slice configuration: For i-Fluoro scans, a special slice mode is available under the collimation 32 x 1.2 mm: 9.6 mm - 19.2 mm - 9.6 mm.

The selectable slice width is displayed as 19.2 mm on the parameter card. The number of images is set to three. The image text of the **Effective Slice Width** is set to the real slice width of the image: 9.6 mm or 19.2 mm.

2 On the **Routine** and on the **Scan** parameter card, check the default scan parameters.

3 Correct them, if necessary.

In the majority of cases, you modify the parameters on the **Intervention** parameter card only. Otherwise you can change the parameters on the **Routine** and/or **Scan** parameter card for each of the three scan modes separately.

4 In i-Sequence or i-Spiral mode, select **Start button** or **Foot Switch** from the **Scan Start** selection list.

In i-Fluoro mode, you always perform a scan with the foot switch.

Setting HandCARE

◆ From the **HandCARE** selection list, select a tube position - for example, **10 o'clock position** - where the radiation is paused.

HandCARE is displayed as watermark on the **Intervention** parameter card, on the scan mode icons for i-Sequence and i-Fluoro, and on the **Routine** parameter card.

HandCARE helps to reduce radiation dose for operators inside the examination room.

HandCARE is only available in the i-Sequence and i-Fluoro scan modes. (→ Page 389 *HandCARE*)

Defining the table movement

In the **Movement** selection list, you specify the step length the table moves when you use the joystick or press the symbol keys at the gantry panel.

- Select **Incremental** to move the table by half of the slice width on every interaction.

  - or -

  Select **User defined** to move the table with a user-defined feed and enter the desired step length in the input field.



You can click the **Move Table Top Only** icon to move only the table top. This function provides more space, e.g., for additional devices, between the table base and the gantry during an intervention. A message box informs you when the table top must be moved out of the gantry first.

If the **Move Table Top Only** mode is active, you can tilt the gantry only at the gantry panel and the i-Control.

Defining the table repositioning

Via the items of the **Table control** selection list, you define the automatic table repositioning after each i-Spiral.

To define the table repositioning, there are prerequisites:

✓ The i-Spiral scan mode is active.

- Select **No Feed** to position the table at the end of the preceding i-Spiral.

  - or -

  Select **Feed to Begin Position** to position the table at the begin of the preceding i-Spiral.

  - or -

  Select **Feed to i-Sequence Scan Position** or **Feed to i-Fluoro Scan Position** to position the table at the previous i-Sequence or i-Fluoro scan position.

The items **Feed to i-Sequence Scan Position** or **Feed to i-Fluoro Scan Position** are only available if i-Sequence or i-Fluoro has been scanned in the current intervention.

Defining the image order

The image order on the monitor of the *syngo* Acquisition Workplace depends on the in-room monitor position and the patient position.

The image order is as follows:

Patient orientation	Monitor left of the gantry	Monitor right of the gantry
Head first	Feet-Center-Head	Head-Center-Feet
Feet first	Head-Center-Feet	Feet-Center-Head



- Click the radio button of the real monitor position.

  The images are labeled according to the image order.

Selecting the default screen layout

You can define screen layouts according to your needs. For more information, refer to: (→ Page 320 *Defining Screen Layouts with the Layout Editor*)

- Select the desired screen layout of the image area in the **Layout** selection list.

In the i-Fluoro mode, all acquired images are immediately displayed. Therefore, the list of available screen layouts depends on the No. of images per collimation. If you have modified the parameter **No. of images**, the system verifies if the selected screen layout has a sufficient number of axial segments. If there are not enough axial segments, the system automatically switches to a suitable screen layout.

Selecting the default window settings

- Select the desired window settings in the **Window** selection list.

2.6.5 Performing Scans

The following functionalities are described in the subsequent sections:

- (→ Page 305 *Starting the acquisition*)
- (→ Page 305 *Using i-NeedleSharp*)
- (→ Page 306 *Acquiring images in i-PrecisionView mode*)
- (→ Page 307 *Modifying the scan range*)

- (→ Page 308 *Modifying the window values*)
- (→ Page 308 *Auto stopping the table*)
- (→ Page 309 *Moving the table with the function Same TP*)
- (→ Page 309 *Scrolling through images*)
- (→ Page 311 *Loading different series in a segment*)
- (→ Page 312 *Loading a different recon job*)

Starting the acquisition

As soon as you defined the scan and reconstruction parameters, you can start the acquisition.

The scan start type is predefined on the **Intervention** parameter card.

1 Confirm the scan parameters with **Load**.

2 Start the scan.

You can interact on the CT system during scans (i-Fluoro) and scan pauses.

3 Use the joystick or the keys at the gantry to move the table horizontally.

4 Modify the settings for the next scan.

You can modify, for example, the following settings for the next scan:

- Switching to another interventional scan mode
- Using i-NeedleSharp
- Activating the i-PrecisionView mode
- Switching to 3D Intervention (i-Sequence or i-Spiral only)
- Refreshing 3D images
- Selecting auto stop for table

Using i-NeedleSharp

To reduce needle artifacts use the i-NeedleSharp function.

There are three different needle gauges: small, medium, and large.

✓ The i-Sequence scan mode is active.

Selecting a needle gauge

1 Select the **i-NeedleSharp** check box.



2 Click the suitable needle gauges icon.

Alternatively, you can change the gantry tilt manually in the **Tilt** field. You can save the protocol with the modified tilt value.

Adjusting the scan position

To assure that the needle is within the reconstruction range, you adjust the scan position.

1 Scroll through the images until the best image is displayed.



2 Click the **Move scan range to Displayed table position** icon.

The center of the interventional scan range is positioned at the position of the displayed image.

The horizontal slice position of the resulting nearest image might differ up to half the slice width.

- or -

Switch on the lightmarker on the gantry.

Move the table to place the crosshair of the lightmarker on the Needle position.

3 Start the scan.

If the table is positioned from the *syngo* Acquisition Workplace via icons and simultaneously from the gantry panel or the i-Control, unexpected results may occur.

Acquiring images in i-PrecisionView mode

The i-PrecisionView mode is used to acquire images with a higher or lower eff. mAs/mAs value.

If you click the **i-PrecisionView** icon, you can edit or view the following fields:

- You can edit the **i-PrecisionView** field on the **Intervention** parameter card. The % value defines the eff. mAs/mAs value for the next scan, whereas the value 100% correspond to the default eff. mAs/mAs value.
- The **Eff. mAs/mAs** field is dimmed. It displays the calculated eff. mAs/mAs value to be used for the next scan.

Example: If the default eff. mAs value is 50 mAs and the i-PrecisionView value is set to 120%, the new calculated eff. mAs value is 60 mAs. If the default eff. mAs value is 50 mAs and the i-PrecisionView value is set to 80%, the new calculated eff. mAs value is 40 mAs.



1 On the **Intervention** parameter card, click the **i-PrecisionView** icon.

2 Enter the % value for the i-PrecisionView.

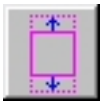
The **i-PrecisionView %** and the **Eff. mAs/mAs** values are updated. The mAs values are only used for the next scan. The %-value is retained.

After the scan, the i-PrecisionView mode is deselected automatically, and the default eff. mAs/mAs value is set again. **Off** is displayed and the item is dimmed.

Modifying the scan range

To modify the scan range, there are prerequisites:

✓ The i-Spiral scan mode is active.



1 Click the **Increase Range** icon on the **Intervention** parameter card to enlarge the scan range.



2 Click the **Decrease Range** icon to shorten the scan range.

The scan range is enlarged or shortened at begin and end position by one slice.



If enlarging or shortening is not possible, the respective icon is dimmed.

Modifying the window values

You can predefine up to three interventional window settings on the **General** tab card of the **Intervention Configuration** dialog box.

1 Select the image you want to modify.



2 Click the **Window Toggle Button** icon on the **Workflow** tab card of the **Intervention** tool bar.

The window switches to the next of four values: The three configured window settings and the value which was manually set before.

Auto stopping the table

The Auto stop functions are used to toggle between two table positions, for example, scan and working position.

Stopping the patient table at a scan position

The position of a scan is saved automatically. You can make the table stop automatically at the position of the last scan:



- Click the **Auto Scan TP** icon on the **Workflow** tab card of the **Intervention** tool bar.

Stopping the patient table at a working position

You can also make the table stop automatically at any other position, which is saved before as working position:

1 Move the table to the desired table position.



2 Click the **Save TP** icon.



3 Click the **Auto Save TP** icon to make the table automatically stop at the saved table position.

As soon as one of the auto stop table positions has been reached, the corresponding icon is highlighted in green.

If the home table position is invalid or not set, the **Auto Home TP** icon is dimmed.

Moving the table with the function Same TP

You can use the **Same TP** function to position the table at the same horizontal table position as the image which is displayed in the selected tomo segment.



- Click the **Move scan range to Displayed table position** icon.

  - or -

  From the **Position** selection list on the **Routine** or the **Intervention** parameter card, select the **Same TP** option.

  The table is repositioned so that the middle of the scan range is located at the horizontal table position of the selected image.



The horizontal slice position of the resulting nearest image might differ up to half the slice width.

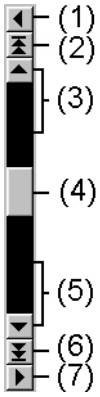
You can also use this function if you have tilted the gantry. In case the center y is not equal to 0, the displayed table position can differ from the image text. Nevertheless, the table is moved to the correct position.

Scrolling through images

To the right of the image display area, the interventional scroll bar is displayed.

The scroll bar provides two different scrolling functions:

- Scrolling through the images *within* an interventional scan
- Scrolling through the images *across* interventional scans



(1) Previous scan

(2) First image

(3) Previous image

(4) Slider

(5) Next image

(6) Last image

(7) Next scan

When scrolling through the images within a scan using the interventional scroll bar, **n of m images** is displayed on the mouse pointer:

- **n** = the number of the image in the axial center segment
- **m** = the total number of images of the interventional scan

When scrolling through the images across the scans using the interventional scroll bar, **n of m scans** is displayed on the mouse pointer:

- **n** = the number of the currently displayed scan
- **m** = the total number of scans

For scrolling through the images within an i-Spiral or i-Sequence scan, you can also use the dog ears and the keys on the symbol keypad.

If you have used the screen layout during the i-Fluoro scan, only the stored images are displayed when scrolling through the images.

If not all images are available, the corresponding segments remain empty. Independent of the configured **i-Fluoro Image Storage Rate**, the last images of the currently performed i-Fluoro scan can be displayed during the intervention.

1 Click the previous scan icon to display the images of the previous scan.

2 Click the first image icon to display the first image of the currently displayed scan.

3 Click the previous image icon to display the previous image of the currently displayed scan.

4 Drag the slider to scroll through the images of the currently displayed scan.

5 Click the next image icon to display the next image of the currently displayed scan.

6 Click the last image icon to display the last image of the currently displayed scan.

7 Click the next scan icon to display the images of the next scan.

Navigating between MPRs and axial images

MPRs and axial images are connected. This function helps you, for example, to display a needle entry point.

1 In the MPR segment, scroll to the needle position.

2 Click the needle.

The axial images that correspond best to this position are displayed. In this example, the needle entry point is displayed.

Loading different series in a segment

You can load a different series (for example, a reference series) from the chronicle or the **Patient Browser** in the predefined reference segment.

- Load the series via drag-and-drop in the reference segment.

Loading a different recon job

In the 3D layout, you can load any recon job (except i-Fluoro) of the current interventional examination from the chronicle. You can then use these data sets to plan a needle path.

1 Load a recon job via drag-and-drop in the MPR segment.

2 Plan the needle path (→ Page 315 *Planning the needle path*).

2.6.6 Using 3D Intervention

The following functionalities are described in the subsequent sections:

- (→ Page 312 *Switching to 3D Intervention*)
- (→ Page 313 *Defining the MPR slice thickness*)
- (→ Page 313 *Refreshing 3D images*)
- (→ Page 314 *Using 3D tools*)
- (→ Page 315 *Planning the needle path*)
- (→ Page 316 *Adjusting the needle path*)
- (→ Page 317 *Deleting the needle path*)
- (→ Page 317 *Switching to the 3D view mode*)
- (→ Page 318 *Detecting the needle*)
- (→ Page 319 *Selecting the image type of a 3D segment*)

Switching to 3D Intervention

In 3D Intervention mode, axial, coronal, and sagittal MPR projections are automatically displayed for i-Spiral and i-Sequence. Furthermore, you can display a VRT projection. You can use the 3D Intervention for improved targeting and navigation during instrument path planning.

For more information, refer to: (→ Page 304 *Selecting the default screen layout*), (→ Page 317 *Switching to the 3D view mode*), (→ Page 320 *Defining Screen Layouts with the Layout Editor*)



◆ On the **Intervention** parameter card, click the **i-3D** icon.

The screen layout switches to the corresponding 3D layout. For i-Spiral, you can immediately see the images. For i-Sequence, you can see the images when the scan starts.

If you have performed a new scan, e.g., a 2D scan, and 3D images from the previous scan are still displayed, they are marked by the image text **Not from current scan** and framed gray.

Defining the MPR slice thickness

You can modify the slice thickness of the 3D MPR projections. This parameter is relevant when using 3D intervention. The maximum slice thickness is 20 mm.

- Enter the desired slice thickness in the **MPR Slice** field on the **Intervention** parameter card.

  - or -



  Press and move the mouse at the bottom of a 3D MPR image to the right or left to increase or decrease the slice thickness.

  The new value is applied to all 3D MPR images.

Refreshing 3D images

If there are 3D projections from a previous scan, you can refresh the last 3D images easily.



- On the **Intervention** parameter card, click the **i-Refresh** icon to add a scan and refresh the 3D projections if you have a 2D i-Sequence or i-Fluoro scan.

  - or -



  Press the **START** key on the control box to refresh the 3D projections if you have a 3D scan.

  - or -



  On the **Intervention** parameter card, click the **i-3D** icon to refresh the 3D projections if you have a 2D Spiral scan.

  In order to refresh the displayed 3D projections, the system repeats the previous 3D scan automatically. After the 3D scan is completed, the previous 2D scan mode is repeated automatically.

If there are no 3D projections from a previous scan, or if the current scan is a 3D scan or an i-Spiral, the **i-Refresh** icon is dimmed.

Using 3D tools

The **3D** tab card of the **Intervention** tool bar provides functions for the 3D evaluation of images.

In order to change position and orientation of the 3D projections, you can perform the following workflow steps:

- Move the reference lines (MPR only)
- Rotate the reference lines (MPR only)
- Rotate images with the mouse (VRT only)

Activating free mode for MPR projections



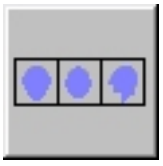
- Click the **Free Mode** icon on the **3D** tab card to rotate the axes in any segment.

Unlocking the reference lines in MPR projections



- Click the **Unlock Reference Lines** icon on the **3D** tab card to move or rotate the reference lines separately.

Resetting the orientation of an MPR projection



- Click the **Default Orientation** icon on the **3D** tab card to reset the orientation of all 3D segments.

Hiding the reference lines in MPR projections



- Click the **Hide Reference Lines** icon on the **3D** tab card to show or hide the reference lines.

Activating VRT rotation mode



- Click the **VRT Rotation** icon on the **3D** tab card to rotate the images with the mouse.

Opening the VRT Gallery



- Click the **VRT Gallery Dialog** icon to open the **VRT Gallery** dialog box.

You can predefine the VRT gallery presets on the **3D** task card. The last selected preset is displayed the next time automatically.

Planning the needle path

To navigate the needle safely during the intervention, you plan the needle path by marking the target point and the entry point.

The 3D visualization of the planned needle path makes it easier to identify areas of risk alongside the path.

It is not possible to set the path points into the topogram or VRT image. You can adjust the path by redefining the path points. For more information, refer to: (→ Page 316 *Adjusting the needle path*)

It is also possible to define a target point only. Then the 3D images are centered to the target.



1 Click the **Needle Target Point** icon on the **Path** tab card of the **Intervention** tool bar.

2 Click the target in the image.

The target point is marked and the 3D projections are centered to the target.



3 Click the **Needle Entry Point** icon on the **Path** tab card of the **Intervention** tool bar.

4 Click the entry point in the image.

The entry point is marked and the path is drawn. The path is applied for the subsequent interventional scans.

The following details of the path are displayed in the 3D MPR projections:

- Length of the path
- Angle between path and axial plane
- Angle between path and sagittal plane

Adjusting the needle path

If the needle deviates from the planned path, you can adjust the path during the intervention.



1 Click the **Needle Tip Point** icon on the **Path** tab card of the **Intervention** tool bar.

2 Click the needle tip in the image.

The needle path is displayed extended between needle tip point and toward the target to the vertical. Needle-oriented images are updated.

- The target point remains marked.
- The angle values in the MPR projections display the deviation of the new path from the line between entry and target point.
- If no path is defined, the **Needle Tip Point** icon is dimmed.

For more information, refer to: (→ Page 318 *Detecting the needle*)

Deleting the needle path



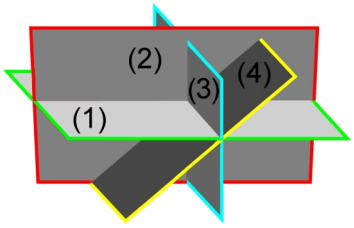
- Click the **Delete Needle Path** icon on the **Path** tab card of the **Intervention** tool bar.

Switching to the 3D view mode

In an Adaptive 3D Intervention, the system provides two different 3D view modes.

Patient-oriented view

In the patient-oriented view, the 3D planes meet in the center of the volume. The axial, coronal, and sagittal planes meet in the target point. You can switch the axial image to the i-VirtualTilt projection. The i-VirtualTilt projection shows a virtual gantry tilt according to the needle.



(1) Coronal image plane

(2) Sagittal image plane

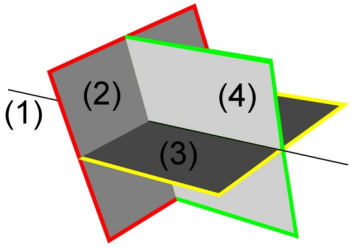
(3) Axial image plane

(4) i-VirtualTilt image plane

The needle path defines the i-VirtualTilt image plane. It displays the needle path completely. The i-VirtualTilt segment is framed in yellow. Instead of the cyan reference line, the image plane is displayed as yellow reference line in the other MPR segments.

Needle-oriented view

The needle-oriented view consists of an i-VirtualTilt image and a needle view image (view through the needle). The plane of the third image is orthogonal to the i-VirtualTilt and the needle view.

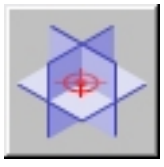


(1) Needle

(2) Needle view plane

(3) i-VirtualTilt image plane

(4) Third image plane



- Click the **Patient Oriented View** icon on the **Path** tab card of the **Intervention** tool bar.

  - or -



Click the **Needle Oriented View** icon.

Detecting the needle

There are two possibilities for needle detection:

- Start automatically after each 3D scan
- Start manually after a 3D scan

The Needle Detection algorithm also detects if the needle is curved. If a curved needle is used, the calculated distance and angles values are not correct. Therefore, the label is extended for curved needles with: **Curved needle!**



1 Click the **Auto Needle Detection** icon on the **Path** tab card of the **Intervention** tool bar to start detection automatically.

- or -



Click the **Single Needle Detection** icon to start detection manually.

Needle-oriented images are updated.

2 Click the **Single Needle Detection** icon again to switch to the next needle in a multi needle intervention.

Selecting the image type of a 3D segment

At the right border of the 3D MPR segments, there are icons to switch the image type.

Toggling VRT view and MPR view



- Click the **VRT** icon to switch to VRT view.

- or -



Click the **MPR** icon to switch to MPR view.

Toggling i-VirtualTilt view and axial view

If a needle path is defined, you can select two further image types for the axial segment of the patient-oriented view. You can also switch to these views without a defined needle path, but you can only see a difference after planning the path.



- Click the **i-VirtualTilt** icon to switch to i-VirtualTilt view.

- or -



Click the **3D Axial** icon to switch to axial view.

2.6.7 Saving Key Images

During the intervention, you can save images that you want to keep for reporting.

Defining a transfer destination

You can define a transfer destination for the key images. All key images are saved in one dedicated key image series.

- Select the desired transfer destination for the key images in the **Key Images** selection list on the **Intervention** parameter card.

Saving all displayed images



- Click the **Save all displayed images as key images** icon on the **Workflow** tab card of the **Intervention** tool bar.

Saving a single image

1 Select the segment with the image you want to save.



2 Click the **Save Key Image** icon on the **Workflow** tab card of the **Intervention** tool bar.

2.6.8 Ending Intervention

Once you have completed the last scan required for the intervention you close the intervention mode.

1 Click the **Cancel** button to cancel the intervention.



2 Continue with the next scan listed in the chronicle or close the examination with the **Close current patient** icon.

With **Close current patient**, the display for the entire radiation dose is reset. It restarts from the beginning at the next examination. If you use **StudyContinue**, the primary dose is used as basis.

2.6.9 Defining Screen Layouts with the Layout Editor

With the **Layout Editor**, you can configure user screen layouts for Adaptive 3D Intervention.

You can change the segments of the second monitor but you cannot change the segments of the system screen layouts of the main monitor. You can only rename the system screen layouts of the main monitor. If a system screen layout is selected, the segment type list of step **2 Define** is dimmed.



You can clear the content of the selected layout with the **Clear** icon.



You can reset the selected layout to its default with the **Default** icon.

You configure screen layouts in three steps:

- Step 1 – Create: Selecting and positioning the segments
- Step 2 – Define: Assigning segment types
- Step 3 – Confirm: Checking and Saving layouts

Opening the Layout Editor

1 Select **Options** > **Configuration...** from the main menu.

The **Somaris/7 – Configuration Panel** is displayed.



2 Double-click the **Intervention** icon.

The **Intervention Configuration** dialog box is displayed.

3 Select the **Layout** tab card.

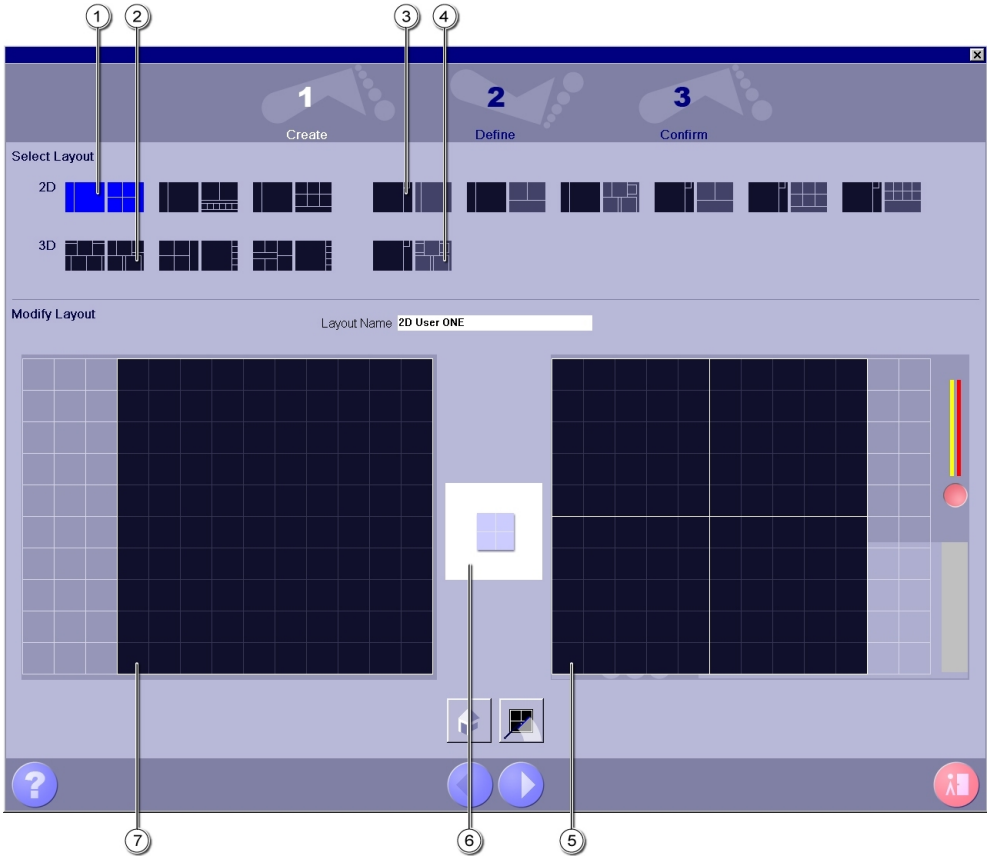


4 Click the **Layout Editor** icon.

The **Open Layout Editor** dialog box with step **1 Create** is displayed.

Creating layouts – step 1

In the layout display, the segments are aligned to the grid.



(1) 2D user screen layouts

(2) 3D user screen layouts

(3) 3D system layouts

(4) 2D system layouts

(5) Layout display main monitor

(6) Segment collection

(7) Layout display second monitor

1 Select the icon of the screen layout you want to change.

2 Drag-and-drop the segment from the segment collection into the layout display to add segments.

3 Drag-and-drop segments out of the layout display to remove segments.

4 Move the segments within the layout display via drag-and-drop to modify their position.

5 Resize the segments by dragging one of the edges.

6 Enter a new name in the **Layout Name** input field if you want to rename the screen layout.

Defining segment types – step 2

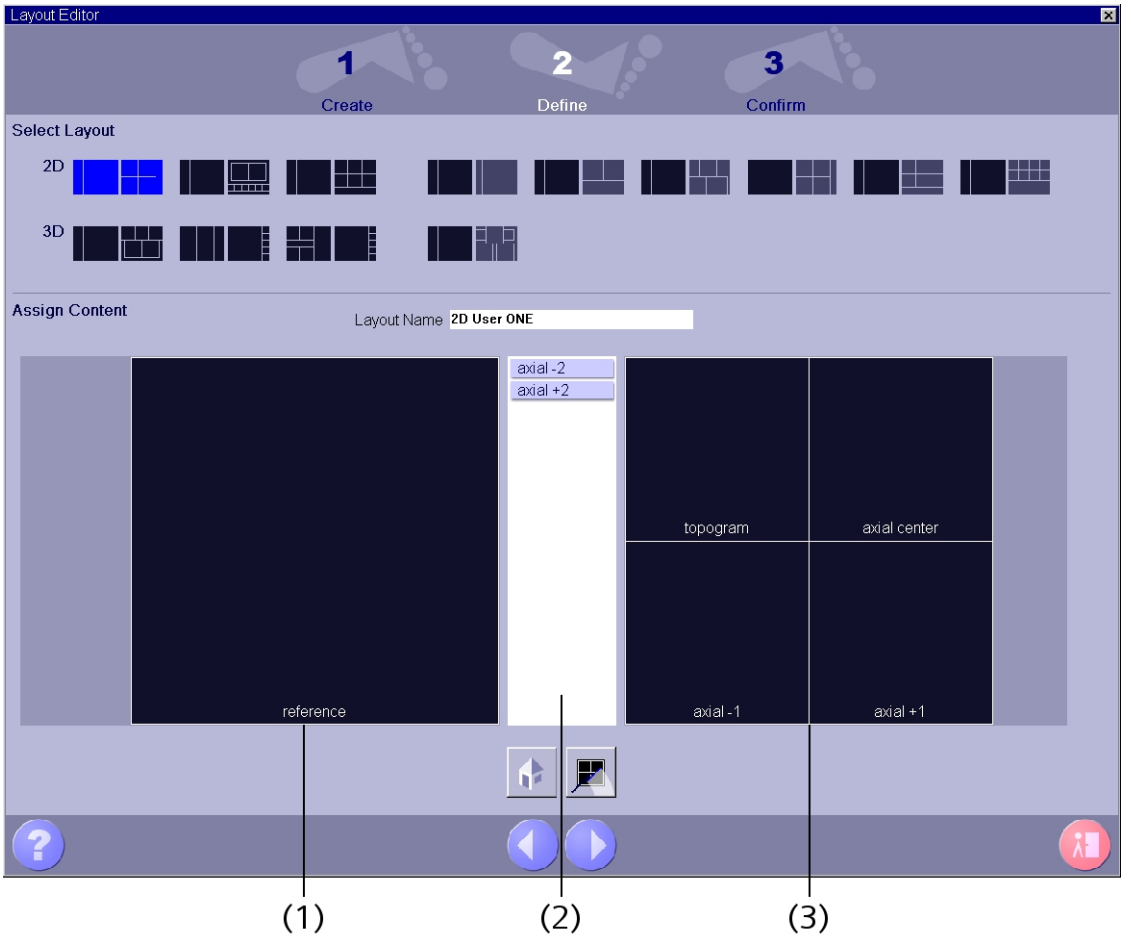
The segment type list leads you through the layout definition. It lists only the possible image types.

For 2D layouts, consider the following procedure:

- At first, you define an axial scan segment on the main monitor.
- Afterwards, you can define:
  - A reference segment
  - A topogram segment
  - Further axial scan segments on the main monitor

For 3D layouts, consider the following procedure:

- At first, you define an axial scan segment on the main monitor.
- Afterwards, you can either define three 3D segments for the patient-oriented view or for the needle-oriented view.
- Furthermore, you can define:
  - A reference segment
  - A topogram segment
  - A VRT segment
  - Further axial scan segments on the main monitor



(1) Layout display second monitor

(2) Segment type list

(3) Layout display main monitor



1 Click the **Next** icon to go to step **2 Define**.

2 Drag-and-drop type names from the segment type list into the segments in the layout display to define or redefine the segment types.

If a system screen layout is selected, the segment type list is dimmed.

Confirming the layouts – step 3



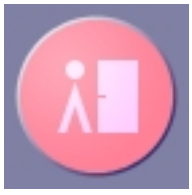
1 Click the **Next** icon to go to step **3 Confirm**.

All screen layouts are displayed and validated.

Invalid screen layouts have a yellow frame. To have more information displayed, move the cursor over the frame.



2 Click the **Save** icon to save the modified screen layout.



3 Click the **Quit** icon to quit the **Layout Editor**.

For editing another screen layout or performing a step again, you can go back to step 1 or 2 with the **Back** icon.

Changes you made with the **Layout Editor** are available after a restart of your system.

2.7 CARE Bolus CT

Many CT examinations are performed with intravenous (I.V.) injection of contrast medium (CM).

For all vascular examinations, it is essential to have a precise timing of the contrast medium. This means that the scan must be performed when the organ or vessel of interest has the optimal contrast enhancement.

Bolus Tracking (CARE Bolus) monitors the flow of CM in the vessel, and triggers the scan at a predefined HU value. It does not require an additional injection of CM but uses the injected CM for the diagnostic scan (spiral, sequence, adaptive 4D spiral, multiscan, Heart Perfusion scan, etc.).

If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key.

The following functionalities are described in the subsequent sections:

- Activating Bolus Tracking
- Performing a PreMonitoring Scan
- Preparing Monitoring Scan and Diagnostic Scan
- Starting Bolus Tracking
- Using Bolus Tracking for TestBolus

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

2.7.1 Activating Bolus Tracking

You can use Bolus Tracking for most of the diagnostic scan modes.

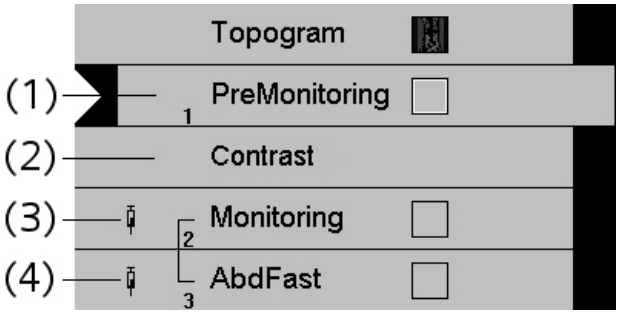
The scan parameters of the diagnostic scan are used to determine the parameter settings of the **PreMonitoring** and **Monitoring** scan.

You can only activate Bolus Tracking if the scan you selected was not examined yet.

1 Select the entry you want to scan with Bolus Tracking in the chronicle.

2 Right-click the entry and select **Bolus Tracking** from the context menu.

All the examination steps required for Bolus Tracking are displayed in the chronicle.



(1) PreMonitoring scan

(2) Contrast medium pause (Contrast)

(3) Monitoring scan

(4) Diagnostic scan for imaging

2.7.2 Performing a PreMonitoring Scan

A **PreMonitoring** scan is always acquired using sequence mode without contrast medium.

◆ Select the **PreMonitoring** scan in the chronicle.

Setting the scan parameters

You can modify the parameters of the **PreMonitoring** scan on the **Routine** parameter card, if necessary.

When inserting Bolus Tracking, e.g., via the main menu, the optimal start delay for the diagnostic scan defines the position of the **PreMonitoring**/**Monitoring** scan.

1 Check and adapt the mAs values, if necessary.



2 Define the position and the FoV in the topogram, depending on the organ to be examined.





The position of the **Monitoring** and **PreMonitoring** scan must be the same.

You cannot modify the gantry tilt of the **PreMonitoring** scan. The tilt of the **PreMonitoring** scan is equal to the tilt of the corresponding diagnostic scan.

Initiating scanning

1 Confirm the parameters of the **PreMonitoring** scan with **Load**.

2 Move the table.



3 Press the **Start** key on the control box.

2.7.3 Preparing Monitoring Scan and Diagnostic Scan

The **PreMonitoring** scan is displayed in the tomo segment. **Contrast** is now selected in the chronicle.

The following functionalities are described in the subsequent sections:

- Defining the trigger ROI
- Defining the Contrast parameters
- Setting scan parameters for Monitoring scan
- Setting scan parameters for diagnostic scan

Defining the trigger ROI

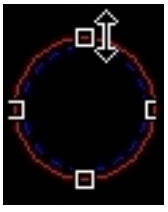
On very small structures, you can zoom the **PreMonitoring** scan to make it easier to draw the ROI.

The **PreMonitoring** image is used as a reference for the enhancement calculation during the monitoring phase. Thus the enhancement values calculated in the monitoring phase are relative and not absolute.

1 Click into the tomo segment to position the ROI.



2 Click into the ROI keeping the left mouse button pressed and move the ROI to the required position.



3 Click the outline of the ROI and, keeping the left mouse button pressed, move it out (larger) or in (smaller).

4 Click the **Accept** button to confirm the previously defined ROI.

Defining the Contrast parameters

You can save the entered information with the scan protocol at the end of the examination. For that purpose, you can call up **Edit** > **Save Scan Protocol** in the main menu. If you insert Bolus Tracking into a scan protocol afterwards, all contrast medium values are reset to 0.

When you save the protocol, only the used monitoring scans are saved as well. For example, if the monitoring only takes 2 scans, this is what will be saved for all patients. Therefore, you should raise the monitoring to a minimum of 15 scans.

1 Edit the contrast medium parameters on the **Contrast** parameter card, if necessary.

2 Set the trigger threshold value using the **Level** spin box.

With the **Auto trigger** mode activated, the diagnostic scan is initiated automatically after reaching the trigger level selected by default.

Setting scan parameters for Monitoring scan

On the **Scan** parameter card, you can check and adapt the following scan parameters, if necessary:

- **mAs** value
- **No. of scans**: If necessary, you can alter the number of **Monitoring** scans with the **No. of scans** spin box. (Currently, the maximum number of scans is 50.)
- **Delay**: The time delay between pressing the **Start** key and triggering the first **Monitoring** scan must be coordinated with the contrast media flow. The value you set depends on the physical condition of the patient and the examination you want to perform.

For the **PreMonitoring** scan and the **Monitoring** scans, a voltage of 120 kV is used by default. On the **Scan** and the **Routine** parameter card, you can adapt the kV value. For the **PreMonitoring** scan and the **Monitoring** scan, the same value will be used.

1 Select the **Monitoring** entry in the chronicle.

2 Check and adapt the scan parameters on the **Scan** parameter card, if necessary.

3 Change the **Cycle time** on the **Scan** parameter card to increase or decrease the intervals between individual scans.

The shorter the cycle time, the more precisely arrival time of the bolus (trigger threshold value) can be defined. However, in that case correspondingly more **Monitoring** scans are acquired.

It is possible to set **Quick** rotation instead of **Full** rotation on the **Scan** parameter card to reduce scan time.

Setting scan parameters for diagnostic scan

- Select the entry in the chronicle and check the range and the parameter settings.

2.7.4 Starting Bolus Tracking

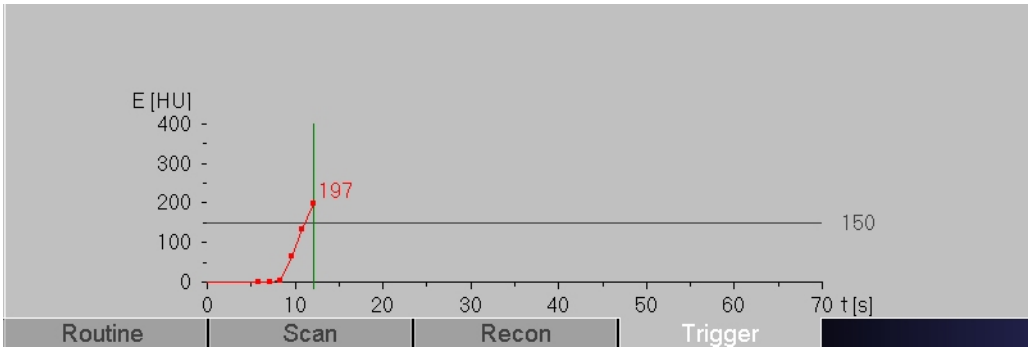
As soon as the set threshold value within the ROI is reached, the diagnostic scan is started automatically.

You can also start the scan manually with the **Start** key on the control box.

- Start contrast medium administration via the bolus injector and the **Monitoring** scan with the **Start** key or the foot switch simultaneously. (➔ Page 333 *CARE Contrast CT*)

Starting the Monitoring scan

After the specified delay time, the system starts the **Monitoring** scan.



1 Check the time-density curve of the contrast enhancement on the **Trigger** parameter card.

If the contrast enhancement does not increase after a few scans, the scanning must be stopped and the bolus injector equipment, the needle, or the vein must be checked.

2 Start the scan if there is contrast enhancement visible in the tomo segment.



After suspending a **Monitoring** scan, you can start the range manually or repeat the **Monitoring** scans.

2.7.5 Using Bolus Tracking for TestBolus

TestBolus is another method of contrast examination, an alternative for the Bolus Tracking method.

On the **Trigger** parameter card, you can easily see at which time a certain HU value is reached.

1 Right-click the chronicle.

2 Choose **Bolus Tracking** to insert the steps into the chronicle.

3 Right-click the diagnostic scan step and insert a **Contrast** pause.

A second contrast pause is inserted in the scan protocol.

4 Plan the ranges.

5 Enter the CM details on the **Contrast** parameter card.

6 Start the bolus injector with the TestBolus.

7 Start scanning the monitoring range.

8 Position the cursor at the point you are interested in on the **Trigger** parameter card and the HU value at this time is shown.

9 Use the time to peak and peak enhancement to calculate the start delay.

10 Enter it as the start **Delay** time on the **Routine** parameter card for the diagnostic scan.

11 Enter the CM details on the second **Contrast** parameter card.

2.8 CARE Contrast CT

The majority of CT examinations are performed with intravenous (i.v.) injection of contrast media (CM). The contrast scan yields good results only, if the acquisition occurs during the optimal phase of enhancement in the region of interest. Therefore, it is essential to determine the exact timing of the contrast injection and the scan. It is also necessary to map this timing onto the CT scanner and bolus injector in a synchronized way.

CARE Contrast CT couples the CT scanner with bolus injectors. Connecting both systems allows the scanner to interact with the bolus injector and vice versa.

If your CT scanner is connected to a bolus injector, communication allows you to start injection and scanning, and stop injection either via the CT scanner or via the bolus injector. You can set the bolus injector parameters on both systems. The parameters are automatically adopted by the other system, and are displayed on the **Contrast** parameter card. The CT system documents the injection parameters. (→ Page 335 *Start/Stop behavior in coupled/uncoupled mode*)

CARE Contrast CT treats the **Pressure Limit** injection parameter as part of the contrast protocol.

We do not recommend establishing a connection to the bolus injector, or switching on the bolus injector during the scan.

For more information on scanning in coupled mode, refer to the operator manual of the used bolus injector.

In compliance with country-specific regulations, only bolus injectors released by Siemens are supported. As soon as the bolus injector is connected, the software checks whether the bolus injector is authorized. It is also checked whether the parameter transfer from the scanner to the bolus injector is available for your bolus injector, or only the transfer from the bolus injector to the scanner.

Contact your Siemens representative for more information on the released bolus injectors.

If you change any values via keyboard, it is necessary that you confirm them by pressing the **Enter** key.

The following functionalities are described in the subsequent sections:

- (→ Page 334 *Activating the coupled mode*)
- (→ Page 338 *Checking the parameter settings*)
- (→ Page 342 *Performing a scan in coupled mode*)
- (→ Page 343 *Canceling a scan in coupled mode*)
- (→ Page 344 *Saving a contrast protocol*)

If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

2.8.1 Activating the coupled mode

You can couple the CT scanner and the bolus injector so that you can start and stop both systems, and transfer the injection parameters between the two systems. The scanner gets extended operational control over the bolus injector. The scanner is able to retrieve information from the bolus injector about the applied injection.

If you paste or repeat a coupled range, the new range is reset to uncoupled.

You can see the status of the bolus injector by different icons in the status bar of the monitor:

Icon	Meaning
	Bolus injector coupling rejected
	Bolus injector available
	Bolus injector ready
	Local procedure on bolus injector active

By selecting **Edit** > **Save Scan Protocol** from the main menu, you can save scan protocols with **Injector coupled** as predefined scan start.

Scan ranges are marked within the chronicle to distinguish an unscanned from an already finished or uncoupled scan range.

Icon	Meaning
	Coupled unscanned scan range
	Coupled scanned scan range
	Uncoupled scan range

Start/Stop behavior in coupled/ uncoupled mode

	Mode	Action	Result
Start	Uncoupled	**Start** key/foot switch	■ Scan starts ■ Injection will not start ■ Injection parameters can only be entered for documentation purposes
	Coupled (start button)	■ **Start** key at the control box ■ **Start** key at the gantry ■ Bolus injector console ■ Bolus injector head	■ Injection protocol is sent to or received from the bolus injector ■ Injection and scan will start simultaneously
	Coupled (foot switch)	■ Foot switch at the CT scanner ■ Bolus injector console ■ Bolus injector head	■ Injection protocol is sent to or received from the bolus injector ■ Injection and scan will start simultaneously
Stop	Coupled (start button or foot switch)	**Stop** key at the CT scanner	■ Injection is canceled ■ Scan is canceled
		■ **Suspend** key at the CT scanner ■ **Suspend** button on the **Examination** task card	■ Injection is canceled ■ Scan is canceled
		Stop injection at the bolus injector	■ Injection is canceled ■ Scan is not canceled
		Bolus injector stops injection due to an incident	■ Injection is canceled ■ Scan is not canceled
		CT scanner stops scan due to an incident	■ Injection is canceled ■ Scan is canceled

Setting the coupled mode In case of an auto range, only the first scan range can be coupled. All following scan ranges are always uncoupled.

Safety advice

Please observe the safety instructions in the operator manual of the bolus injector manufacturer.

CAUTION

Scanning with coupled contrast medium injection!

Undesired radiation.

- Check whether a coupled start is activated or not.

CAUTION

Scanning with coupled contrast medium injection!

Contrast medium not or only partially usable.

- Follow the instructions in the operator manual of your bolus injector.

CAUTION

Coupled start is not activated!

Injection will not be started automatically, if coupled start is not activated.

- Check in **Scan** subtask card whether a coupled start is activated or not.

1 Load a scan protocol with **Contrast** entry.

- or -

Right-click the chronicle.

2 Choose **Contrast**, **Bolus Tracking**, or **TestBolus** on the context menu.

You can change the scan start (**Scan** parameter card) to any coupled option. In this case, a **Contrast** entry is inserted automatically.

3 Select the **Contrast** entry in the chronicle.

The **Contrast** parameter card is displayed.

4 Select **Injector coupled (start button)** or **Injector coupled (foot switch)** from the **Scan start** selection list.

2.8.2 Checking the parameter settings

As the CT scanner and the bolus injector start simultaneously, you have to adjust the scan delay time.

If you activate the coupled mode by inserting a **Contrast** entry, the injection parameters are received from the bolus injector. You can then edit the parameters either on the **Contrast** parameter card, or on the bolus injector, depending on the selected contrast protocol.

Invalid parameters are displayed with a yellow background color.

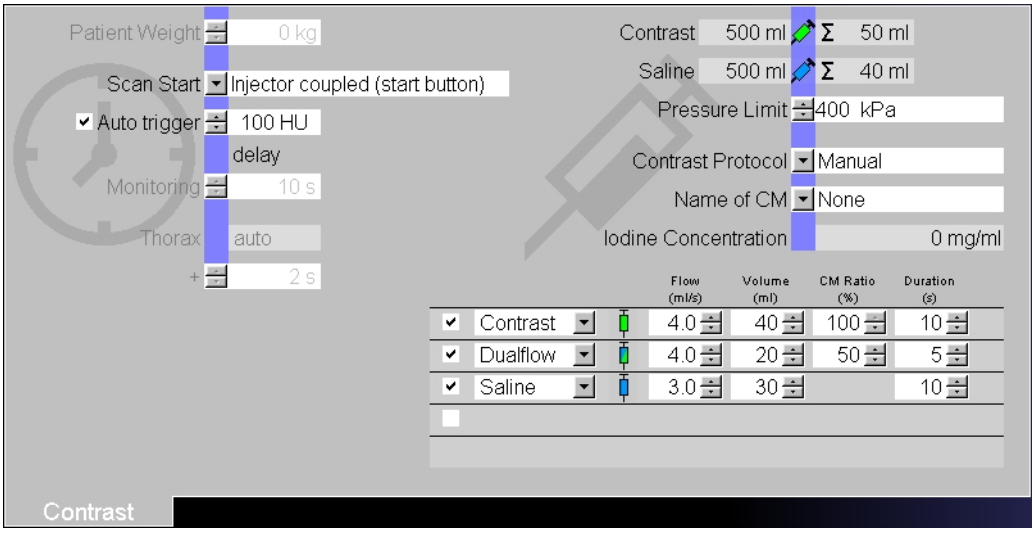
Changing the injection parameters on the **Contrast** parameter card may not be possible on your system. Change the parameters on the bolus injector instead.

We recommend placing the remote control of the bolus injector close to the *syngo* Acquisition Workplace to observe additional messages coming from the bolus injector.

On the **Contrast** parameter card, up to 10 injection phases (incl. delay phases) can be displayed. You cannot see additional phases from the bolus injector.

The **Contrast** parameter card is subdivided into three different areas:

- Left part: Scan parameters
- Upper right part: Injector status, currently set pressure limit, selected contrast protocol, contrast medium information
- Lower right part: Contrast protocol (injection parameters)



From the selection list on the **Contrast** parameter card, you can choose the different kinds of bolus injector parameter handling:

- **Injector**: The injection parameters are received from the bolus injector and are displayed on the **Contrast** parameter card.
- **Manual**: In the coupled mode, the injection parameters are editable and will be immediately transferred to the bolus injector for parametrizing.
- User-defined contrast protocols: The injection parameters of the user-defined contrast protocols are used for setting the parameters of the bolus injection.

In the upper right part of the **Contrast** parameter card, you can see the total amount of remaining contrast medium and saline. ∑ indicates the total amount of the contrast medium and saline to be applied.

Double-check the pressure limit before each scan. Make sure you check the pressure limit on the **Contrast** parameter card and at the bolus injector.

Only valid contrast protocols can be sent to the bolus injector. The contrast protocols of the CT system and the bolus injector will only match if valid parameters are set.

1 In the chronicle, select the **Contrast**, **TestBolus**, or **Bolus Tracking** entry.

   The **Contrast** parameter card is displayed.

2 From the **Contrast Protocol** selection list, select the desired contrast protocol.

   The injection parameters on the bolus injector will be overwritten.

3 On the **Contrast** parameter card or on the bolus injector, check the injection parameters.

Instead of clicking each injection parameter value separately, you can also use the **Tab** key of your keyboard.

4 On the **Contrast** parameter card or on the bolus injector, change the parameters, if necessary.

   After changing the parameters on the **Contrast** parameter card, they are sent immediately to the bolus injector. The entry in the **Contrast Protocol** selection list changes to **Manual**.

5 In the **Name of CM** selection list, check the used contrast medium and change it, if necessary.

On the **Contrast** tab card of the **Examination Configuration** dialog box, you can add more contrast media to the **Name of CM** selection list.

In the **Apply** selection list, choose **Dualflow** instead of **Saline** or **Contrast** to apply saline and contrast medium at the same time. **Dualflow** is only available for the coupled mode if the connected bolus injector supports this feature. In the **CM Ratio%** entry field, you can adjust the amount of the applied contrast medium.

6 Select the diagnostic scan entry in the chronicle.

7 Check the default scan parameters on the **Routine** parameter card and correct them, if necessary.

Defining the start delay

You can perform a TestBolus scan with a small amount of contrast medium to define the start delay. Therefore choose **TestBolus** from the context menu of the chronicle. Load the acquired images in *syngo* Dynamic Evaluation to evaluate the time to peak enhancement. This time can then be used as the optimal start delay time for the diagnostic scan.

CAUTION

Misunderstanding of reference point for start delay in bolus examination!

Faulty synchronization between bolus and scanning.

- Ensure that the chosen delay time fits to the characteristics of the bolus injection.

- Enter the required scan delay time in the **Delay** entry field.

  On the **Contrast** parameter card, the delay is updated accordingly (read-only).

2.8.3 Performing a scan in coupled mode

If your CT scanner is connected to a bolus injector, communication allows you to start injection and scanning, and stop injection either via the CT scanner or via the bolus injector. If the bolus injector is released for the injection parameter transfer from the CT scanner to the bolus injector, the injection parameter are also editable on the **Contrast** parameter card.

1 Perform the scan in the usual way. (→ Page 215 *Scan*)

If the connected bolus injector is not ready for injection yet, a yellow message bubble will be displayed that prompts you to check the bolus injector.

2 Check the bolus injector as described in the operator manual of the bolus injector.

3 Enable the bolus injector for injection.



If you have checked it already before loading, the yellow message bubbles **Press foot switch** or **Press START** together with a syringe icon indicate that both systems are ready for scanning.

As soon as the bolus injector is enabled for injection, the parameters are dimmed on the **Contrast** parameter card.



For more information on the remote CT scanner start, refer to the operator manual of the configured bolus injector.

4 Press the **START** key on the control box or the foot switch of the CT scanner to start both systems.

- or -

Press the **START** key on the bolus injector to start both systems.

After the injection, the effectively used injection parameters are updated on the **Contrast** parameter card, and are documented by the CT system.

Depending on the bolus injector, the bolus injector console shows nominal values of the injection protocol after the injection. On the **Contrast** parameter card, the achieved values are displayed.

For further instructions on switching the display to the achieved values of the injection (flow and pressure curve), refer to the operator manuals of the bolus injector manufacturer.

The values for the injection phase duration and pressure limit which are displayed at the bolus injector and the **Contrast** parameter card can slightly differ. This behavior is caused by different rounding methods.

The contrast management and the injection parameters are documented via the following features:

- MPPS
- Patient protocol
- E-Logbook

2.8.4 Canceling a scan in coupled mode

For more information on the bolus injector handling, see the operator manual of the bolus injector manufacturer.

Safety advice

Please observe the safety instructions in the operator manual of the bolus injector manufacturer.

CAUTION

Loss of communication to the bolus injector!

Injection will not be stopped automatically, if scan is aborted or suspended.

- If needed, stop injection at the bolus injector console.
- Stop scan if the bolus injector has not delivered enough contrast media.

CAUTION

Injection stopped by the user!

X-ray not or only partially usable.

- Press **Suspend** at scanner if not enough contrast media was delivered.

- Click the **Suspend** button to cancel both, injection of contrast medium and radiation.

If the injection is canceled at the bolus injector, the scan is not automatically stopped. (→ Page 335 *Start/Stop behavior in coupled/uncoupled mode*)

2.8.5 Saving a contrast protocol

A contrast protocol is part of the scan protocol.

When you save a scan protocol, the corresponding contrast protocol is also saved.

Instead of saving the contrast protocol along with the scan protocol, you can save the contrast parameter settings separately. Then you can append the saved contrast protocol to any scan protocol.

Saving the contrast protocols may not be possible on your system, depending on the bolus injector and your country-specific regulations.

1 On the **Contrast** parameter card, change the injection parameters.

2 On the main menu, choose **Edit** > **Save Contrast Protocol** to overwrite the current contrast protocol.

- or -

Choose **Edit** > **Save Contrast Protocol As...** to save a new contrast protocol.

3 In the **File name** entry field of the **Save Contrast Protocol** dialog box, enter the name of the contrast protocol.

4 Click the **Save** button.

Appending a contrast protocol to a scan protocol

The same contrast protocol can be appended to different **Contrast** entries in different scan protocols. This means that changing a contrast protocol influences all scan protocols which are linked with this particular contrast protocol.

1 Load a scan protocol.

2 Insert a **Contrast**, **TestBolus**, or **Bolus Tracking** entry.

3 From the **Contrast Protocol** selection list, select a contrast protocol.

In the Scan Protocol Assistant, you can also append a contrast protocol to a scan protocol.

2.9 MPPS

The exchange of information based on Modality Performed Procedure Step (MPPS) closes the gap between the modalities and the HIS/RIS. The information documents the actions being performed for a patient.

During an examination, the modality sends a message indicating the start and the end of the examination. As a result, you can call up the status of the examination at any time.

The MPPS is generated according to the DICOM Standard for archiving and evaluation purposes.

The MPPS component mainly handles the following points:

- Creating MPPS during patient examination
- Passing information to the HIS/RIS
- Updating the MPPS status to the HIS/RIS based on user interaction and automatic procedures

Thus a smooth clinical flow is ensured, and billing, dosage, and other information is generated within the hospital system.

Following helpful features for integrating the modalities with the supervising information system in the hospital are provided:

- Displaying the patient information for MPPS
- Viewing the protocol codes for MPPS
- Viewing the dose information for MPPS
- Viewing the billing information for MPPS

The MPPS function is available by an optional software license. If this license is not available, only local MPPS management is possible, and no feedback is sent to the HIS.

The CT system generates entries automatically in the MPPS, for example, applied dose, generated series, and consumed contrast media. You can also add information manually (for example, volume, contrast medium).

An MPPS is typically created as a part of the patient registration process, in which the following actions can be performed:

- The HIS/RIS requests a worklist procedure
- A locally created procedure (such as for an emergency patient) is prepared for acquisition

In case you cannot edit the MPPS information, you do not have appropriate access rights. Security in *syngo* ensures that access to functions and data is always provided in accordance with the privileges and permissions granted to a user.

The following functionalities are described in the subsequent sections:

- Controlling the MPPS
- Completing the MPPS



If you are not familiar with the basic functionalities of the *syngo* software, refer to: (→ Page 13 *Basic Functionalities*)

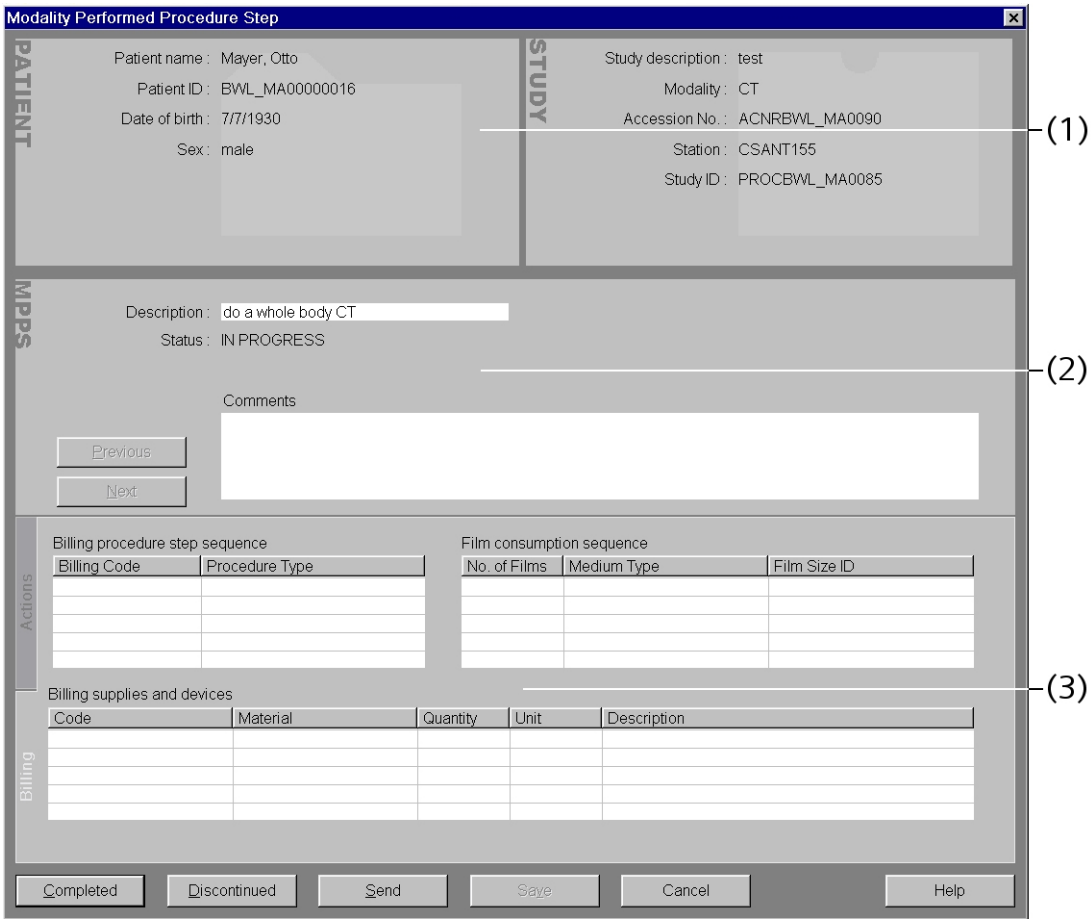
2.9.1 Controlling the MPPS

The availability of buttons depends on the status of the MPPS.

Layout of the MPPS dialog box

The **Modality Performed Procedure Step** dialog box consists of three areas:

- **Patient** and **Study** areas
  - Patient data
  - Study description
- Upper part of the **MPPS** area
  - Data of the selected MPPS
  - Input field for comments to the MPPS and navigation buttons
- Lower part of the **MPPS** area
  - Examination data sorted by various aspects and displayed in three tab cards (not all of them may be available at your modality)



(1) **PATIENT** and **STUDY** areas

(2) Upper part of the **MPPS** area

(3) Lower part of the **MPPS** area

Information about status and changes of the MPPS is sent to the HIS/RIS every time you click one of the following buttons in the **Modality Performed Procedure Step** dialog box:

- **Completed**
- **Discontinued**
- **Send**

The following functionalities are described in the subsequent sections:

- Opening the MPPS dialog box
- Navigating between MPPS objects
- Saving an MPPS
- Finishing an MPPS
- Aborting an MPPS
- Sending Information back to HIS/RIS
- Closing the MPPS dialog box without any changes
- Checking the MPPS Information

Opening the MPPS dialog box

In the **Patient Browser**, the MPPS series are marked by the following flags:

- IN PROGRESS: Series refers to MPPS which is in Progress
- DISCONTINUED: Series refers to MPPS which is Discontinued
- HIS (Hospital Information System) or LOC (Local): Series belongs to an examination planned by RIS (Radiology Information System) or locally by the MTRA
- se: MPPS message acknowledged by IS

1 Select the patient, the examination, or one of the associated series or images from the **Patient Browser**.



2 Click the **Show MPPS** icon in the tool bar of the **Patient Browser**.

Navigating between MPPS objects

Before you conclude your work on the examination by archiving, check and add missing entries to the performance report.

The usage of the DICOM service MPPS depends on the availability of the corresponding RIS system. Even if no RIS with MPPS service is connected, the **MPPS** icon is displayed in the **Patient Browser**.

By default, the latest MPPS object is displayed.

1 Click the **Next** button to have the later MPPS object displayed.

2 Click the **Previous** button to have the earlier MPPS object displayed again.

Saving an MPPS

Saving an MPPS does not complete the examination. No message is sent to the HIS/RIS.

- Click the **Save** button to save your changes of the document.

Finishing an MPPS

If you consider further steps, you can at first save the document, and close it later.

- Click the **Completed** button to close the MPPS dialog box when all data shown in the performance document are correct, and complete the examination.

  The MPPS is closed. A corresponding message is forwarded to the HIS/RIS.

Aborting an MPPS

- Click the **Discontinued** button if the examination is canceled.

  The MPPS is closed. A corresponding message is forwarded to the HIS/RIS.

Sending Information back to HIS/RIS

The **Send** button is displayed only, if an MPPS node is configured.

- Click the **Send** button to mark the MPPS as being processed and to inform the HIS/RIS about changes in the MPPS.

Closing the MPPS dialog box without any changes

- Click the **Cancel** button to close the dialog box if you only have opened the document for printing or viewing.

Checking the MPPS Information

In the status bar of any task card, you can easily confirm whether the message was successfully sent from MPPS to HIS/RIS.

1 Click in the center of the status bar of the task card to check the corresponding entry in the History of Events.

A list of events is displayed.

2 Look for an entry in the list concerning the MPPS.

If you do not find such an entry, it is already removed, because the information was sent successfully to the HIS/RIS.

3 If you find an entry concerning the MPPS, click it.

If an error occurred, a message appears. Check also the status bar at the bottom of the task card for any error information.

2.9.2 Completing the MPPS

You can complete all MPPS of a patient or a study simultaneously.

Automatic completion

In the **Workflow** tab card of the **Examination Configuration** dialog box, you can activate the checkbox **Auto Complete MPPS**. All MPPS are then automatically set to **COMPLETED** after all recon jobs were reconstructed and the patient was closed.

- Make sure that you printed all film sheets before closing the patient. Otherwise MPPS does not consider the film sheets anymore.

If autofilming is active, all the images sent to **Filming** will be inserted in the MPPS and not the ones that were really printed.

Manual completion

1 Select the study or patient.



2 Click the **Complete MPPS** icon in the **Patient Browser**.

The status of all related MPPS is set to **COMPLETED**.

2.10 Scan Protocol Assistant

You can use the **Scan Protocol Assistant** to manipulate scan protocols, change their parameters, import, export, restore them as well as to define contrast protocols, list, import, and export them.

The number of available protocols has a high impact on the performance of the **Scan Protocol Assistant**. When you use the **Scan Protocol Assistant** very often, Siemens recommends reducing the number of protocols as far as possible.

Two different categories of scan protocols are available:

- Siemens protocols
- User protocols

You can only manipulate and create user protocols.

Siemens default scan protocols provide an optimized set of parameters balancing image quality, scan time, and patient dose. They are defined to be applied directly to your examination after minor adaptions of, for example, the language of the Automatic Patient Instructions. Special clinical conditions and applications may require the adaption of the default recommendations. As the final diagnosis is the sole responsibility of the user, the user always has to make sure that the chosen scan protocol meets the requirements of the examination.

The availability of scan protocols depends on your license.

Additionally, the availability of features depends on your user account. For this reason, Siemens recommends closing the **Scan Protocol Assistant** and logging off before changing user.

The following aspects are described in the subsequent sections:

- Calling up the Scan Protocol Assistant
- Modifying scan protocols
- Changing parameters

- Importing user scan protocols
- Exporting scan protocols
- Restoring scan protocols to Siemens default
- Mapping *syngo*.via workflow
- Defining contrast protocols
- Listing/importing/exporting contrast protocols

If you are not familiar with the basic functionalities of the *syngo* software, see (→ Page 13 *Basic Functionalities*)

2.10.1 Calling up the Scan Protocol Assistant

You can call up the **Scan Protocol Assistant** via the **Somaris/7 – Configuration Panel**.

1 Select **Options** > **Configuration...** to open the **Somaris/7 – Configuration Panel**.



2 Double-click the **Scan Protocol Assistant** icon in the **Somaris/7 – Configuration Panel** to open the **Scan Protocol Assistant**.



You can close the **Scan Protocol Assistant** without saving the changes at any time by clicking the **Quit** icon.

2.10.2 Modifying scan protocols

You can cut, copy, paste, remove scan protocols, and assign **Emergency** and **FAST Cardio Wizard** protocols.

Adult and **Child** protocols are managed separately.

1 Click the **Manipulate scan protocols (cut/copy/paste/delete)** radio button on the step **1** page of the **Scan Protocol Assistant**.



2 Click the step **2** button.

3 Activate the checkbox of the scan protocol you want to modify.

- or -

Activate the **Select invalid protocols** checkbox to show all invalid scan protocols.

If you want, you can export a list of the invalid protocols.
(→ Page 362 *Listing scan protocols*)

4 Right-click the scan protocol.

The context menu is displayed.

5 Select **Cut**, **Copy**, or **Remove** from the context menu.

You cannot remove the **Emergency** protocol and the **FAST Cardio Wizard** protocol.

Assigning Emergency and FAST Cardio Wizard protocols

You can set one scan protocol as the **Emergency** protocol with the **Emergency** icon in front of its name, or one cardio protocol as a **FAST Cardio Wizard** protocol with the **FAST Cardio Wizard** icon in front of its name.

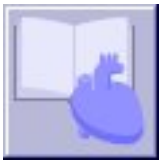
1 Select the protocol you want to set as **Emergency** protocol on step **2** page.



2 Click the **Set emergency protocol** icon.

3 Confirm the displayed message box.

4 Select the protocol you want to set as **FAST Cardio Wizard** protocol.



5 Click the **Set FAST Cardio Wizard protocol** icon.

An **Emergency** protocol cannot be set as a **FAST Cardio Wizard** protocol, and a **FAST Cardio Wizard** protocol cannot be set as an **Emergency** protocol as well.

The **Set FAST Cardio Wizard protocol** icon appears only for **Adult** and depends on the availability of a license.



6 Click the step **3** button.

All relevant information is displayed on the **Confirmation Page**:

- Names of the modified scan protocols
- Destination folders
- Names of the deleted protocols
- Names of the changed **Emergency** and **FAST Cardio Wizard** protocols

7 Check the modifications that you have done.

8 Deactivate the checkbox in front of the protocol to discard the changes, if necessary.

9 Click the **Yes** button to save the changes.

Step **4** is displayed.

If a password protection is activated in the Local Service configuration, the Save Scan Protocol dialog box opens. See (→ Page 367 *Activating a password protection*). Enter the configured password. Otherwise the scan protocol cannot be saved.

10 Click the **Yes** button to make further changes.

- or -

Click the **End** button to exit the **Scan Protocol Assistant**.

11 Restart the system to activate a new default **Emergency** protocol.

2.10.3 Changing parameters

Using the **Scan Protocol Assistant**, you can change all scan protocols and also change the parameters of several scan protocols simultaneously.

You can select the following groups of scan protocols:

- All scan protocols
- Axial recon jobs
- 3D recon jobs
- SAFIRE recon jobs
- All scan protocols with ECG
- Protocols with Dual Source and Dual Energy
- Respiratory protocols
- Interventional protocols
- All customized scan protocols
- All Siemens default protocols
- Single scan protocols
- All scan protocols within a body region
- Several body regions

The display of the scan protocol parameters depends on the selected section.

1 Click the **Change parameters** radio button on the step **1** page of the **Scan Protocol Assistant**.



2 Click the step **2** button.

Step **2** page is displayed.

3 Select **Adult** or **Child**.

If the **Child** checkbox is selected, a text is shown to tell you about the definition of **Quality ref. mAs** value for child scan protocols.

When you change the **Quality ref. mAs** value for a child protocol and if the protocol is from an older software version, a notice window informs you to adjust the value to the new reference patient size.

4 Select the scan protocols for changing parameters.

- or -

Activate the **Select invalid protocols** checkbox to show all invalid scan protocols.



5 Click the step **3** button.

The **Protocol**, **Topogram**, **Scan**, **Recon**, **Auto Tasking**, **Trigger**, **Intervention**,and **Contrast** buttons are displayed in the upper area of the **Scan Protocol Assistant** dialog box.

6 Click the desired button.

The corresponding **Change parameters** page opens.

7 Double-click the parameter entry in a cell of the grid.

8 Change the parameters in the cell.

- or -

Select the desired item from the selection list.

Special characters (for example, * ! = ; ? % /) are not allowed to be included in the name of a scan protocol.

9 Click another parameter entry to confirm your changes.

The background of the modified parameters is displayed in different colors, depending on the status of the parameters:

- Green: Valid modified parameters
- Yellow: Invalid modified parameters
- White: Existing, not modified or saved parameters

These color rules only work for the selected protocols. After saving, the modified parameters change to having white as a background color.



10 Click the step **4** button.

All relevant information is displayed on the **Confirmation Page** including names of modified protocols and relevant parameters, as well as old and new values of the modified parameters.

11 Deactivate the **Apply** checkboxes of the protocols in case you do not want to change them.

12 Click the **Yes** button to save the changes.

Step **5** is displayed.

If a password protection is activated in the Local Service configuration, the Save Scan Protocol dialog box opens. See (→ Page 367 *Activating a password protection*). Enter the configured password. Otherwise the scan protocol cannot be saved.

13 Click the **Yes** button to make further changes.

- or -

Click the **End** button to exit the **Scan Protocol Assistant**.

Changing the parameter panel set

You can change the view of the parameter panel and call up special functions on the **Change parameters** page.



1 Click the **Column Configuration** icon to change the view of the parameter panel if necessary.

You can change the order of the columns, as well as their width, and show or hide them in the panel.



2 Click the **Show/Hide Parameter** to show or hide the parameter modification area if necessary.



3 Click the **Parameter Property** if necessary.

You can see the **Minimum value**, **Maximum value**, **Increment**, and **Unit** of the parameters.



4 Click **Find / Replace** to find the parameter you want to change and replace it with a new one.

2.10.4 Importing user scan protocols

You can import scan protocols from a CD-R/DVD-R or a USB device.

The scan protocols that are displayed depend on your system licenses.

You can only import scan protocols that have been exported from an equivalent CT system having the same or an older software version.

1 Insert the medium on which the scan protocols are stored.

2 Copy the scan protocols data to the H:\SiteData \ImportScanProtocols folder via the **File Browser**.

3 Click the **Import user scan protocols** radio button on the step **1** page of the **Scan Protocol Assistant**.



4 Click the step **2** button.

The list of scan protocols to be imported is displayed.

5 Select the protocols you want to import.

6 Click the **Import** button to import the selected scan protocols.

The selected scan protocols are copied to the system and placed on the corresponding body region in the **Scan Protocol Assistant**.



7 Click the step **3** button.

8 Click the **Yes** button to make further changes.

- or -

Click the **End** button to finish the import.

2.10.5 Exporting scan protocols

You can export scan protocols to the H:\SiteData \ExportedScanProtocols folder, and transfer them to the peripheral equipment via the **File Browser**.

1 Click the **Export scan protocols** radio button on the step **1** page.



2 Click the step **2** button.

3 Select a scan protocol or a group of scan protocols.



4 Click the step **3** button.

The list of scan protocols to be exported is displayed in the **Export overview** window.

5 Click the **Yes** button to confirm the export.

A message box is displayed to inform you that the scan protocols have been exported to the H:\SiteData\ExportedScanProtocols folder.

6 Click the **OK** button.

Step **4** page is displayed.

7 Click the **Yes** button to make further changes.

- or -

Click the **End** button.

2.10.6 Restoring scan protocols to Siemens Default

You can restore the scan protocols that you have modified to the Siemens default.

1 Click the **Restore scan protocols to Siemens default** radio button on the step **1** page of the **Scan Protocol Assistant**.



2 Click the step **2** button.

Now you can select the required function.

Replacing protocols

1 Select the modified scan protocols you want to restore to the Siemens default.

2 Select **Replace customized protocols with same name**.



3 Click the step **3** button.

All selected protocols are displayed.

4 Click the **Yes** button on the confirmation page to confirm the substitution.

All selected scan protocols are replaced with the Siemens default scan protocols. The changed protocols will be replaced.

If a scan protocol with the same name exists, new copies are numbered.

Duplicating protocols

1 Select the scan protocols you want to duplicate.

2 Select **Add Siemens protocols as duplicates**.



3 Click the step **3** button.

All selected protocols are displayed.

4 Click the **Yes** button to confirm the duplication.

All modified scan protocols having the same name as original Siemens protocols are saved with the extension **Customized**.

The original Siemens protocols are copied to the corresponding body region folder.

You can activate the **Select all** checkbox to view all deleted and modified Siemens default scan protocols for the current body size.

2.10.7 Listing scan protocols

You can have all or the selected scan protocols listed in an overview window, and can also export a scan protocol list.

The displayed parameters of the list are set by the system.



1 Click the **List all protocols** icon in the lower left corner of the **Scan Protocol Assistant** to list all scan protocols.

- or -



Click the **List selected protocols** icon to list all currently selected scan protocols.

The **Scan protocol listing** dialog box is displayed.

2 Click the **Export** button to export the list.

The scan protocol list is exported to H:\SiteData\protocols for reuse in Microsoft Excel on an external computer.

You have to use the **File Browser** to transfer the XML file and the corresponding XSLT stylesheet to the peripheral equipment, for example, with a USB device.

2.10.8 Mapping *syngo*.via workflow

If your CT system is connected to a *syngo*.via server, the *syngo*.via workflows are available. You can *map the syngo*.via workflows to scan protocols in the **Scan Protocol Assistant**.

1 Click the **syngo.via** radio button on the step **1** page of the **Scan Protocol Assistant**.



2 Click the step **2** button.

The step **2** page is displayed.

3 Select **Adult** or **Child**.

4 Activate the checkbox of the desired scan protocols.



5 Select the step **3** button.

The list of scan protocols to be defined is displayed.

6 Double-click the **Workflow** entry in a cell of the grid and select the desired workflow from the selection list.

7 Activate the checkbox of the required recon job.

8 Double-click the **Data role** entry in a cell of the grid and select the desired data role from the selection list.



9 Click the step **4** button.

The scan protocols with changes are listed.

10 Deactivate the **Apply** checkboxes of the protocols in case you do not want to change them.

11 Click the **Yes** button to save the changes.

The Step **5** is displayed.

If a password protection is activated in the Local Service configuration, the Save Scan Protocol dialog box opens. See (→ Page 367 *Activating a password protection*). Enter the configured password. Otherwise, the scan protocol cannot be saved.

12 Click the **Yes** button to make further changes.

- or -

Click the **End** button to exit the **Scan Protocol Assistant**.

2.10.9 Defining contrast protocols

You can select, copy, paste, add, remove and define contrast protocols.

Manipulating contrast protocols

1 Click the **Define contrast protocols** radio button on the step **1** page of the **Scan Protocol Assistant**.



2 Click the step **2** button.

3 Right-click the contrast protocol.

The context menu is displayed.

4 Select **Copy**, **Paste** or **Remove** from the context menu.

The contrast protocols cannot be restored after being removed.

A contrast protocol can be linked to a scan protocol on the **Contrast** page under the **Change parameters** task. If the linked contrast protocol is removed, the parameter of the **Contrast protocol** on the contrast entry will be set to **Manual**.

5 Click the **Add new protocol** button to create a new contrast protocol if necessary.

The newly created contrast protocol initially only consists of a contrast phase and a saline phase.

Defining contrast protocols

1 Activate the checkbox of the required contrast protocol on the step **2** page.

2 Click the step **3** button.

The **Define contrast protocols** page is displayed.

3 Right-click on a phase in the parameter grid.

The context menu is displayed.

4 Select **Insert phase** or **Delete phase** if necessary.

It is impossible to insert more than 10 phases in a contrast protocol. The last remaining phase is not deletable.

5 Double-click the parameter entry you want to change in a cell of the grid.

6 Change the parameter in the cell.

- or -

Select the desired item from the selection list.

7 Click another parameter entry to confirm the changes.

The background of the modified parameters is displayed in different colors, depending on the status of the parameters:

- Green: Valid modified parameters
- Yellow: Invalid modified parameters
- White: Existing, not modified or saved parameters

These color rules only work for the selected protocols. After saving, the modified parameters change to having white as a background color.



8 Click the step **4** button.

All relevant information is displayed on the **Confirmation Page**, including names of modified protocols and relevant parameters, as well as old and new values of the modified parameters.

9 Deactivate the **Apply** checkboxes of the protocols in case you do not want to change them.

10 Click the **Yes** button to save the changes.

Step **5** is displayed.

If a password protection is activated in the Local Service configuration, the Save Scan Protocol dialog box opens. See (→ Page 367 *Activating a password protection*). Enter the configured password. Otherwise, the scan protocol cannot be saved.

11 Click the **Yes** button to make further changes.

- or -

Click the **End** button to exit the **Scan Protocol Assistant**.

2.10.10 Listing/importing/exporting contrast protocols

You can list the contrast protocols, and import them from or export them to a CD-R/DVD-R or a USB device.

You can only import contrast protocols that have been exported from an equivalent CT system having the same or an older software version.

1 Click the **List/import/export contrast protocols** radio button on the step **1** page of the **Scan Protocol Assistant**.



2 Click the step **2** button.

The **Select contrast protocols** page is displayed with a list of the contrast protocols.

3 Select the desired contrast protocol from the list.

Now you can carry out the following operations for the selected contrast protocol, if a contrast license is available.

Listing contrast protocols



1 Click the **List all contrast protocols** button in the lower left corner of the **Scan Protocol Assistant** to list all contrast protocols.

- or -



Click the **List selected contrast protocols** button to list all selected contrast protocols.

A message box is displayed to inform you that the contrast protocols have been successfully exported.

2 Click the **OK** button to confirm.

The **Contrast protocol listing** dialog box is displayed.

The contrast protocol list is exported to H:\SiteData \ContrastProtocols for reuse in Microsoft Excel on an external computer.

You have to transfer the XML file and the corresponding XSLT stylesheet, for example, with a USB device.

Importing contrast protocols

You can import protocols from a CD-R/DVD-R or a USB device.

1 Insert the medium on which the contrast protocols are stored.

2 Copy the contrast protocols data to the H:\SiteData \ImportContrastProtocols folder via the **File Browser**.



3 Click the **Import contrast protocols** button in the lower left corner of the **Scan Protocol Assistant**.

The list of contrast protocols that can be imported is displayed.

4 Select the protocols you want to import.

5 Click the **Import** button.

The step **3** page is displayed to inform you that the selected contrast protocols have been successfully imported.



6 Click the step **4** button.

The step **4** page is displayed.

7 Click the **Yes** button to make further changes.

- or -

Click the **End** button to finish the import operation.

Exporting contrast protocols

1 Select the contrast protocol you want to export on the step **2** page.



2 Click the **Export selected contrast protocols** button in the lower left corner of the **Scan Protocol Assistant**.

3 Click the **Export** button to confirm the export.

A message box is displayed to inform you that the contrast protocols have been successfully exported to the H:\SiteData \ExportedContrastProtocols folder.

4 Click the **OK** button.

The step **4** page is displayed.

5 Click the **Yes** button to make further changes.

- or -

Click the **End** button.

2.10.11 Activating a password protection

You can activate a password protection to allow only authorized persons to save changes to a scan protocol.

By default, the password protection is deactivated.

1 In the main menu, choose **Options** > **Service** > **Local Service...** to open the **Local Service** configuration.

   The **Authentication** window is displayed.

2 Delete all entries from the entry fields.

3 Click **OK**.

   The **Service Software** window is displayed.

4 Click the **Configuration** button.

5 Select the **Application** option.

6 In the field **Scan Protocol Password**, enter a password.

7 Repeat the password in the line below.

8 Click **Save**.

   The password protection is activated. When saving a scan protocol, you must enter the configured password.

2.11 E-Logbook

The E-Logbook is a tool for collecting, viewing and archiving patient information for statistics, documentation and research. It offers effective and efficient functionality for processing examination information.

The E-Logbook can replace the manual scan documentation when printed.



The Security Package does not support the functions of the E-Logbook.

The E-Logbook consists of the following functions:

- **E-Logbook Configuration**: For configuring the fields to be displayed in the **E-Logbook Input** dialog box
- **E-Logbook Input**: For editing the manual and contrast fields

- **E-Logbook Browser:**
  - For listing the records that lie within a certain date range
  - For viewing, searching, sorting, and editing the record list
  - For hiding or unhiding records in the record list
  - For exporting and printing the record list

The following aspects are described in the subsequent sections:

- Configuring the E-Logbook
- Using the E-Logbook Input dialog box
- Using the E-Logbook Browser



If you are not familiar with the basic functionalities of the *syngo* software, see (→ Page 13 *Basic Functionalities*)

2.11.1 Configuring the E-Logbook

On the *syngo* Acquisition Workplace, configuration changes are immediately visible in the **E-Logbook Browser** in most cases. The changes are visible after registration of the next patient in the **E-Logbook Input** dialog box.



Configuration changes take effect as follows:

- **E-Logbook Configuration** on the *syngo* Acquisition Workplace: Immediately
- **E-Logbook Browser** on the *syngo* Acquisition Workplace: Immediately except for configuration of **Show hidden records**
- **E-Logbook Input** on the *syngo* Acquisition Workplace: After next patient registration
- **E-Logbook Browser** on the *syngo* CT Workplace: After next restart of the *syngo* CT Workplace

You can deactivate **Activate E-Logbook**, if it is not desired. The E-Logbook on or off status is logged to eventlog at system startup.

If you activate the **Show E-Logbook** checkbox in the **General** tab card, the E-Logbook appears in the **Examination** task card after clicking the **Close current patient** icon.

1 From the main menu, choose **Options** > **Configuration...** to open the **Somaris/7 – Configuration Panel**.



2 In the **Somaris/7 – Configuration Panel**, double-click the **E-Logbook Configuration** icon.

The **Configuration Overview** dialog box is displayed.

Activating the E-Logbook

1 Select the **General** tab card to activate the logbook and to determine a default time period.

2 Select the **Activate E-Logbook** checkbox to activate the E-Logbook.

3 Select the **System** tab card to configure the system fields to be displayed.

The selected system fields are displayed in the **E-Logbook Input** dialog box and in the **E-Logbook Browser**.

4 Select the **Manual** tab card to configure the manual fields and to add customized fields.

If **Manual** fields are configured in the **E-Logbook Configuration**, the **Show E-Logbook** checkbox in the **General** tab is checked automatically.

5 Select the **Contrast** tab card to configure the contrast medium fields to be displayed.

The system fields, the manual fields, and the contrast ones are displayed in the **E-Logbook Input** dialog box and in the **E-Logbook Browser**.

Deactivating the E-Logbook

1 Select the **System** tab card and deactivate all system fields.

2 Select the **Manual** tab card and deactivate all manual fields.

3 Select the **Contrast** tab card and deactivate all contrast medium fields.

4 Select the **General** tab card to deactivate the logbook.

5 Deactivate the **Activate E-Logbook** checkbox.

6 Deactivate the **Show E-Logbook** checkbox.

7 Click the **OK** button.

The E-Logbook is deactivated for the next patient.

Showing hidden records

The default setting of the **Show hidden records** is switched off.

1 Select the **General** tab card to activate the logbook and to determine a default time period.

2 Select the **Show hidden records** checkbox to activate it.

3 Click the **OK** button.

The hidden records are displayed in a different background color and font color from that of the normal records in the **E-Logbook Browser**.

A configuration change for **Show hidden records** will take effect after restart of the **E-Logbook Browser**.

Selecting default printer

You can select any printer that is connected to the system as the default printer.

1 Select the default printer from the **Default printer** list on the **General** tab card.

2 Click the **OK** button.

Selecting default printout template

1 Select the default printout template from the **Default printout template** list on the **General** tab card.

2 Click the **OK** button.

You can modify, remove and create a template in the **Templates** tab card of **E-Logbook Configuration**.

Once you create a new template, it is immediately visible and can be selected as the default printout template.

2.11.2 Using the E-Logbook Input dialog box

There are three kinds of fields that can be recorded in **E-Logbook Input** dialog box: system fields, manual fields and contrast fields.

The system fields data is collected automatically from system and are displayed as read-only.

The manual fields data is input manually at end of the examination and in the **E-Logbook Browser**.

The contrast field data is collected automatically by the system, but you still can modify it in the **E-Logbook Input** dialog box.

The **E-Logbook Input** dialog box pops up only when **Show E-Logbook** is enabled in the **E-Logbook Configuration** dialog box.

If the character length exceeds the field width of the read-only system fields, "..." is displayed. You can see the whole text as a tool tip by moving the mouse pointer above the field.



1 Click the **Close current patient** icon in the chronicle to complete the current examination.

   The **E-Logbook Input** dialog box pops up in the parameter card area.

2 Modify the desired manual and contrast fields in the **E-Logbook Input** dialog box.

3 Click the **OK** button to save the changes and to end the examination.

   The fields are saved in the E-Logbook.

4 Click the **Cancel** button to close the **E-Logbook Input** dialog box and to return to the examination.

2.11.3 Using the E-Logbook Browser

The **E-Logbook Browser** lists the patient records that lie within a certain date range, or which are matched a search using certain criteria. Using the **E-Logbook Browser**, you can view, sort, export and print the records list.

You can use the **E-Logbook Browser** on the *syngo* Acquisition Workplace and on the *syngo* CT Workplace.

You can configure the default setting of the date range in the **General** tab card of the **E-Logbook Configuration** dialog box.

The following aspects are described in the subsequent sections:

- Calling up the E-Logbook Browser
- Searching records
- Using and editing records
- Exporting records
- Printing records

Calling up the E-Logbook Browser

◆ Select **Patient** > **E-Logbook** from the main menu.

The records that lie within the default date range are listed in the record list.



You can call up the **E-Logbook Browser** by pressing **F12** in the **Examination** task card.

Searching for records

You can use the following time period buttons:

- **Today /Yesterday**
- **This Week /Last Week**
- **This Month /Last Month**
- **This Year /Last Year**

1 Click the corresponding time period button.

- or -

Select the start date and end date in the selection list.

2 Click the **List now** button.

The records that lie within the specified date range are listed.

- or -

Define further search conditions to search for matching records.



3 Click the **Search** icon.

The matched records are listed.

The **Search** function consists of two search terms, each having three input fields:

- **only within**
- **condition**
- An edit box for search values

Using and editing records

The record list displays the records that lie within the selected time range or which match certain search criteria. It consists of a number column, non-editable columns and editable columns containing the recorded data.

There are several functions available for editing and using the record list.

Resizing and reordering columns

1 Drag the column head to reorder the table columns.

2 Drag the right border of the column to resize the columns.

Sorting the data within the record list

You can decide whether the data in the record list should be listed in ascending or descending order.

1 Click the top of the column.

An arrow appears to show the sorting direction.

2 Click the column head.

The existing order will be reversed.

Calling up the Patient Browser

You can call up the **Patient Browser** via the record list.

◆ Double-click a record.

The **Patient Browser** is called up with the corresponding study marked.

The **E-Logbook** is updated automatically when examination data has been changed within the **Patient Browser** using **Correct** and **Rearrange**.The following fields are updated:

- Patient name
- Date of birth
- Patient ID
- Study ID

Modifying the records

You can edit the **E-Logbook** manual field or contrast field in the **E-Logbook Browser**.

The background color of the read-only cells is gray.

1 Right-click the cell to be modified and modify the information.

The background color of the cell automatically changes to green for indication.



2 Click the **Apply** icon.

The change is applied to the database and the cell background color returns to the normal color.

Hiding or unhiding records

1 Select **Show hidden records** on the **General** tab card of **E-Logbook Configuration**.

The hidden records are shown in a different background and font color in the **E-Logbook Browser**.

2 Select the record you want to hide or show.



3 Click the **Hide/Unhide** icon.

If **Show hidden records** is de-selected, the selected records will disappear from the **E-Logbook Browser** immediately after clicking the **Hide** icon.

Exporting records

To use results in Microsoft Excel on an external computer, you have to transfer two files: The XML-file and the corresponding XSLT-stylesheet.

Siemens recommends performing this transfer daily.



- Click the **Export** icon to export the record results.

  The record results listed in the record list are exported to the folder H:\SiteData\E-Logbook as an XML-file.

Copying to the USB device

1. Open the **File Browser** by selecting **Options** > **File Browser** in the main menu.
2. Navigate to the folder H:\SiteData\E-Logbook and right-click the file.

   A context menu is displayed.
3. Select **Send to** > **USB storage device**.

Printing records

You can print records, preview records, and set page properties for records in the **E-Logbook Browser**.

Printing the records



- Click the **Print** icon.

  You can print the records with the default printer setting if the default printer has already been pre-defined.

Previewing the records



1. Click the **Print Preview** icon.

   A preview window displays.
2. Click **Print** in the preview window if you are satisfied with the layout.

Setting page properties



1 Click the **Page Setup** icon.

The **Page Setup** dialog opens.

2 Change the report title or select a different format for the header and footer if necessary in the dialog.



There is one format for the report header and 8 formats for the footer available for selection. In the format description, (L) stands for left position, (C) stands for center position, and (R) stands for right position.

2.12 Dose management and optimization

As with every imaging modality that uses ionizing radiation, CT scanning must be used in an appropriate manner. To reduce the exposure to patients, determine appropriate clinical indications before performing a CT examination.

The following definitions, features, and workflows assist you in managing and optimizing the dose for the patient:

- (→ Page 378 *Definitions of dose measures*)
- (→ Page 381 *Dose documentation*)
- (→ Page 382 *Dose optimization features*)
- (→ Page 398 *Performing a dose-optimized workflow*)
- (→ Page 429 *Considerations for pediatric scanning*)
- (→ Page 440 *Considerations for Cardiac CT*)

Answers to frequently asked questions (FAQ) can be found here:

- Performing a dose-optimized workflow: (→ Page 423 *FAQ*)
- Considerations for pediatric scanning: (→ Page 436 *FAQ*)
- Considerations for Cardiac CT: (→ Page 448 *FAQ*)

2.12.1 Definitions of dose measures

In radiology, the term dose or patient dose refers to the absorbed dose: A measure of the energy deposited in the body of the patient by ionizing radiation.

Unit	Description
Effective mAs (→ Page 378 *Effective mAs (Eff. mAs)*) or mAs/rot. (cardiac)	The effective mAs is the product of tube current and scan time per rotation (mA × s), divided by the pitch (p). The pitch is defined as the table feed divided by the total collimation. In cardiac scan modes mAs/rot. is set instead of the effective mAs.
CT Dose Index volume (→ Page 379 *CT Dose Index volume ($CTDI_{vol}$)*)	The CT Dose Index volume ($CTDI_{vol}$) is measured in the standard head (16 cm) or body CT (32 cm) dosimetry phantom. The $CTDI_{vol}$ is measured in milligrays (mGy). The $CTDI_{vol}$ is displayed in the **Routine** and **Scan** parameter cards, in the Dose Structured Report (Dose SR), and in the Patient Protocol.
Dose Length Product (→ Page 379 *Dose Length Product (DLP)*)	The Dose Length Product (DLP) is the product of the $CTDI_{vol}$ and the scan length, measured in mGy × cm.
Effective Dose (→ Page 380 *Effective Dose (Eff. Dose)*)	The Effective Dose (Eff. Dose) indicates the total dose to the patient, radiation type and radiation sensitivity for different organs. It is specified in millisieverts (mSv). The effective dose is not a measure for the individual risk but a unit defined purely for radiation protection purposes.

For information on further scan parameters, see *Workflow Assistant*.

Effective mAs (Eff. mAs)

The concept of the effective mAs was introduced with multislice CT scanners. The effective mAs takes into account the influence of the pitch factor p on both the image quality and the dose.

The effective mAs is defined as the tube current multiplied with the rotation time (mAs), divided by the pitch factor p. The pitch factor indicates how much the data acquisition overlaps. Thus a constant effective mAs means a constant dose, independent of the pitch. Changing the pitch only affects the total scan time and not the dose or image quality.

Eff. mAs = mAs ÷ p

Cardiac CT

In Cardiac CT, the image quality is characterized by mAs per rotation (mAs/rot.) rather than effective mAs due to special requirements for cardiac image reconstruction. In cardiac modes, constant mAs/rot. yields constant image quality but not necessarily constant dose.

In dual source CT, the combined tube current from both tubes is considered.

mAs/rot. = mA × rotation time

CT Dose Index volume ($CTDI_{vol}$)

The average dose in the scan plane is described by the $CTDI_{vol}$ for the selected scan parameters.

The $CTDI_{vol}$ is displayed on the user interface in the **Routine** and **Scan** parameter card for the selected scan parameters. It is also displayed in the Patient Protocol and in the Dose Structured Report (Dose SR).

The $CTDI_{vol}$ is an objective technical dose parameter that you can use to compare scan protocols and CT scanners. The $CTDI_{vol}$ can be used to establish reference dose values for various applications since similar $CTDI_{vol}$ values should lead to similar image quality.

The $CTDI_{vol}$ is measured in dedicated plastic phantoms:

- 16-cm diameter for child and adult head
- 32-cm diameter for child and adult body

Dose Length Product (DLP)

The dose length product is the $CTDI_{vol}$ multiplied with the scan length. Therefore it is a technical dose parameter that is proportional to the total dose deposited in the scan volume during the scan.

DLP = $CTDI_{vol}$ × scan length

Like the $CTDI_{vol}$, the DLP is displayed on the user interface in the **Routine** and **Scan** parameter cards. It is also displayed in the Patient Protocol and in the Dose SR.

The DLP is measured in dedicated plastic phantoms:

- 16-cm diameter for child and adult head
- 32-cm diameter for child and adult body

Effective Dose (Eff. Dose)

When asking what the radiation dose is, what you actually want to know is what the risk of an examination is. Information on individual patient dose depends on multiple parameters, for example, patient-specific characteristics, and technical parameters of the system and the examination.

Therefore, the International Commission on Radiation Protection (ICRP) has introduced the concept of effective dose. It represents a risk-related quantity for the control of radiation exposure and optimization of protection. It cannot be measured directly, but rather is calculated using defined dosimetric models. Therefore it applies to a reference person and does not provide risk information for the individual.

Several approaches to estimate the effective dose for CT examinations have been investigated. A generic method was proposed to estimate effective dose from the DLP of an examination[1], with the DLP being reported on most systems. Conversion factors for normalized effective dose per DLP were obtained from Monte Carlo calculations of effective dose for various clinical examinations. These conversion factors depend only on the region of the body being scanned (head, neck, thorax, abdomen, or pelvis).

Conversion factors are also available for children of various ages[2]. Special attention must be paid to the fact that the conversion factors published might apply to values reported in the 16-cm CTDI phantom.



Calculating the effective dose using this method can only be a rough estimate of effective dose. Many parameters that influence the effective dose are not taken into account.

The body size and the exact location of the scanned area in relation to the dose-sensitive organs are only two of those parameters.

Usually this method is sufficiently exact for the purpose the effective dose concept was developed for: Radiation protection and getting an estimate on the total exposure that is also comparable with other sources of radiation.

[1] Jessen KA, Panzer W, Shrimpton PC, et al. EUR 16262: European Guidelines on Quality Criteria for Computed Tomography. Luxembourg: Office for Official Publications of the European Communities; 2000.

[2] Shrimpton PC, Hillier MC, Lewis MA, Dunn M. National survey of doses from CT in the UK: 2003. Br J Radiol. 2006 Dec;79(948): 968-980. PubMed PMID: 17213302.

2.12.2 Dose documentation

Dose is reported in terms of $CTDI_{vol}$ and DLP, as required by International Electrotechnical Commission (IEC) standards. These values represent the dose delivered to a reference phantom reported in a standard way for all CT scanners. The values do not reflect the actual exposure to any given patient.

The $CTDI_{vol}$ is measured in the 16-cm phantom for adult head examinations and for all child examinations (head and body). In the 32-cm phantom, the $CTDI_{vol}$ is measured for adult body examinations. A tooltip on the **Routine** and **Scan** parameter cards indicates the phantom size used to ease the transition.

The **$CTDI_{vol}$** is displayed on the **Routine** and **Scan** parameter cards prior to the examination. It reflects the changes of the scan parameters.

The applied dose can be documented in the Patient Protocol and in the Dose Structured Report (Dose SR) at the end of an examination.

Patient Protocol

The Patient Protocol summarizes examination data. Therefore you can use it to document examinations.

The Patient Protocol can be displayed on the **Viewing** task card. It can also be filmed and sent, for example, from the **Patient Browser**.

A Patient Protocol contains the following information:

- Patient data, like name and ID
- Administrative data, like referring physician and ward
- Examination scan data, like patient position
- Contrast data, like media quantity and injection parameters, if entered
- Range name for each scan
- Dose parameters, like $CTDI_{vol}$ and DLP

(→ Page 422 *Viewing a Patient Protocol*)

DICOM Dose Structured Report (Dose SR)

After closing an examination, a Dose SR can be generated automatically, if configured, according to the DICOM standard for archiving and evaluation purposes (→ Page 401 *Configuring the Dose Structured Report*).

A dose report contains the following information:

- Patient data, like name and ID
- Administrative data, like referring physician, date of the report
- Device information, like scanner type or software version
- Dose parameters of the whole examination and of each scan range, like $CTDI_{vol}$ and DLP

The Siemens Dose Structured Report is compliant with the Radiation Exposure Monitoring (REM) profile defined by the Integrated HealthCare Enterprise (IHE). *http://www.siemens.com/ihe*, *http://www.aapm.org/meetings/amos2/pdf/42-12234-94897-404.pdf*

(→ Page 422 *Viewing a DICOM Dose Structured Report*)

2.12.3 Dose optimization features

During a CT examination, the patient is exposed to a certain amount of radiation. Therefore, it is important to limit the patient dose by using dose reduction techniques and applications.

The common practice is to apply the As Low As Reasonably Achievable (ALARA) principle. The aim of ALARA is to reduce the risk of radioactive exposure to a level that is necessary to obtain the desired diagnostic information.

The CARE Dashboard (optional) gives a quick overview of the dose optimization features and technologies for each scan range of the current examination. The features which are currently activated are indicated in green.

The following dose optimization features are provided by the system:

- (→ Page 383 *Dose Notification*)
- (→ Page 383 *Dose Alert*)
- (→ Page 383 *CARE Dose4D*)
- (→ Page 387 *CARE kV*)
- (→ Page 388 *X-CARE*)

- (→ Page 389 *HandCARE*)
- (→ Page 391 *Sinogram Affirmed Iterative Reconstruction (SAFIRE)*)
- (→ Page 390 *Iterative Reconstruction in Image Space (SAFIRE Excel)*)
- (→ Page 393 *Neuro BestContrast*)
- (→ Page 393 *ECG Pulsing and MinDose*)
- (→ Page 395 *Pitch Adaptation*)
- (→ Page 395 *Adaptive Cardio Sequence*)
- (→ Page 396 *Adaptive Dose Shield*)
- (→ Page 397 *Shaped X-ray beam filter*)

Dose Notification

The dose notification monitors the dose for each scan range. It informs you if the user-specified notification values are exceeded.

You can configure the notification values in the **Scan Protocol Assistant**. (→ Page 403 *Setting the values for the Dose Notification*)

If the configured notification values are exceeded, the $CTDI_{vol}$ and DLP values on the **Scan** and **Routine** parameter cards are marked red.

A **Dose Notification** dialog box can also be displayed, if configured. (→ Page 401 *Configuring the display of the Dose Notification*), (→ Page 420 *Handling the Dose Notification*)

Dose Alert

The dose alert monitors the accumulated $CTDI_{vol}$ at any z-position as well as the accumulated DLP for all scan ranges to be scanned. It informs you if the user-specified alert values are exceeded.

You can configure the alert values in the **Examination Configuration** dialog box. (→ Page 401 *Configuring the dose alert values*)

If the configured alert values are exceeded, the **Dose Alert** dialog box is displayed. (→ Page 421 *Handling the Dose Alert*)

CARE Dose4D

CARE Dose4D is an automated exposure control which provides constant image quality for all body sizes and body regions at an optimized dose. It automatically adapts the tube current to the specific anatomical characteristics of each individual patient to deliver diagnostic image quality consistently.

CARE Dose4D combines different adaptation methods:

- (→ Page 384 *Dose adaptation to the patient size*)
- (→ Page 384 *Dose adaptation along the z-axis*)
- (→ Page 385 *Angular modulation*)

Dose adaptation to the patient size

Larger patient sizes lead to more attenuation and a reduced number of X-ray quanta reaching the detector, resulting in increased noise in the images. This adverse effect can be limited with dose adjustment according to the body size.

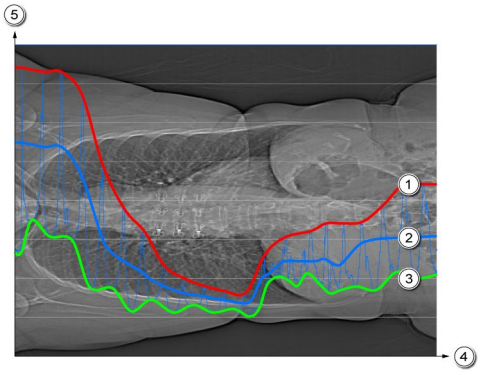
CARE Dose4D automatically modifies the tube current during acquisition. A Quality Reference mAs is used to define the baseline image quality based on the selected scan protocols. The Quality Reference mAs is used to establish the image quality for a reference patient weighing 70 kg to 80 kg (155 lbs to 180 lbs), even for child protocols.

The actual patient attenuation is determined from the topogram. Depending on the selected scan protocols and the patient size, the effective mAs (**Eff. mAs**) may increase or decrease during the acquisition.

Dose adaptation along the z-axis

Based on a single topogram either in the Anterior-Posterior (AP) or lateral position, the attenuation profile along the z-axis of the patient is measured in the direction of the X-ray projection. The attenuation profile is calculated for the perpendicular projection by a dedicated algorithm. For example, if the topogram is in the AP position, the attenuation profile is measured in the AP direction and calculated for a lateral projection and vice versa.

Based on these attenuation profiles, axial tube current profiles (both lateral and AP) and the resulting effective mAs for every table position are calculated. The correlation between attenuation and tube current is defined by an analytical function. This function results in an optimized dose and image noise in every slice of the scan. The correlation is based on a clinical assessment of diagnostic image quality. This assessment showed that, for good diagnostic image quality at a reasonably low dose level, the image noise does not need to be constant for all body sizes and body regions.



(1) Lateral mAs profile

(2) Mean mAs calculated from both mAs profiles

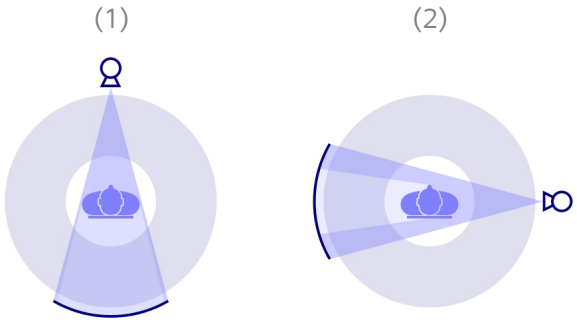
(3) AP mAs profile

(4) Z-direction

(5) mAs

Angular modulation

Without modulation, the attenuation of the X-ray beam for elliptical body regions such as the shoulders varies strongly with the tube rotation angle:



(1) In a front-to-back direction, the section is thinner and the X-ray attenuation is lower

(2) In a lateral direction, the section is thicker and the X-ray attenuation is higher

The angular modulation adapts the tube current over each single tube rotation according to the angular attenuation profile:

- For the low attenuation areas, the tube current is reduced to avoid excessive dose.
- For the high attenuation areas, the tube current is increased to reduce image noise.

The angular attenuation profile is measured during each single tube rotation. The appropriate modulation is applied for the next rotation with a delay of only half a rotation so that consistent image quality can be achieved.

Combined adaptations

CARE Dose4D automatically combines the following tube current adaptations, each of them bringing its specific benefits for optimum dose utilization:

Tube current adaptation	Operation
Dose adaptation to the patient size	General effective mAs level adjustment

Tube current adaptation	Operation
Dose adaptation along the z-axis	Tube current changes depending on the local attenuation of the scanned section
Angular modulation	Tube current varies for different angular positons depending on the section shape

For certain examination protocols, the CARE Dose4D operation is modified to meet specific conditions.

(→ Page 426 *Does CARE Dose4D always operate with the same modulation?*), (→ Page 399 *Adapting the CARE Dose4D settings*), (→ Page 406 *Setting CARE Dose4D*)

CARE kV

Conventional dose modulation approaches control only the X-ray tube current, while the X-ray tube voltage (the kV setting) is left untouched. Yet there is considerable potential for dose reduction by adapting the kV setting, and therefore the radiation energy to the diagnostic task. In this way, an optimized contrast-to-noise-ratio is achieved.

CARE kV is an extension of CARE Dose4D which supports optimizing radiation exposure to patients.

If CARE kV is activated, the system automatically proposes the appropriate kV and effective mAs settings. They optimize the applied dose while the image quality is maintained.

The proposal is based on the following parameters:

- Patient attenuation calculated based on the topogram
- Examination type (adjustable) (→ Page 408 *Adjusting the examination type*)
- Quality reference mAs (adjustable) (→ Page 408 *Setting the image quality*)

Image quality

The quality of CT images is characterized by the following parameters:

- Contrast
- Noise
- Sharpness (spatial resolution)

Improving these parameters will render a better image and enable the reading physician to make a more precise diagnosis. If, for example, the contrast is high and the noise is low, the image quality improves.

Additionally, an iodine contrast medium is often administered to improve contrast and therefore the visibility of organ structures, particularly in CT Angiography (CTA) examinations. The contrast is best with lowered X-ray tube voltage, since the low energy X-rays are better absorbed by the dense iodine than by the surrounding tissue. In order to maintain low noise levels, the tube current usually requires an adjustment.

For larger patients who have a higher X-ray attenuation, the output of the X-ray tube at lower kV settings may not be sufficient to produce the required contrast-to-noise-ratios. For these patients, higher X-ray tube voltages must be selected, despite reduced iodine contrasts.

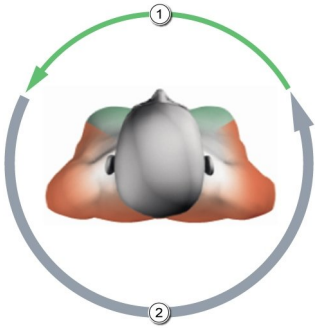
(→ Page 407 *Setting CARE kV*), (→ Page 402 *Setting the CARE kV limits*)

X-CARE

X-CARE protects the eyes and the breast of the patient. When using X-CARE scan protocols, the tube current will be reduced in a predefined area at the front side of the patient during the whole scan. At the opposite area, the tube current is increased accordingly to maintain the image quality in comparison with a scan without X-CARE.

X-CARE reduces radiation dose at the surface, that is, for peripheral organs, in the frontal angle segment. However, dose reduction will not be reflected in the CT Dose Index (CTDI) or Dose Length Product (DLP) as they are defined by averaging over a full rotation.

X-CARE is applicable for spiral scans and sequence scans, except interventional scans, cardio scans, and high pitch spirals.



(1) Reduced dose

(2) Increased dose

If X-CARE is on, the breast of the patient is irradiated with reduced dose (green color).

X-CARE adapts to the patient orientation. When an X-CARE protocol is chosen, the default orientation is selected. If another patient orientation is selected, the X-CARE protocol is adapted to the new selection.

If you have selected an X-CARE scan protocol, the pitch value is limited to a maximum of 0.6.

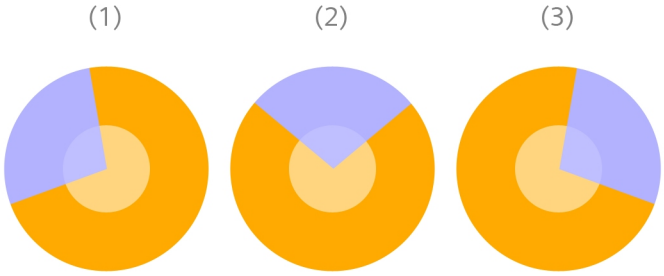
The area with reduced tube current for the patient is shown in the image on the **Routine** parameter card in green. The position of the displayed area takes the position of the patient into account. As soon as you change the patient position, the display is updated accordingly.

It is not possible to deactivate X-CARE in an X-CARE protocol. To deactivate X-CARE, select another protocol.

HandCARE

HandCARE is a function for reducing the dose to the hand of the operator and patient during a CT intervention by switching off the radiation for a fixed sector during the tube rotation. It is available only in the i-Sequence and i-Fluoro modes.

You can select three different positions to switch off the exposure: 10:00, 12:00, and 2:00 o' clock. These positions usually correspond to the user-preferred side or entry point during the procedure.



(1) 10:00 o'clock

(2) 12:00 o'clock

(3) 2:00 o'clock

For information on using HandCARE, see (→ Page 301 *Displaying and setting the parameters*).

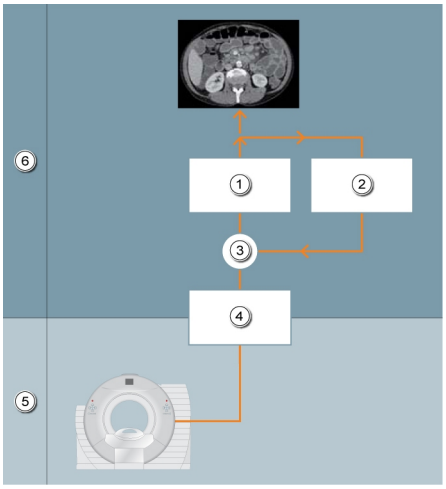
The use of HandCARE results in a slower frame rate for image display when using the i-Fluoro mode. It still permits continuous visualization and tracking of the needle.

Iterative Reconstruction in Image Space (SAFIRE Excel)

During the initial raw data reconstruction, a master volume is generated. This master volume contains the full amount of raw data information but at the cost of significant image noise also being included.

The following iterative corrections are consecutively performed in the image space. They clean up the image and remove the image noise without degrading the sharpness of the image. These corrections avoid time-consuming repeated projections and corresponding back projections. The noise texture of the image is comparable to the standard convolution kernels.

SAFIRE Excel results in artifact and noise reduction, increased image sharpness, and a dose reduction of up to 60% for a wide range of clinical applications.



(1) Image data reconstruction

(2) Image correction

(3) Compare

(4) Master volume reconstruction

(5) Slow raw data space

(6) Fast image data space

(→ Page 411 *Setting the reconstruction parameters for SAFIRE Excel*)

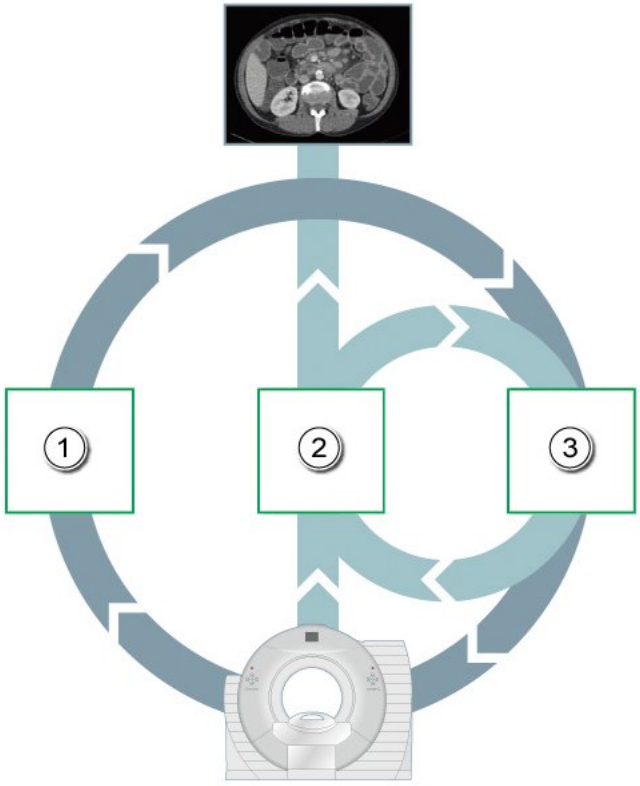
Sinogram Affirmed Iterative Reconstruction (SAFIRE)

Iterative reconstruction approaches allow decoupling of spatial resolution and image noise.

With the Sinogram Affirmed Iterative Reconstruction (SAFIRE), correction loops are introduced into the image generation process. These iteration loops utilize raw-data information to significantly improve image quality.

Additionally, image noise is removed in the iterative corrections without degrading image sharpness. The noise texture of the images is comparable to the standard convolution kernels.

SAFIRE results in an improved image quality with reduced noise and increased image sharpness. It can be translated to a dose reduction of up to 60% for a wide range of clinical applications.



(1) Raw data reconstruction

(2) Image data reconstruction

(3) Image correction

(→ Page 411 *Setting the reconstruction parameters for SAFIRE*)

Neuro BestContrast

Neuro BestContrast improves image quality during the image reconstruction phase of head examinations. It improves contrast enhancement with a minimal increase in image noise.

Neuro BestContrast is applied to the kernels H10 - H45 (except H22, H32, and H42) in Head Routine and Head Neuro Siemens default protocols as well as in all customer protocols that are based on the respective Siemens default protocols.



Neuro BestContrast is not activated for high-resolution kernels H60 and H70. It is also not activated for head scans in trauma protocols or head angio protocols.

The image is divided into two data sets:

- Low spatial frequencies

  The low frequency pass image is reconstructed and tissue contrast is improved. During this reconstruction phase, the increase in noise is minimal.

- High spatial frequencies

  The high frequency pass image data contains the sharp details and original noise. During this reconstruction phase, noise is curbed.

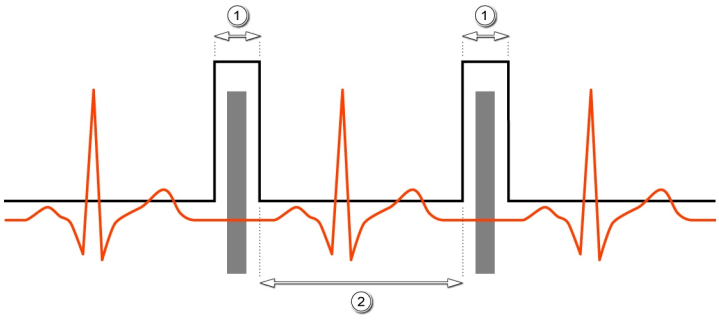
Finally, both data sets are merged, resulting in an improved image that has a better contrast-to-noise ratio.

ECG Pulsing and MinDose

ECG Pulsing is a method to modulate the radiation dose during a gated spiral CT scan.

The tube current is maintained at 100% of the desired level only during a predefined diagnostically relevant phase of the cardiac cycle.

During the rest of the time, the tube current is modulated by default to 25% of the nominal current. The resulting images are appropriate for a functional analysis and sufficient for a coronary evaluation.



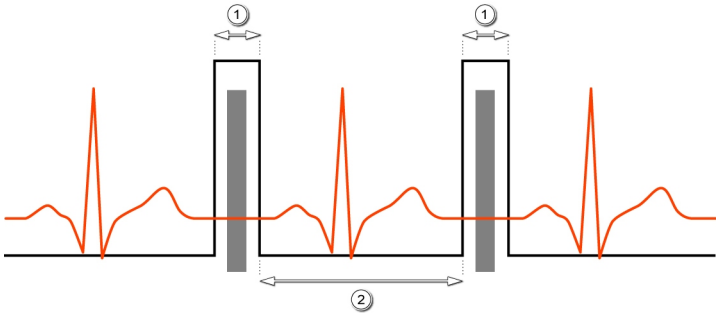
(1) High dose level

(2) Low dose level

(→ Page 444 *Using ECG Pulsing*)

MinDose

For MinDose, the tube current is reduced to 4% of the nominal current outside the diagnostically relevant heart phase. Therefore, the mean radiation dose is further reduced compared to the normal ECG pulsing setting.



(1) High dose level

(2) Low dose level

ECG-controlled dose modulation is based on the continuous monitoring of the ECG. An algorithm predicts when the desired ECG phase will start by calculating the mean durations of the preceding cardiac cycles. Therefore ECG Pulsing can react flexibly to arrhythmia and ectopic beats.

(→ Page 446 *Using MinDose*)

Pitch Adaptation

When scanning a retrospective ECG-gated spiral, you only achieve continuous volume coverage in the same cardiac phase when the pitch or scanning speed is adapted to the heart rate of the patient. In general, low scanning speeds or pitch values are employed to provide sufficient overlap of the scanned volume in each rotation of the gated acquisition. This method ensures that there are no gaps in the volume data for retrospective cardiac reconstruction.

In the past, cardiac protocols employed fixed pitch values. The heart rate of the patient had to be observed and the appropriate scan protocol had to be selected. It had to be ensured that the heart rate of the patient did not vary out of range after loading the protocol and during the entire scan procedure. The pitch was intentionally preset to a lower value in order to meet the requirements for wider ranges for heart rates. As a result, the radiation doses with these protocols were high, especially when imaging patients with moderate to high heart rate ranges. Adapting the pitch value to the heart rate can therefore reduce the dose.

Currently you can change the scan pitch by choosing the appropriate heart rate range after selecting a cardiac protocol. Siemens recommends selecting the pitch manually only to experienced users in the event of a clear clinical indication.

Siemens recommends using the automatic pitch adaptation which is activated in the default protocols. It allows the system to monitor the heart rate of the patient over the last ten cardiac cycles. Additionally, it adapts the pitch instantly before initiation of the scan which is based on the lowest heart rate measured within these ten cycles. The CT scanner increases the pitch with higher heart rates, resulting in a faster scan and, therefore, a reduced dose.

(→ Page 446 *Adapting the pitch*)

Adaptive Cardio Sequence

Prospective ECG triggering combined with step-and-shoot acquisition of axial slices offers a way to scan a wide variety of patients. The ECG signal of the patient is monitored during the examination. Axial scans are started with a pre-defined time offset relative to the R waves.

With conventional approaches, the method reaches its limitations for patients with arrhythmia, since ECG-triggered axial scanning depends on a reliable prediction of the next cardiac cycle. Thereby the mean length of the preceding cardiac cycles is used.

With the Adaptive Cardio Sequence, a more refined analysis of the ECG is performed. The acquisition window can be extended within the diastolic phase of the cardiac cycle to find the optimum reconstruction phase. Additionally, the variance of the heart rate is taken into account for the calculation of reconstruction time points. In case of ectopic heartbeats, the scan can be repeated at the same position.

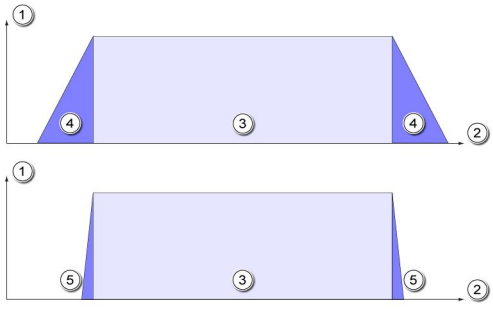
(→ Page 442 *Using the Adaptive Cardio Sequence with the Flex mode*)

Adaptive Dose Shield

The Adaptive Dose Shield dynamically adapts the collimation to reduce the excess dose applied at the edges of the scanned volume for spiral acquisitions.

In spiral scan modes, to collect all the required raw data for image reconstruction, the scan range must exceed the imaged range. This effect partly causes unused dose.

The over-radiation can be corrected with the use of dynamic collimation, which controls the size of the aperture at the start and end of the spiral acquisition. The spiral scan starts with the smallest possible aperture and gradually opens to the nominal collimation. Then it closes again at the end of the scan range.



(1) mAs

(2) Z-direction

(3) Nominal spiral length with full dose

(4) Additional dose without Adaptive Dose Shield

(5) Additional dose with Adaptive Dose Shield

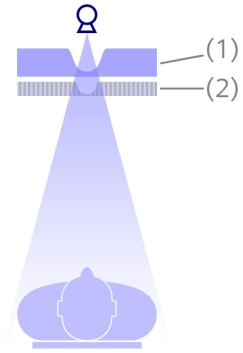
The $CTDI_{vol}$ is not affected by the Adaptive Dose Shield, but the DLP is corrected when the Adaptive Dose Shield is employed for the scan.

Shaped X-ray beam filter

The shaped X-ray beam filter provides a shaped filter for examinations where the best diagnostic image quality is focused on the center part of the scan field, for example, for imaging the heart. With this additional shaped filter, a further dose reduction in the outer region of the scan field is achieved.

A combination of two shaped filters allows the following settings of the resulting shaped filter:

- Standard
- Narrow



(1) Permanent shaped filter

(2) Shaped filter

The narrow filter setting is moved in automatically and reduces the dose by approximately 20% (in body examinations) compared to the standard setting.

The selection of the shaped filter is done automatically, depending on the protocol type selected, for optimized dose and image quality.

2.12.4 Performing a dose-optimized workflow

The following workflow describes how you can adapt the configuration settings and the scan parameters for dose-optimized scanning. You are also informed about how you can proceed if conflicts occur and where the applied dose is documented.

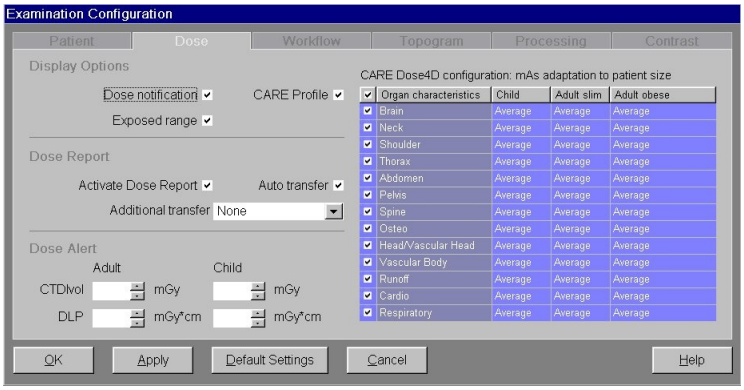
If you are not familiar with the basic procedures of preparing and performing a scan, see (→ Page 215 *Scan*).

The following functionalities are described in the subsequent sections:

- (→ Page 398 *Checking the examination configuration parameters*)
- (→ Page 402 *Configuring limits and notification values*)
- (→ Page 405 *Checking the parameter settings*)
- (→ Page 412 *Positioning the patient*)
- (→ Page 413 *Acquiring a topogram*)
- (→ Page 415 *Handling parameter conflicts*)
- (→ Page 422 *Viewing the dose documentation*)
- (→ Page 423 *FAQ*)

Checking the examination configuration parameters

1. In the **Options** menu, choose **Configuration...**.
2. In the **Somaris/7 – Configuration Panel**, double-click the **Examination** icon.
3. Click the **Dose** tab card of the **Examination Configuration** dialog box to adapt the dose settings, if necessary.



The following functionalities are described in the subsequent sections:

- (→ Page 399 *Adapting the CARE Dose4D settings*)
- (→ Page 400 *Configuring the display of the CARE Profile (optional)*)
- (→ Page 401 *Configuring the display of the exposed range*)
- (→ Page 401 *Configuring the display of the Dose Notification*)
- (→ Page 401 *Configuring the dose alert values*)
- (→ Page 401 *Configuring the Dose Structured Report*)

Adapting the CARE Dose4D settings

In the field **CARE Dose4D configuration: mAs adaptation to patient size**, you can select a different CARE Dose4D adaptation strength to the patient size.

The adaptation strength can be set individually for the various organ characteristics and various patient sizes (**Child**, **Adult slim**, **Adult obese**).

1 For a specific organ characteristic, for example, **Abdomen**, click into the CARE Dose4D curve setting of a patient size, for example, **Adult slim**.

2 In the selection list, select a CARE Dose4D adaptation strength.

You can choose between **Very Weak**, **Weak**, **Average**, **Strong**, and **Very Strong**.

The setting of the adaptation strength is effective for all protocols with CARE Dose4D.

The organ characteristic is displayed on the **Scan** parameter card.

The CARE Dose4D curve is simultaneously adapted for all selected organ characteristics.

You can select all organ characteristics at once if you select the **Organ characteristics** checkbox.

For **Adult slim**, **Adult obese**, and **Child**, the Siemens default settings are **Average** for all organ characteristics.

If all images of slim patients are too noisy, select a weaker CARE Dose4D curve.

If all images of obese patients are too noisy, select a stronger CARE Dose4D curve.

For adapting the child-specific settings, see (→ Page 431 *Adapting the dose to the patient size*).

Configuring the display of the CARE Profile (optional)

The CARE Profile displays the dose to be applied along the z-axis of the patient. It is displayed next to the topogram for a selected range.

- In the **Display Options** field of the **Dose** tab card, select the **CARE Profile** checkbox to display the mAs profile in the topogram.

  - or -

  Deselect the **CARE Profile** checkbox if you do not want to display the mAs profile in the topogram.

If a conflict occurs, the CARE Profile appears, even if it is deactivated or if no license is available.

Configuring the display of the exposed range

The exposed range is displayed as dashed orange lines on the topogram by default.

- In the **Display Options** field of the **Dose** tab card, deselect the **Exposed range** checkbox if you do not want to display the exposed range in the topogram.

Changes will be applied after you have restarted the system.

Configuring the display of the Dose Notification

The **Dose Notification** monitors the dose for each scan range and can inform you if the notification values either for $CTDI_{vol}$ or DLP are exceeded.

- In the **Display Options** field of the **Dose** tab card, select the **Dose Notification** checkbox to display the **Dose Notification** dialog box.

  To configure the notification values for **$CTDI_{vol}$** and **DLP** of the **Dose Notification**, see (→ Page 403 *Setting the values for the Dose Notification*).

Configuring the dose alert values

The **Dose Alert** dialog box informs you if the accumulated dose of the examination exceeds the configured alert values either for **$CTDI_{vol}$** or **DLP** with the next scan range or the next scan ranges.

- In the **Dose Alert** field of the **Dose** tab card, configure the **$CTDI_{vol}$** and **DLP** alert values for **Adult** and **Child**.

  In contrast to the **DLP**, the calculation of the accumulated **$CTDI_{vol}$** is specific to a z-position.

If no alert values are configured, the **Dose Alert** dialog box is not displayed.

For adapting the child-specific settings, see (→ Page 432 *Setting the dose alert values*).

Configuring the Dose Structured Report

You can configure the creation and the auto transfer of the dose report in the **Dose Report** field of the **Dose** tab card.

1 Select the **Activate Dose Report** checkbox to activate the automatic creation of the DICOM Dose Structured Report.

2 Select the **Auto transfer** checkbox to activate the automatic transfer of the dose report together with the image data, for example, to a DVD drive or network node.

3 In the **Additional transfer** selection list, select a network node to specify an additional destination node for the dose report.

Configuring limits and notification values

In the **Scan Protocol Assistant**, you can configure the dose-relevant limits and dose notification values.

The default Siemens protocols provide the best compromise between optimizing image quality, scan time, and dose.

1 In the main menu, choose **Options** > **Configuration...**.

2 In the **Somaris/7 – Configuration Panel**, double-click the **Scan Protocol Assistant** icon.

If you are not familiar with the functionalities of the **Scan Protocol Assistant**, see Modifying scan protocols, (→ Page 356 *Changing parameters*).

3 In the **Scan Protocol Assistant** dialog box, click the step **3** button.

4 In the upper area of the **Scan Protocol Assistant** dialog box, click the **Scan** button to open the **Scan** page.

5 Click the **Dose** tab card.

The following functionalities are described in the subsequent sections:

- (→ Page 402 *Setting the CARE kV limits*)
- (→ Page 403 *Setting the values for the Dose Notification*)
- (→ Page 404 *Setting the limits for FAST Adjust*)

Setting the CARE kV limits

For individual scan ranges, certain kV values can be excluded if the CARE kV limits are configured.

- In the **CARE kV** selection list, select the minimum and maximum **kV** values for each scan, for example, **min. kV** = 80 kV; **max. kV** = 140 kV.

  The limits are displayed in the tooltip of the **kV** item on the **Scan** parameter card.

  CARE kV will select the tube voltage for an examination only within the configured CARE kV limits.

For scans within a CARE kV group with different limits, CARE kV selects the kV values within the defined limits for all scans of this CARE kV group. (→ Page 409 *Adding scan ranges to a CARE kV group*)

If there is no appropriate value within these limits, the **Ref. kV** value will be used.

Setting the values for the Dose Notification

You can set the notification values either for **$CTDI_{vol}$** or **DLP** for an individual scan. If these values are exceeded for a planned scan, the **$CTDI_{vol}$** and **DLP** notification values on the **Scan** parameter card change their color to red.

Additionally, a **Dose Notification** dialog box can be displayed. (→ Page 401 *Configuring the display of the Dose Notification*)

When you select one or more scan protocols in the **Scan Protocol Assistant**, all corresponding scan ranges and, when indicated, monitoring ranges are selected as well.

If you then set the notification values for the **Dose Notification**, the values will also be applied for the monitoring ranges.

When loading the monitoring ranges for an examination, the $CTDI_{vol}$ will be calculated for a defined number of monitoring scans, usually 30 scans. Therefore the **Dose Notification** dialog box will be displayed unnecessarily.

Make sure to set the notification values only for diagnostic scans.

1 In the **Range name** column, deselect the checkboxes of the monitoring ranges, where necessary.

2 In the **CTDI$_{vol}$** and **DLP** spin box of the **Dose Notification** field, set the notification values.

If the notification values are not configured, the **Dose Notification** dialog box is not displayed. In this case, the **CTDI$_{vol}$** and **DLP** notification values on the **Scan** parameter card will retain their color.

Setting the limits for FAST Adjust

Limits must be configured first to use FAST Adjust if the system limits are exceeded. Within these limits, the scan time can be increased or the **max. mAs** value can be reduced by using the Fully Automated Scanner Technology **FAST Adjust**. (→ Page 416 *Using the Adjust button (optional)*)

1 In the **Upper limit max. scan time** spin box of the **FAST Adjust** field, set the maximum scan time for each scan range.

The maximum scan time can only be configured for non-cardiac spirals.

2 In the **Lower limit max. mAs** spin box of the **FAST Adjust** field, set the lower limit for the maximum mAs reduction (in %) from the peak value for each scan range.

The configured limits are displayed in the tooltip of the **Adjust** button. They are also displayed in blue in the **FAST Scan Assistant** dialog box.

If no limits for **FAST Adjust** are configured, the **Adjust** button will not be displayed.

Adapt the limits to the different kinds of examinations, for example, the maximum acceptable scan time for contrast scans.

(→ Page 416 *Using FAST Adjust (optional) and FAST Scan Assistant*)

Activating password protection for the Dose Alert

You can activate password protection for the **Dose Alert** to allow only authorized persons to continue scanning in case the alert values are exceeded.

By default, password protection is deactivated.

1 In the main menu choose **Options** > **Service** > **Local Service...** to open the **Local Service** configuration.

The **Authentication** window is displayed.

2 Delete all entries from the entry fields.

3 Click **OK**.

The **Service Software** window is displayed.

4 Click the **Configuration** button.

5 Select the **Application** option.

6 In the **Dose Alert Password** field, enter a password.

7 Repeat the password in the field below.

8 Click **Save**.

Password protection is activated.

If the **Dose Alert** dialog box appears during an examination, the configured password must be entered to continue scanning. Otherwise the scan range cannot be loaded.

The respective dose log file will document whether a password was configured or not.

Checking the parameter settings



If you are not familiar with the basic functionalities of preparing a scan, see (→ Page 207 *Defining Examination Data*).

After choosing a scan protocol from the selection list of the **Patient Model Dialog**, you can check and adapt the scan parameter settings in the parameter cards individually for each scan range.

The following functionalities are described in the subsequent sections:

- (→ Page 406 *Setting CARE Dose4D*)
- (→ Page 407 *Setting CARE kV*)
  - (→ Page 407 *Setting CARE kV*)
  - (→ Page 408 *Adjusting the examination type*)
  - (→ Page 408 *Setting the image quality*)
  - (→ Page 409 *Defining a kV value for follow-up examinations*)
  - (→ Page 409 *Adding scan ranges to a CARE kV group*)
- (→ Page 410 *Setting scan parameters for post-processing applications*)
- (→ Page 411 *Setting the reconstruction parameters for SAFIRE*)
- (→ Page 411 *Setting the reconstruction parameters for SAFIRE Excel*)

Setting CARE Dose4D

Dose modulation provides constant image quality for all body sizes and body regions at an optimized dose. (→ Page 383 *CARE Dose4D*)

◆ On the **Scan** parameter card, select the **CARE Dose4D** checkbox.

After scanning the topogram, the average **Eff. mAs** value calculated by CARE Dose4D for the following scan is displayed on the **Routine** parameter card and the **Scan** parameter card.



Siemens recommends to keep CARE Dose4D activated.



As soon as the scan is completed, this value will be updated to the mAs actually applied. The value may differ slightly due to the online modulation according to the angular attenuation profile of the patient.



If CARE Dose4D is deactivated, adapt the **Eff. mAs** manually.

Setting CARE kV

If CARE kV is activated, the system automatically sets the appropriate **kV** and **Eff. mAs** settings. They optimize the applied dose while keeping the image quality constant (→ Page 387 *CARE kV*). The image quality is defined by the **Quality Ref. mAs** and the **Ref. kV**.

CARE kV is only available for scans with CARE Dose4D. For Dual Energy scans, CARE kV is not available.

CARE kV scanning is performed with a constant kV value (no online modulation of the voltage).

Setting CARE kV

For **CARE kV On**, an optimized **kV** value is automatically set by the system. This value is set within the limits configured in the **Scan Protocol Assistant** and based on the examination type defined by the setting of the **Dose Optimization** slider (→ Page 402 *Setting the CARE kV limits*).

✓ CARE Dose4D is activated.

◆ In the **CARE kV** selection list of the **Scan** parameter card, select **On**.

The **CARE kV** value is calculated for the next scan to be performed. This scan is indicated by a white triangle on the selected scan range.

If **CARE kV** is set to **On**, the values for **Eff. mAs** / **mAs**, **kV**, **CTDIvol**, and **DLP** are displayed on the parameter cards after CARE kV has been calculated for the current scan range.

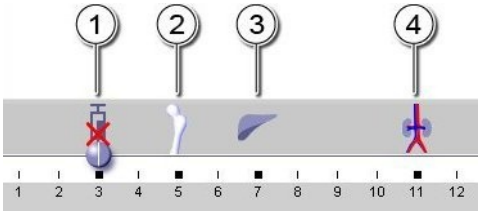
For repeated scans with **CARE kV On** or **CARE kV Semi**, always check the examination type.

If **CARE kV** is set to **Semi** or **On**, select the **FAST Window** checkbox on the **Recon** parameter card to automatically get the window values adapted.

Adjusting the examination type



1 Click the dose settings icon to open the **Dose Optimization** dialog box.



(1) **Non contrast**

(2) **Bone**

(3) **Soft tissue contrast**

(4) **Vascular**

2 In the **Dose Optimization** dialog box, drag the **Dose Optimization** slider with the mouse to the relevant examination type.



To move the slider, you can also use the arrow keys on your keyboard.

Setting the image quality

If you want to change the image quality, you can adapt the **Qual. Ref. mAs** and the **Ref. kV** value.

1 In the **Qual. Ref. mAs** spin box, set the value.

2 In the **Ref. kV** selection list, select the value.



For some examination types and patient sizes, CARE kV can set a higher kV value than the **Ref. kV** value.



For adapting the child-specific settings, see (→ Page 434 *Adapting the Quality Ref. mAs*).

Defining a kV value for follow-up examinations

You can select **CARE kV Semi** to scan with a defined **kV** value, for example, to perform a follow-up examination which requires the same kV setting as in the prior scan.

✓ CARE Dose4D is activated.

1 In the **CARE kV** selection list, select **Semi** to set a defined **kV** value.

2 In the **kV** selection list, select the **kV** value.

The **Eff. mAs** value is calculated depending on the examination type which is defined by the **Dose Optimization** slider.



For repeated scans with **CARE kV On** or **CARE kV Semi**, always check the examination type.



If **CARE kV** is set to **Semi** or **On**, select the **FAST** Window checkbox on the **Recon** parameter card to automatically get the window values adapted.

Adding scan ranges to a CARE kV group

You can add scan entries to a CARE kV group to set the same kV value for all scan ranges at once, for example, to perform a three-phase liver examination.

✓ CARE kV is set to **On**.

✓ All scan entries have the same **Ref. kV** value.

✓ At least one value of the interval between **min. kV** and **max. kV** configured in the **Scan Protocol Assistant** must match. Otherwise the scan range cannot be added. See (→ Page 402 *Setting the CARE kV limits*).

1 In the chronicle, right-click the scan entries to be grouped.

2 In the context menu of these scan entries, choose **Add to CARE kV group**.

Scan entries belonging to a CARE kV group are marked by a chain symbol in the chronicle.

All scan ranges which are added to a CARE kV group are scanned with the same kV value while the other settings are kept.

Copied or repeated scan entries within a CARE kV group are automatically a member of this group.

For a scan range which is added to a CARE kV group, **CARE kV On** is set automatically.

Via the context menu, you can also remove a scan entry from the CARE kV group.

Setting scan parameters for post-processing applications

If you use one of the following post-processing applications, use the scan parameters listed below:

Calcium Scoring

For an Agatston equivalent calcium score, perform a cardiac scan with the following settings:

- Slice thickness: 3.0 mm
- Increment: 1.5 mm
- Kernel: B35f
- Tube voltage: 120 kV

When using **CARE kV**, make sure to set the CARE kV limits for **min. kV** and **max. kV** in the Scan Protocol Assistant to 120 kV (→ Page 402 *Setting the CARE kV limits*).

NeuroDSA and NeuroPBV

When using **CARE kV**, make sure that both the CTA and the non-contrast scan are grouped in a CARE kV group (chain symbol) (→ Page 409 *Adding scan ranges to a CARE kV group*).

Follow-up

For a reliable follow-up comparison of volumetric or density measurements between two time points, perform these scans with the same kV setting as that from the prior.

LungCAD

You can achieve an optimized performance with a tube voltage of 120 kV.

KV settings that differ from settings ranging from 120 kV to 140 kV may influence the performance of the LungCAD algorithm with regard to sensitivity or specificity.

Colon PEV

For scans without intravenous contrast, use a standard exposure for supine and prone position of at least 50 mAs and 30 mAs respectively.

When using **CARE kV**, make sure to set the CARE kV limits for **min. kV** and **max. kV** in the Scan Protocol Assistant to 120 kV (→ Page 402 *Setting the CARE kV limits*).

You can achieve an optimized resolution with the following settings:

- Collimation: ≤ 1 mm
- Slice width of ≤ 1 mm with 30% overlap
- Kernel: B30f/B20f for supine data, B10f for prone data

Setting the reconstruction parameters for SAFIRE

Use an appropriate reconstruction technique like the Sinogram Affirmed Iterative Reconstruction (SAFIRE), if available. This way you can reduce the dose by up to 60%. (→ Page 255 *Performing a sinogram affirmed iterative reconstruction (SAFIRE)*)

- On the **Recon** parameter card, select the **SAFIRE** checkbox.

Avoid submillimeter slices. Select thicker slices, smoother kernel and wider windowing to reduce image noise, and in return to reduce dose if scan parameters are changed for future examinations.

Setting the reconstruction parameters for SAFIRE Excel

Use an appropriate reconstruction technique like the iterative reconstruction in image space (SAFIRE Excel), if available. This way you can reduce the dose by up to 60%. (→ Page 258 *Performing an iterative reconstruction (SAFIRE Excel)*)

- On the **Recon** parameter card, select the **SAFIRE Excel** checkbox.

Avoid submillimeter slices. Select thicker slices, smoother kernel and wider windowing to reduce image noise, and in return to reduce dose if scan parameters are changed for future examinations.

Positioning the patient

Only use accessories approved by Siemens.

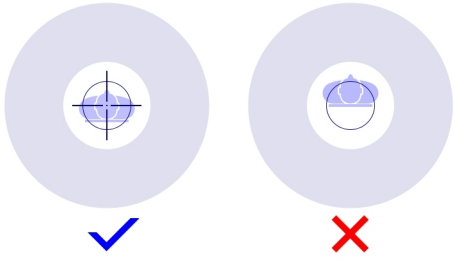
Defective or non-approved accessories can cause artifacts, injuries to the patient and operating personnel, or damage to the equipment.

- Replace defective accessories with new original accessories immediately. *SOMATOM Operator Manual*

For adapting the child-specific settings, see (→ Page 436 *Positioning the patient*).

Centering the patient

1 For optimum image quality and dose application to patient size and body shape with CARE Dose4D, position the patient in the isocenter of the gantry.



2 Double-check and verify the position of the patient with the laser light marker as well as in the topogram.

If the patient is positioned too high, the mAs for the subsequent scan will be increased.

If the patient is positioned too low, the mAs for the subsequent scan will be reduced and the images will show increased noise.

For head scans with **Auto Isocenter**, you may be prompted to raise or lower the patient table. This will have no impact on the dose modulation with CARE Dose4D.

Positioning the arms of the patient

- For optimum CARE Dose4D utilization, position the arms of the patient for thorax and body scans on the head-arm support.

Acquiring a topogram

If you are not familiar with the basic functionalities of acquiring a topogram, see (→ Page 216 *Acquiring a Topogram*).

If there is no topogram, CARE Dose4D and CARE kV cannot be activated.

- Scan a topogram.

- If information from more than one topogram from the same tube position is available, only the most recent one will be used to determine the **Eff. mAs**.

  If two topograms from different tube positions are available, for example, AP and lateral, both topograms will be used to determine the **Eff. mAs**.
- If the scan range exceeds the topogram range, the **Eff. mAs** value which was calculated at the last position of the topogram will be used.

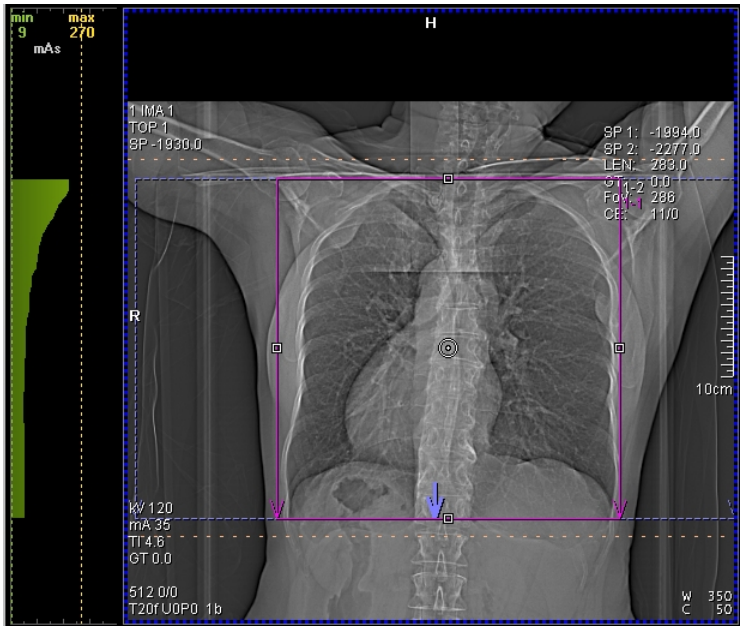
Avoid repositioning of the patient on the patient table and excessive motion of the patient between the topogram and the scan.

Best image quality is achieved when using protocols with CARE Dose4D for the body regions they are designed for. Use child protocols for children.

Check that the organ characteristic, which is displayed in the **Scan** parameter card, matches the scan to be performed.

Always check whether the scan range settings by FAST Planning are reasonable. (→ Page 221 *Using recon planning for spirals*)

If configured in the **Examination Configuration** dialog box, the **CARE Profile** is displayed to the left of the topogram.
(→ Page 400 *Configuring the display of the CARE Profile (optional)*)



The CARE Profile shows the distribution of the dose to be applied along the z-axis of the patient for a selected scan range. The system limits for the maximum possible mAs are displayed.

Depending on the examination, for example, Sequence, Spiral, or Cardio scan, the CARE Profile may look different. For a cardiac scan, the mean **Eff. mAs** for the whole scan range is displayed.

Handling parameter conflicts

A conflict occurs in the following situations:

- The system limits are exceeded.
- The amount of exceedance affects the dose to be applied or the image quality.

In case of a conflict, the CARE Profile may be displayed in the following colors:

- Green CARE Profile with green-striped peak
- Green CARE Profile with yellow peak
- Yellow CARE Profile

The area of the CARE Profile which exceeds the limits is colored depending on the amount of the exceedance.

If a conflict occurs, the CARE Profile appears, even if it is deactivated or if no license is available. (→ Page 400 *Configuring the display of the CARE Profile (optional)*)

Green CARE Profile with green-striped peak



The mAs, which is calculated by CARE Dose4D and which is needed for achieving an appropriate image quality, slightly exceeds the system limits for some regions.

Loading is recommended since the impact on the image quality will be negligible. The peak of the CARE Profile will be lowered to the maximum possible mAs in this case.

Green CARE Profile with yellow peak



The mAs which is needed for some regions of the scan exceeds the limits of the system.

There are two possibilities to continue scanning:

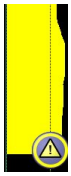
- Load the scan.

  The peak of the CARE Profile will be lowered to the maximum possible mAs. The image quality may be reduced in this area.

- Click the **Adjust** button to resolve the conflict. (➔ Page 416 *Using the Adjust button (optional)*)

  The scan time will be increased within the limits configured in the **Scan Protocol Assistant**. (➔ Page 404 *Setting the limits for FAST Adjust*)

Yellow CARE Profile



The mAs which is needed for the scan exceeds the limit of the system. Loading of the scan range is not possible. The scan range is invalid.

Adapt the scan parameters. (➔ Page 416 *Using the Adjust button (optional)*), (➔ Page 418 *Using the FAST Scan Assistant*)

CAUTION

The quality reference parameters exceed the system limit for CARE Dose 4D.

The *mAs* curve of the topogram turns yellow in the respective area. Locally increased image noise.

- Adjust the scan parameters to allow for a higher mAs value.
- Modify scan time, pitch, or rotation time.
- Adapt the injection protocols, if necessary.

Using FAST Adjust (optional) and FAST Scan Assistant

If a conflict occurs, the **Adjust** button (optional) and the **FAST Scan Assistant** can be displayed.

The **Adjust** button is displayed if the peak of the CARE Profile or the whole CARE Profile is yellow. The **FAST Scan Assistant** is only displayed if the whole CARE Profile is yellow.

With **FAST Adjust** and the **FAST Scan Assistant**, scan parameter conflicts can be resolved automatically.

Using the Adjust button (optional)

If the system limits are exceeded, the **Adjust** button is displayed on the bottom of the chronicle.

The tooltip of the **Adjust** button displays the limits for scan time and the maximum mAs decrease configured in the **Scan Protocol Assistant**. (➔ Page 404 *Setting the limits for FAST Adjust*)

✓ The limits for **FAST Adjust** are configured in the **Scan Protocol Assistant**.

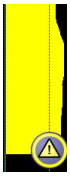
✓ The scan parameters are adjustable within the configured limits.

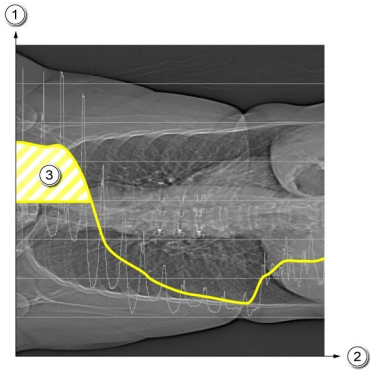


◆ Click the **Adjust** button to resolve the conflict automatically.

The values are automatically adapted within the limits configured in the **Scan Protocol Assistant**.

If the **Adjust** button is clicked, the tooltip displays the adjusted values.

Color of the CARE Profile	Reducing or solving the conflict
	If only the peak of the CARE Profile is yellow, the scan time will be increased until the conflict is resolved or the configured limit is reached.
	If the whole CARE Profile is yellow, first the scan time will be increased until the conflict is resolved. If increasing the scan time is not sufficient to resolve the conflict, the **max. mAs** will be additionally decreased until the conflict is resolved or the configured limit is reached. For example, the system allows for a **max. mAs** of 600 mAs, and the configured limit allows for a decrease of up to 25%. Then the **max. mAs** will be decreased until the conflict is resolved or until the lower limit of 450 mAs is reached. The mAs is only decreased for areas where system limits would be exceeded. Otherwise the mAs remains unchanged.



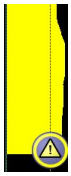
(1) mAs

(2) Z-direction

(3) Decrease of the mAs if the system limits are exceeded

As long as an adjusted scan range is not scanned, you can revoke the adaptations by clicking the **Adjust** button again.

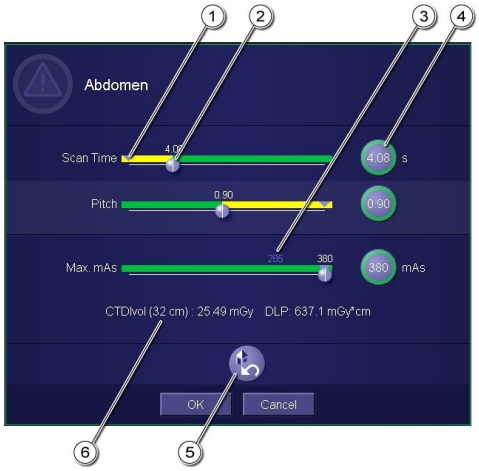
Using the FAST Scan Assistant



If a cooling or a scan parameter conflict occurs, the **FAST Scan Assistant** button is displayed. The invalid scan ranges and scan parameters are indicated in yellow in the parameter cards.

With the **FAST Scan Assistant**, you can check and change the settings made by the **Adjust** button.

1 Click the **FAST Scan Assistant** button to open the **FAST Scan Assistant** dialog box.



(1) Original value

(2) Currently set value

(3) Configured limit for the **Adjust** button

(4) Value which resolves the conflict

(5) **Undo** button

(6) Dose descriptors



If the system requires cooling time, a clock icon indicates the remaining cooling time in the **FAST Scan Assistant** dialog box.

The limits for **Scan Time** increase and **Max. mAs** decrease of **FAST Adjust**, which are configured in the **Scan Protocol Assistant**, are displayed above the sliders. (➔ Page 404 *Setting the limits for FAST Adjust*)

If a slider is positioned in the green zone, the scan parameter is valid and scannable. As long as one of the sliders is positioned in the yellow zone, the scan is invalid.

The buttons on the right-hand side display the values which resolve the conflict for the corresponding slider by either increasing the scan time or decreasing the maximum mean mAs. Clicking one of the buttons changes the value of the corresponding slider.

2 Adapt the scan parameters such that they are suitable for the patient and the examination.

To move the sliders manually, you can also use the arrow keys on the keyboard.

3 Click **OK**.

The **FAST Scan Assistant** dialog box is closed.

If the conflict is resolved, you can load the scan.

As long as an adjusted scan range is not scanned, you can revoke the adaptations by clicking the **Undo** button in the **FAST Scan Assistant** dialog box.

In the following cases, the changes by **FAST Adjust** and the **FAST Scan Assistant** for maximum mAs decrease are automatically revoked:

- CARE Dose4D has been activated or deactivated in the **Scan** parameter card.
- The **Eff. mAs** or the **mAs** value has been manually changed in the **Scan** parameter card.
- ECG Pulsing has been activated or deactivated in the **Trigger** parameter card.

Handling the Dose Notification

If scan parameters exceed the notification values for **CTDI$_{vol}$** or **DLP** configured in the **Scan Protocol Assistant**, the color of these values in the parameter cards changes to red. (→ Page 403 *Setting the values for the Dose Notification*)

If you load the scan range, a **Dose Notification** dialog box will be additionally displayed, if configured in the **Examination Configuration** dialog box. (→ Page 401 *Configuring the display of the Dose Notification*)

- Check if the scan parameters are suitable for the examination.

Continue a scan without correcting the exceeded scan parameters only if clinically justifiable. In this case, insert the **Diagnostic reason** (optional) into the **Dose Notification** dialog box.

After confirming the **Dose Notification**, the exceedance of the dose parameters will be documented in the folder H:\SiteData \DoseLogs including the following information:

- Type (Dose Notification)
- Date and time
- Patient ID
- Diagnostic reason
- Scan range name
- Actual $CTDI_{vol}$ and $CTDI_{vol}$ notification value
- Actual DLP and DLP notification value

You are responsible for creating back-ups of the dose log files.

Handling the Dose Alert

If you are loading a scan for which the accumulated $CTDI_{vol}$ at any z-position or the accumulated DLP for the next scan ranges exceed the alert values configured in the **Examination Configuration**, the **Dose Alert** dialog box will be displayed.

◆ Check if the scan parameters are suitable for the examination.

Continue a scan without correcting the exceeded scan parameters only if clinically justifiable. In this case, insert your **User name** (mandatory) and the **Diagnostic reason** (optional) into the **Dose Alert** dialog box.

If password protection is activated in the **Local Service** configuration, enter the configured password to continue scanning. Otherwise the scan range cannot be loaded. See (→ Page 405 *Activating password protection for the Dose Alert*).

After confirming the **Dose Alert**, the scan protocol can no longer be saved.

After confirming the **Dose Alert**, the exceedance of the dose parameters will be documented in the folder H:\SiteData \DoseLogs including the following information:

- Type (Dose Alert)
- Date and time
- Patient ID
- User name
- Diagnostic reason
- Actual $CTDI_{vol}$ and $CTDI_{vol}$ alert value
- Actual DLP and DLP alert value
- Configuration of password protection

You are responsible for creating back-ups of the dose log files.

Viewing the dose documentation

The applied dose can be documented in the Patient Protocol and in the DICOM Dose Structured Report for each scan.

Viewing a Patient Protocol

If configured, the system creates the Patient Protocol at the end of an examination.

The automatic creation of the Patient Protocol and the **Auto filming** function is set in the **Examination Configuration** dialog box.

◆ To view the Patient Protocol, load it into *syngo* **Viewing**.

If you click the **Hide Graphics** icon on the **Filming** task card, you also hide the Patient Protocol.

Viewing a DICOM Dose Structured Report

If configured, a Dose SR is generated automatically according to the DICOM standard for archiving and evaluation purposes at the end of an examination (➔ Page 401 *Configuring the Dose Structured Report*). The Dose SR cannot be modified.

✓ The *syngo* Structured Report (SR) Viewer is installed.



◆ Double-click the icon in the content area of the Patient Browser to view the dose report in the *syngo* SR Viewer.

The complete information of the dose report is listed in the *syngo* SR Viewer despite the converse note displayed in the header line of the report.

FAQ Answers to frequently asked questions can be found here:

- (→ Page 424 *How can I reduce dose?*)
- (→ Page 424 *When do I customize a default scan protocol?*)
- (→ Page 424 *How do I adapt a customized scan protocol to a new scanner?*)
- (→ Page 425 *What do I do if images are too noisy?*)
- (→ Page 425 *Do I have to use different protocols for slim and obese patients?*)
- (→ Page 426 *For CARE Dose4D, is there a linear relationship between tube current and patient attenuation?*)
- (→ Page 426 *Does CARE Dose4D always operate with the same modulation?*)
- (→ Page 426 *What is the difference between CARE Dose and CARE Dose4D?*)
- (→ Page 427 *Do metal implants affect the tube current adaptation of CARE Dose4D?*)
- (→ Page 427 *When do I use low kV scanning?*)
- (→ Page 427 *Do you recommend breast shields?*)
- (→ Page 428 *Is CARE kV online-modulated?*)
- (→ Page 428 *Which $CTDI_{vol}$ and DLP values are displayed?*)
- (→ Page 428 *Why are the values for $CTDI_{vol}$, DLP and Eff. mAs not displayed as expected?*)
- (→ Page 428 *How are the $CTDI_{vol}$ and DLP values calculated and reported?*)

- (→ Page 429 *Why does the CARE Profile of tilted scans not have the same length as the scan range?*)
- (→ Page 429 *Why is the Adjust button not displayed even though the CARE Profile is green-yellow or yellow?*)

How can I reduce dose?

1. Check that a CT scan is the most appropriate diagnostic test for the clinical question at hand.
2. Scan only the regions that are indicated.
3. Optimize scan parameters to the diagnostic task.
4. Avoid multiphase examinations by reducing the number of phases when appropriate.
5. Use automatic exposure control by selecting CARE Dose4D. (→ Page 406 *Setting CARE Dose4D*)
6. Use automatic kV adjustment by selecting CARE kV. (→ Page 407 *Setting CARE kV*), (→ Page 427 *When do I use low kV scanning?*)
7. Use a lower dose when a low contrast resolution is not required, for example, for lung and bone imaging as well as for follow-up studies for shunt or tube placement.
8. Use organ-based dose modulation by selecting an X-CARE protocol. (→ Page 388 *X-CARE*)
9. Use an appropriate reconstruction technique. (→ Page 411 *Setting the reconstruction parameters for SAFIRE*), (→ Page 411 *Setting the reconstruction parameters for SAFIRE Excel*)

When do I customize a default scan protocol?

As a starting point, Siemens provides default scan protocols for adults and children, tailored to various body regions and procedures. You may customize and save these protocols according to your imaging needs. Ensure that only authorized personnel change your scan protocols.

How do I adapt a customized scan protocol to a new scanner?

1. On your new CT scanner, select the corresponding default scan protocol.
2. Adapt the scan and the reconstruction parameters, if necessary, to match your customized protocols.
3. Adjust the **mAs** value to match the **CTDI**$_{vol}$ of your customized scan protocol to ensure similar image quality.

It is recommended to recheck the scan parameters after scanning a few patients. Adjust the scan parameters, for example, if dose can be reduced.

What do I do if images are too noisy?

Check the following settings:

1 If the scan is completed and the raw data are available, perform the reconstruction using a smoother kernel, thicker slices, and adapt the windowing settings.

2 If the images of all examinations with the same protocol are generally too noisy, check the **Qual. ref. mAs** and **Ref. kV** values in the **Dose Optimization** dialog box of the **Scan** parameter card. Also check the position of the **Dose Optimization** slider.

3 If the images of very slim or obese patients are generally too noisy, check the CARE Dose4D modulation curves in the **Examination Configuration** dialog box. (→ Page 399 *Adapting the CARE Dose4D settings*)

If all images of slim patients are too noisy, select a weaker CARE Dose4D curve.

If all images of obese patients are too noisy, select a stronger CARE Dose4D curve.

4 If the images of certain organs are too noisy, check whether you are using protocols with the correct organ characteristic.

Ensure that a scan protocol for a certain body region is saved for the corresponding organ characteristic.

Do I have to use different protocols for slim and obese patients?

In some cases, you may have to adapt the scan parameters to an individual patient size, for example, if the image quality is not sufficient.

Setting the dose adaptation to patient size

- Adapt the patient size and the CARE Dose4D adaptation strength, if necessary.

  (→ Page 399 *Adapting the CARE Dose4D settings*),
  (→ Page 431 *Adapting the dose to the patient size*)

If **CARE Dose4D** and **CARE kV** are set to **On**, the mAs and the kV values are adapted automatically.

Use child protocols for children (→ Page 437 *When do I use a child protocol?*).

For CARE Dose4D, is there a linear relationship between tube current and patient attenuation?

Clinical experience has shown that the relationship between optimum tube current and patient attenuation is not linear. While larger patients need a higher dose than average-sized patients, they also have more body fat, which increases tissue contrast.

Smaller patients need a lower dose than average-sized patients, but they have less fat and less tissue contrast, which would result in noisy images if the dose was too low.

Therefore, during realtime dose modulation, CARE Dose4D reduces radiation dose less than might be expected for smaller patients, while increasing the dose less than might be expected for larger patients. This maintains good diagnostic image quality while achieving an appropriate radiation dose.

Does CARE Dose4D always operate with the same modulation?

No. For certain examination protocols, the CARE Dose4D operation is modified to meet specific conditions:

- For adult head protocols, the tube current is adapted to the variation along the z-axis of the patient and not to the angular attenuation profile.
- For protocols such as the extremities protocols, NeuroPCT protocols, and BodyPCT protocols, only angular tube current modulation (CARE Dose) is supported.
- For cardiac protocols, the mAs/rot. setting is adjusted to the patient size and not modulated during the scan; instead ECG dose modulation is used.
- For X-CARE protocols, dose modulation is only possible in the z-direction.

What is the difference between CARE Dose and CARE Dose4D?

CARE Dose only supports angular tube current modulation whereas CARE Dose4D also supports tube current modulation to patient size and along the z-axis.

Do metal implants affect the tube current adaptation of CARE Dose4D?

No. CARE Dose4D automatically adapts the tube current to different patient sizes and anatomic shapes, but automatically detects metal implants and avoids excessive dose.

When do I use low kV scanning?

Especially for contrast-enhanced vascular examinations, you can reduce dose by lowering the kV values.

Choosing lower kV settings requires an increase in **mAs** to maintain the image quality. Even with such increased settings, the dose can be reduced.

When adjusting your **mAs** value at the lower **kV** setting, monitor the **CTDI**$_{vol}$ until the desired value is reached.

If **CARE Dose4D** and **CARE kV** are set to **On**, the mAs and the kV values are automatically adapted.

Scanning with 70 kV (optional) may be applicable for children and slim adults in combination with contrast-enhanced examinations, for example, CT angiographic examinations.

70 kV is automatically considered if set as the lower limit in CARE kV.

For larger patients who have a higher X-ray attenuation, the output of the X-ray tube at lower kV settings may not be sufficient to produce the required contrast-to-noise ratios. For these patients, higher X-ray tube voltages must be selected, despite reduced iodine contrasts.

Do you recommend breast shields?

Siemens does not recommend the use of breast shields.

If you decide to use shielding with your Siemens CT scanner, it is important to ensure that shields are removed during topogram acquisition. Otherwise the system will increase the dose according to the additional attenuation in the scan area, and the potentially positive effect is negated.

Always follow the instructions of the breast shield manufacturers for proper use and placement.

If radiation-sensitive organs are exposed during the scan, for example, breast tissue in thoracic examinations, use X-CARE if available on your system. X-CARE provides organ-specific dose reduction without the disadvantages of breast shields. (→ Page 388 *X-CARE*)

Is CARE kV online-modulated?

No. If CARE kV is activated, scanning is performed with a constant kV value (no online modulation of the voltage).

Which $CTDI_{vol}$ and DLP values are displayed?

- For all head examinations, adult as well as child, the $CTDI_{vol}$ and DLP values are related to the 16-cm phantom.
- For all body* examinations, adult as well as child, the $CTDI_{vol}$ and DLP values are related to the 32-cm phantom.

* Body examinations include neck and extremities.

Why are the values for $CTDI_{vol}$, DLP and Eff. mAs not displayed as expected?

If CARE Dose4D is activated, the values for **$CTDI_{vol}$**, **DLP** and **Eff. mAs** are not displayed on the parameter cards as long as no topogram has been scanned. If the topogram has been scanned, the displayed values refer to the current patient and are reliable.

In the **Scan Protocol Assistant**, the **$CTDI_{vol}$** for pediatric protocols refers to the **Quality Ref. mAs** of an adult protocol, because there is no topogram available.

How are the $CTDI_{vol}$ and DLP values calculated and reported?

The Dose Length Product (DLP) and the $CTDI_{vol}$ are reported in the Patient Protocol and in the Dose Structured Report, available after closing the current examination. (→ Page 381 *Dose documentation*), (→ Page 378 *Definitions of dose measures*)

$CTDI_{vol}$ phantom size

The $CTDI_{vol}$ for tomogram scans is displayed before and after scanning in the **Scan** parameter card.

The $CTDI_{vol}$ is measured in dedicated plastic phantoms: 16-cm diameter for child and adult head protocols, 32-cm diameter for child and adult body protocols.

Adaptive dose shield

The adaptive dose shield reduces the overscan dose for spiral scans, depending on the scan parameters used. (→ Page 396 *Adaptive Dose Shield*)

The usage of the adaptive dose shield is reflected in the DLP and does not influence the displayed $CTDI_{vol}$.

Why does the CARE Profile of tilted scans not have the same length as the scan range?

For tilted scans, the CARE Profile is displayed in relation to the z-position of the rotation center.

Why is the Adjust button not displayed even though the CARE Profile is green-yellow or yellow?

CARE Profile is green-yellow or yellow

- No limits for **FAST Adjust** are configured in the **Scan Protocol Assistant**. (➔ Page 404 *Setting the limits for FAST Adjust*)
- The limits are already exceeded with the current scan configuration.

CARE Profile is green-yellow

- The scan time currently set for the scan range may be higher than the scan time limit configured in the **Scan Protocol Assistant** (➔ Page 404 *Setting the limits for FAST Adjust*). For example, the scan time of the current scan is 10 s and the limit for **Upper limit max. scan time** is set to 6 s.
- The scan range is not suitable for a scan time adaptation:
  - For cardiac spirals, the scan time depends on the heart rate and cannot be changed.
  - For sequence scans, the total examination time depends on the selected cycle time.

2.12.5 Considerations for pediatric scanning

For the description of a basic dose-optimized workflow, see (➔ Page 398 *Performing a dose-optimized workflow*). In the following chapter you will find the settings which must be taken into account for dose-optimized scanning of children.

The following functionalities are described in the subsequent sections:

- (➔ Page 431 *Checking the examination configuration parameters*)
- (➔ Page 432 *Configuring limits and notification values*)
- (➔ Page 434 *Checking the parameter settings*)

- (→ Page 436 *Positioning the patient*)
- (→ Page 436 *FAQ*)

Anatomical and physiological differences between children and adults require special attention when imaging pediatric patients. Image quality requirements are different, because of smaller structures, as well as higher heart rates and difficulties in cooperating during the scan, to name just a few reasons.

Adjusting imaging parameters is important to meet image quality requirements and in addition is essential to reduce dose as children are more sensitive to radiation than adults. The smaller the cross section of the patient, the higher the radiation dose that is actually absorbed.

Nevertheless, computed tomography imaging is of great importance for the treatment of pediatric patients, especially for complex lung imaging, for the treatment of congenital malformations, and in intensive care.

As a consequence, the ALARA principle (As Low As Reasonably Achievable) is of particular importance in pediatric patients. It calls for always selecting the dose that is as low as possible, yet sufficient for a reliable diagnosis.

Adjust the dose for each individual scan carefully to achieve the necessary image quality. Scans with lower radiation dose may have higher image noise, but deliver diagnostic image quality.

The $CTDI_{vol}$ and DLP for pediatric head scans are reported in the 16-cm CTDI phantom.

The $CTDI_{vol}$ and DLP for pediatric body scans are reported in the 32-cm CTDI phantom.

Characteristics of child protocols

For CT examinations of children, Siemens offers special child protocols in combination with accurate dose modulation.

You can access child protocols in the **Patient Model Dialog**. Based on the entered patient birth date or age, child protocols are automatically displayed in the **Patient Model Dialog** if the age of the patient is below the maximum child age. The default value for the maximum child age is 11 years. Child protocols incorporate features and optimized parameters at appropriate dose levels.

- Dose modulation parameters for CARE Dose4D dedicated to children
- Special kernels (C) for head examinations
- Faster rotation times to shorten scan times and to reduce motion artifacts
- 70 kV (optional), for some protocols, for higher contrast-to-noise ratio, and lower dose level

The **Quality Reference mAs** for CARE Dose4D is defined for a patient weighing 70 kg to 80 kg, even for child protocols. Based on this value, the system adapts the **Eff. mAs** to the size and shape of the current patient. (→ Page 434 *Adapting the Quality Ref. mAs*)

Checking the examination configuration parameters

1 In the **Options** menu, choose **Configuration**.

2 In the **Somaris/7 – Configuration Panel**, double-click the **Examination** icon.

The following functionalities are described in the subsequent sections:

- (→ Page 431 *Adapting the dose to the patient size*)
- (→ Page 432 *Setting the dose alert values*)
- (→ Page 432 *Adapting the maximum child age*)

Adapting the dose to the patient size

You can adapt the settings of the CARE Dose4D adaptation strength separately for children.

For **Child**, the Siemens default settings for the CARE Dose4D adaptation strengths are **Average** for all organ characteristics.

1 In the **Examination Configuration** dialog box, click the **Dose** tab card.

2 In the selection lists for **Child** of the field **CARE Dose4D configuration: mAs adaptation to patient size**, select a CARE Dose4D adaptation strength, if necessary.

Setting the dose alert values

You can set the **Dose Alert** values separately for children.

The **Dose Alert** dialog box informs you if the alert values for **$CTDI_{vol}$** or **DLP** are exceeded for the whole examination.

1 In the **Examination Configuration** dialog box, click the **Dose** tab card.

2 In the **Dose Alert** field for **Child**, set the **$CTDI_{vol}$** and **DLP** alert values.

In contrast to the **DLP**, the calculation of the accumulated **$CTDI_{vol}$** is specific to a z-position.

If no alert values are configured, the **Dose Alert** dialog box is not displayed.

Adapting the maximum child age

1 In the **Examination Configuration** dialog box, click the **Patient** tab card.

2 In the **Max. child age** spin box of the **Patient Data** field, set the maximum age.

The default value for the maximum child age is 11 years.

The **Child** radio button is automatically selected when opening the **Patient Model Dialog** if a corresponding patient has been registered.

Configuring limits and notification values

In the Scan Protocol Assistant, you can configure the dose-relevant limits and dose notification values.

1 In the main menu, choose **Options** > **Configuration...**.

2 In the **Somaris/7 – Configuration Panel**, double-click the **Scan Protocol Assistant** icon.

If you are not familiar with the functionalities of the **Scan Protocol Assistant**, see Modifying scan protocols, (→ Page 356 *Changing parameters*).

3 Click the **Change parameters** radio button on the step **1** page of the **Scan Protocol Assistant**.

4 In the **Scan Protocol Assistant** dialog box, click the step **2** button.

5 Click **Child**.

6 Select a scan protocol.

7 Click the step **3** button.

8 In the upper area of the **Scan Protocol Assistant** dialog box, click the **Scan** button to open the **Scan** page.

9 Click the **Dose** tab card.

The following functionalities are described in the subsequent sections:

- (→ Page 433 *Setting the CARE kV limits*)
- (→ Page 433 *Setting the notification values for the Dose Notification*)
- (→ Page 433 *Setting the limits for FAST Adjust*)

Setting the CARE kV limits

You can set the CARE kV limits separately for child protocols.

◆ In the **CARE kV** selection list, select the minimum **kV** values and the maximum **kV** values for each scan.

You can select **70 kV** (optional) or **80 kV** for **Min. kV**.

The limits are displayed in the tooltip of the **kV** item on the **Scan** parameter card.

Setting the notification values for the Dose Notification

You can set the **Dose Notification** values separately for child protocols.

◆ In the **Ref. CTDI$_{vol}$** and **Ref. DLP** spin box of the **Dose Notification** field, set the notification values.

Setting the limits for FAST Adjust

You can set the limits for **FAST Adjust** separately for child protocols.

1 In the **Upper limit max. scan time** spin box of the **FAST Adjust** field, set the maximum scan time for each scan range.

2 In the **Lower Limit max. mAs** spin box of the **FAST Adjust** field, set the maximum amount of mAs decrease (maximum mean mAs per rotation in %) for each scan range.

If no limits for **FAST Adjust** are configured, the **Adjust** button will not be displayed.

Checking the parameter settings

After choosing a scan protocol from the selection list of the **Patient Model Dialog**, you can check and adapt the scan parameters in the parameter cards individually for each scan range.

(→ Page 434 *Adapting the Quality Ref. mAs*)

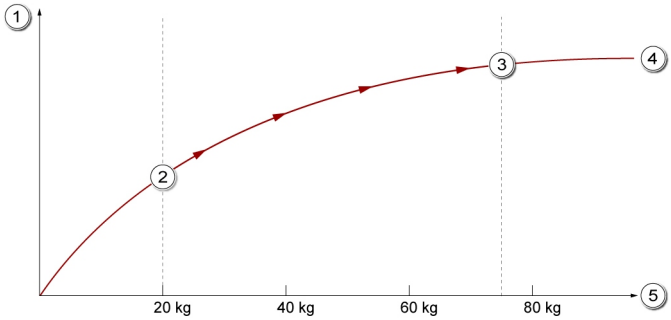
Adapting the Quality Ref. mAs

The Quality Reference mAs value of child protocols of software versions older than *syngo* CT 2011A is no longer applicable and must be adapted.

In software versions older than *syngo* CT 2011A, the **Quality Ref. mAs** value for CARE Dose4D child protocols was defined for a special reference pediatric patient (20 kg, 5 years).

With the software versions from *syngo* CT 2011A, the **Quality Ref. mAs** value is always defined for a reference adult patient size of 70 kg to 80 kg, even for child protocols.

When loading a child protocol that has not been updated yet, a message box appears. It informs you that the reference patient size for CARE Dose4D child protocols has changed. As long as the **Quality Ref. mAs** value is not changed, scanning is not possible.



(1) Product of tube current and scan time (mAs)

(2) Quality Reference mAs value of software versions older than *syngo* CT 2011A for a child of 20 kg or 5 years

(3) Quality Reference mAs value from software version *syngo* CT 2011A for an adult or child of approximately 75 kg

(4) CARE Dose4D adaptation strength

(5) Patient size (kg)

1 On the **Scan** parameter card, adapt the **Quality Ref. mAs** value to the corresponding reference patient size of an adult.

CARE Dose4D automatically adapts the **Eff. mAs** value to the current pediatric patient.

You can also adapt the **Quality Ref. mAs** value in the **Scan Protocol Assistant**.

2 Save the scan protocol.

After the **Quality Ref. mAs** value has been changed and the scan protocol has been saved, the message box will no longer appear. It is only shown once per scan entry.

For default child protocols from software version *syngo* CT 2011A, the **Quality Ref. mAs** values are already set to the correct reference value.

Positioning the patient

You can position babies comfortably and securely on the patient table by using the baby mattress. *SOMATOM Operator Manual*

- For infants and small children, use the baby mattress.

FAQ

Answers to frequently asked questions can be found here:

- (→ Page 436 *How can I reduce dose?*)
- (→ Page 437 *When do I use a child protocol?*)
- (→ Page 437 *How do I scan children with a comparable size as an average adult (75 kg)?*)
- (→ Page 439 *When do I customize a default scan protocol?*)
- (→ Page 439 *Why are the values for $CTDI_{vol}$, DLP and Eff. mAs not displayed as expected?*)
- (→ Page 439 *How do I immobilize infants and young children?*)

How can I reduce dose?

1. Check that a CT scan is the most appropriate diagnostic test for the clinical question at hand.
2. Scan only the regions that are indicated.
3. Optimize scan parameters to the diagnostic task.
4. Avoid multiphase examinations by reducing the number of phases when appropriate.
5. Use automatic exposure control by selecting CARE Dose4D. (→ Page 406 *Setting CARE Dose4D*)
6. Use automatic kV adjustment by selecting CARE kV. (→ Page 407 *Setting CARE kV*), (→ Page 427 *When do I use low kV scanning?*)
7. Use a lower dose when a low contrast resolution is not required, for example, for lung and bone imaging as well as for follow-up studies for shunt or tube placement.
8. Use organ-based dose modulation by selecting an X-CARE protocol. (→ Page 388 *X-CARE*)
9. Use an appropriate reconstruction technique. (→ Page 411 *Setting the reconstruction parameters for SAFIRE*), (→ Page 411 *Setting the reconstruction parameters for SAFIRE Excel*)

When do I use a child protocol?

Child protocols are recommended up to a patient age of six years (for head examinations) or up to a patient body weight of 55 kg (for body examinations).

You can use adult protocols for children older than six years (head examinations) or heavier than 55 kg (body examinations).

Based on the entered patient birth date or age, child protocols are automatically displayed in the **Patient Model Dialog** if the actual age is below the maximum child age.

The **Max. child age** is configurable in the **Examination Configuration** dialog box. (→ Page 432 *Adapting the maximum child age*)

How do I scan children with a comparable size as an average adult (75 kg)?

There are two possibilities depending on whether the same dose and image quality as those for an adult are needed, or if a reduced dose and image quality are sufficient.

Using the same dose and image quality as those for an adult

✓ The **Dose** tab card of the **Examination Configuration** dialog box is open.

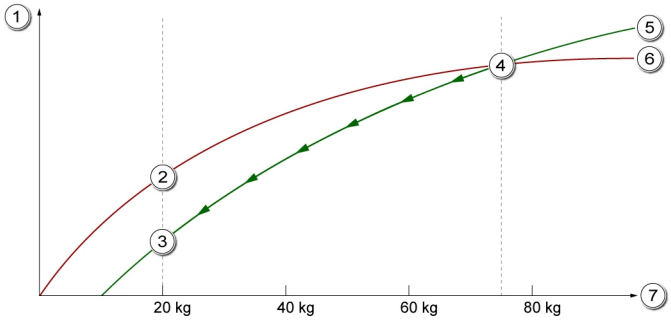
◆ Change the CARE Dose4D adaptation strength in the **Child** selection list of the field **CARE Dose4D configuration: mAs adaptation to patient size** towards **Strong**.

For **Child**, the Siemens default settings for the CARE Dose4D adaptation strengths are **Average** for all organ characteristics.

CARE Dose4D automatically adapts the **Eff. mAs** value to the current pediatric patient.

Changing the CARE Dose4D adaptation strength decreases the dose reduction for larger children.

When a child is larger than the reference patient, the CARE Dose4D adaptation strength for **Adult obese** is used.



(1) Product of tube current and scan time (mAs)

(2) Quality Reference mAs value of a software version older than *syngo* CT 2011A for child

(3) Changed CARE Dose4D adaptation strength

(4) Quality Reference mAs value from software version *syngo* CT 2011A for child

(5) CARE Dose4D adaptation strength towards **Strong**

(6) CARE Dose4D adaptation strength **Average**

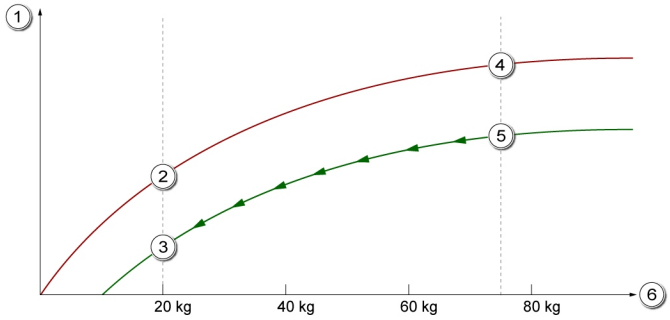
(7) Patient size (kg)

Reducing dose and image quality

✓ The **Dose Optimization** dialog box of the **Scan** parameter card is displayed. To open the **Dose Optimization** dialog box, see (→ Page 408 *Adjusting the examination type*).

◆ Reduce the **Quality Ref. mAs** in small steps.

Decreasing the **Quality Ref. mAs** value reduces dose and image quality, independent of the current patient size.



(1) Product of tube current and scan time (mAs)

(2) Quality Reference mAs value of a software version older than *syngo* CT 2011A for child

(3) Changed Quality Reference mAs

(4) Quality Reference mAs value from software version *syngo* CT 2011A for child

(5) Changed Quality Reference mAs

(6) Patient size (kg)

When do I customize a default scan protocol?

As a starting point, Siemens provides default scan protocols for adults and children, tailored to various body regions and procedures. You may customize and save these protocols according to your imaging needs. Ensure that only authorized personnel change your scan protocols.

Why are the values for $CTDI_{vol}$, DLP and Eff. mAs not displayed as expected?

If CARE Dose4D is activated, the values for $CTDI_{vol}$, DLP and Eff. mAs are not displayed on the parameter cards as long as no topogram has been scanned. If the topogram has been scanned, the displayed values refer to the current patient and are reliable.

In the **Scan Protocol Assistant**, the **$CTDI_{vol}$** for pediatric protocols refers to the **Quality Ref. mAs** of an adult protocol, because there is no topogram available.

How do I immobilize infants and young children?

You can position babies comfortably and securely on the patient table by using the baby mattress. *SOMATOM Operator Manual*

1 Only use accessories approved by Siemens.

2 Replace defective accessories with new original accessories immediately.

Defective or non-approved accessories can cause artifacts, injuries to the patient and operating personnel, or damage to the equipment.

Consider sedating the patient to avoid rescans due to patient motion.

2.12.6 Considerations for Cardiac CT

For the description of a basic dose-optimized workflow, see (→ Page 398 *Performing a dose-optimized workflow*). In the following chapter you will find the settings which must be taken into account for dose-optimized Cardiac CT scanning.

The following Cardiac CT modes are provided:

- ECG-triggered sequence
- ECG-gated spiral
- BiSegment spiral

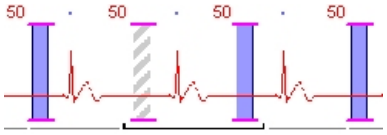
Initial situation	Recommended scan mode
■ Regular sinus rhythm ■ Moderate heart rate ■ Limited to increased variance ■ Several ectopic beats	■ ECG-triggered sequence (→ Page 441 *Scanning a prospectively ECG-triggered sequence*)
■ High to very high heart rate ■ Very irregular heart rate, which needs a high flexibility in reconstruction up to editing the ECG	■ ECG-gated spiral (→ Page 444 *Scanning a retrospectively ECG-gated spiral*)

Initial situation	Recommended scan mode
■ Very high heart rate	■ BiSegment spiral (→ Page 451 *When do I use a BiSegment spiral?*)

Answers to frequently asked questions can be found here:
(→ Page 448 *FAQ*)

Scanning a prospectively ECG-triggered sequence

Prospective ECG triggering combined with step-and-shoot acquisition of axial slices acquires the appropriate amount of scan data needed for image reconstruction during the previously selected heart phase. The ECG signal of the patient is monitored during examination, and axial scans are started with a pre-defined time offset relative to the R-waves. Irregularities are reliably detected, and in case of an ectopic beat, the scan is repeated at the same position.



The patient table moves the patient to the first z-position. The scan is triggered depending on the ECG. Then the patient is moved to the next z-position. The procedure is repeated until the range to be scanned is completed.

For low heart rates up to moderate heart rates, the optimum time point for data acquisition is in the end-diastolic phase at a heart phase of approximately 70%.

The following functionalities are described in the subsequent sections:

- (→ Page 442 *Using the Adaptive Cardio Sequence with the Flex mode*)
  - (→ Page 442 *Defining the scan range*)
- (→ Page 442 *Using ECG Pulsing*)
  - (→ Page 442 *Defining the ECG pulsing window if the heart rate shows no variances*)
  - (→ Page 445 *Defining the ECG pulsing window if the heart rate shows variances*)

- (→ Page 443 *Setting the reconstruction time point*)
  - (→ Page 443 *Setting Phase Start*)
  - (→ Page 447 *Setting Cardio BestPhase*)

Using the Adaptive Cardio Sequence with the Flex mode

The **Adaptive Cardio Sequence** and the **Flex** mode is activated by default.



It is recommended to keep **Adaptive Cardio Sequence** and the **Flex** mode activated.

For the Adaptive Cardio Sequence, the trigger timing for a scan is prospectively estimated based on the preceding three cardiac cycles.

Defining the scan range

Since **Flex** is active, you can define the start and end phase of the scan.

- On the **Trigger** parameter card, enter the values in the **Scan** entry fields for the start and end phase of the scan.

Using ECG Pulsing

You can combine the Adaptive Cardio Sequence with ECG Pulsing for individually defining the time points for the acquisition (**Scan**) as well as the high dose level (**Range**) used for ECG Pulsing.

Defining the ECG pulsing window if the heart rate shows no variances

- In the **Pulsing** selection list of the **Trigger** parameter card, select **auto** to use the predefined values of the configuration depending on the heart rate.



If necessary, modify the predefined values of the configuration by clicking the **ECG Pulsing configuration** icon. You can make your modifications for each heart rate in the **HeartView configuration** dialog box.

Defining the ECG pulsing window if the heart rate shows variances

1. In the **Pulsing** selection list of the **Trigger** parameter card, select **manual**.
2. In the **Unit** selection list, select **ms**.
3. In the **Range** entry fields, enter positive values for the pulsing window.

If you enter a positive value in ms, the scan window and the pulsing window stay constant. Therefore, heart rate variances do not lead to an extension of the scan window or the pulsing window.

For scanning patients with high heart rate variances, you can set the positive absolute delay values in the systolic phase (Range setting: 300 – 400 ms) for the pulsing window. This will ensure accurate triggering of the scan at a high dose in the systolic phase without an increase in patient dose.

The reconstruction must be performed in ms in every setting of Cardio BestPhase as well.

(→ Page 450 *How can I reduce dose for patients with high heart rate variances?*)

Setting the reconstruction time point

The **Phase Start** value of 70% RR (diastolic phase) is set as a default value in the standard protocols. (→ Page 451 *Alternative reconstruction time points to 70%*)

Setting Phase Start

1 In the **Unit** selection list of the **Trigger** parameter card, select **ms** (absolute delay) or **%** (relative delay) as the trigger unit.

2 In the **Phase Start** spin box, set the recon delay, if necessary.

Setting Cardio BestPhase

Cardio BestPhase is used to identify the best diastolic or best systolic phases for image reconstruction.

The determined best phase represents the optimum image quality in the systolic phase (0-50% RR) or in the diastolic phase (50-100% RR).

- In the **BestPhase** selection list of the **Trigger** parameter card, select **BestSyst** or **BestDiast**.

If the scan is started and irregular heartbeats are detected, a message in the ECG trigger field informs you about the detected arrhythmia, and that the scan is repeated. (→ Page 449 *How are ectopic beats handled?*)

Scanning a retrospectively ECG-gated spiral

In the spiral mode, data acquisition continuously proceeds while the patient table is moving forward with a constant pitch.

Due to the continuous data acquisition, the spiral mode allows maximum flexibility for data reconstruction. If necessary, you can also edit the ECG in this mode for challenging patients.

Since, compared with non-gated spirals, the pitch depends on the heart rate of the patient, very low pitch values of approximately 0.2 are needed. This may be at the expense of a higher radiation dose.

To alleviate this effect, the tube current should be modulated with ECG Pulsing and MinDose depending on the current heart phase.

The following functionalities are described in the subsequent sections:

- (→ Page 444 *Using ECG Pulsing*)
  - (→ Page 444 *Defining the ECG pulsing window if the heart rate shows no variances*)
  - (→ Page 445 *Defining the ECG pulsing window if the heart rate shows variances*)
- (→ Page 446 *Using MinDose*)
- (→ Page 446 *Adapting the pitch*)
- (→ Page 446 *Setting the reconstruction time point*)
  - (→ Page 446 *Setting Phase Start*)
  - (→ Page 447 *Setting Cardio BestPhase*)

Using ECG Pulsing

ECG Pulsing reduces the applied dose down to 25% of the nominal current.

Use ECG Pulsing if you want to perform a functional analysis on the reconstructed images, and a functional image impression based on a reduced dose level is acceptable.

Defining the ECG pulsing window if the heart rate shows no variances

- In the **Pulsing** selection list of the **Trigger** parameter card, select **auto** to use the predefined values of the configuration depending on the heart rate.





If necessary, modify the predefined values of the configuration by clicking the **ECG Pulsing configuration** icon. You can make your modifications for each heart rate in the **HeartView configuration** dialog box.

Defining the ECG pulsing window if the heart rate shows variances

1 In the **Pulsing** selection list of the **Trigger** parameter card, select **manual**.

2 In the **Unit** selection list, select **ms**.

3 In the **Range** entry fields, enter positive values for the pulsing window.



If you enter a positive value in ms, the pulsing window stays constant. Therefore, heart rate variances do not lead to an extension of the scan window or the pulsing window.

For scanning patients with high heart rate variances, you can set the positive absolute delay values in the systolic phase (Range setting: 300 – 400 ms) for the pulsing window. This will ensure accurate triggering of the scan at a high dose in the systolic phase without an increase in patient dose.

The reconstruction has to be performed in ms in every setting of Cardio BestPhase as well.

(→ Page 450 *How can I reduce dose for patients with high heart rate variances?*)

Using MinDose

MinDose reduces the applied dose down to 4% of the nominal current. On average, around 20% of the dose can be reduced compared to the normal ECG pulsing setting.

Use MinDose if you do not want to perform a functional analysis on the reconstructed images.

- In the **ECG Pulsing** selection list of the **Trigger** parameter card, select **MinDose - manual** to define the start and the end point in the diastolic phase.

  - or -

  In the **ECG Pulsing** selection list, select **MinDose - auto** to activate the automatic dose modulation.

Adapting the pitch

The automatic pitch adaptation is set by default. This mode is activated when the estimated heart rate (**Est. HR**) is set to **auto**.

Select a manual pitch adaptation with the estimated heart rate only if clinically indicated, for example, in case of bigeminus, or if the heart rate decreases by about 10 beats during the breath-hold command.

Setting the reconstruction time point

The **Phase Start** value of 70% RR (diastolic phase) is set as a default value in the standard protocols. (→ Page 451 *Alternative reconstruction time points to 70%*)

Setting Phase Start

1 In the **Unit** selection list of the **Trigger** parameter card, select **ms** (absolute delay) or **%** (relative delay) as the trigger unit.

2 In the **Phase Start** spin box, set the recon delay, if necessary.

Setting Cardio BestPhase

Cardio BestPhase is used to identify the best diastolic or best systolic phases for image reconstruction.

The determined best phase represents the optimum image quality in the systolic phase (0-50% RR) or in the diastolic phase (50-100% RR).

- In the **BestPhase** selection list of the **Trigger** parameter card, select **BestSyst** or **BestDiast**.

Using CARE Dose4D and CARE kV

The use of CARE Dose4D and CARE kV is valid for all cardiac workflows.

Using CARE Dose4D

For cardiac scan protocols, CARE Dose4D is activated by default.



It is highly recommended to keep CARE Dose4D activated.



For cardiac scan protocols, the mAs/rot. setting is adjusted to the patient size. Additionally, ECG modulation is used.

Using CARE kV

CARE kV is activated by default.



It is recommended to keep CARE kV activated.

CARE kV optimizes the applied dose for a defined image quality level by automatically adapting the tube voltage and the tube current.



If CARE kV is activated, scanning is performed with a constant kV value (no online modulation of the voltage).

- In the **Dose Optimization** dialog box, set the slider to **Vascular**.

Setting kV manually

If you do not have the CARE kV option, set the tube voltage manually.

For CTA examinations, scanning with 100 kV provides images with a considerably higher contrast compared to 120 kV.

✓ Patient weight up to 80 kg (175 lbs)

◆ In the **kV** selection list of the **Scan** parameter card, select **100 kV** tube voltage.

For patients weighing more than 80 kg, select **120 kV**.

If you set the tube voltage manually, you also have to adapt the **Quality Ref. mAs**.

FAQ Answers to frequently asked questions can be found here:

- (→ Page 449 *When do I use a sequence scan mode versus a spiral scan mode?*)
- (→ Page 449 *How do I scan obese patients?*)
- (→ Page 449 *How are ectopic beats handled?*)
- (→ Page 450 *How do I scan patients with bradycardia?*)
- (→ Page 450 *How do I scan patients with bypass?*)
- (→ Page 450 *How can I reduce dose for patients with high heart rate variances?*)
- (→ Page 451 *When do I use a BiSegment spiral?*)
- (→ Page 451 *How are the acquisition windows for spirals and sequences adapted?*)
- (→ Page 451 *Alternative reconstruction time points to 70%*)
- (→ Page 451 *When do I use MinDose?*)
- (→ Page 451 *Are Cardio BestPhase and ECG Pulsing coupled?*)
- (→ Page 451 *How is the automatic adaptation of the pitch calculated?*)
- (→ Page 452 *For scanning a sequence, when do I use Quick, when Flex?*)
- (→ Page 452 *What do I have to consider for Cardiac CT examinations with CARE Dose4D?*)

- (→ Page 452 *Why is the Eff. mAs value not displayed in the cardiac scan protocols?*)
- (→ Page 452 *How is the ECG signal predicted?*)
- (→ Page 452 *When do I use a TrueStack reconstruction?*)
- (→ Page 453 *Can I reduce the dose for a MinDose spiral to the same level as for a sequence?*)

When do I use a sequence scan mode versus a spiral scan mode?

Scanning a sequence is recommended if the heart shows a regular sinus rhythm, a moderate heart rate, and a limited variance. Single ectopic beats do not affect a sequence scan.

Scanning a spiral is recommended for very high or irregular heart rates, which require a high flexibility in reconstruction up to the editing of the ECG.

How do I scan obese patients?



For cardiac spiral scans, it is not possible to increase the dose utilization by reducing the pitch.

For a sequence, you can reduce dose in a limited way by slowing down the rotation speed (optional).

- In the **Rotation time** selection list of the **Scan** parameter card, select a slower rotation time.

How are ectopic beats handled?

When using the Adaptive Cardio Sequence modes, the trigger timing for the scan is estimated prospectively based on the preceding three cardiac cycles. The CT scanner will show the following behaviors when ectopic heartbeats are detected.

If an ectopic beat occurs just before the scan start, the acquisition is not performed and the table will remain at that slice position. The scan is triggered again at the same slice position by the next heartbeat. The table feed and acquisition will then resume as normal until the next ectopic occurrence.

If the ectopic beat occurs during the scan, the table will remain at that slice position. The scan will be triggered again at the same slice position by the next heartbeat. The table feed will immediately resume after the secondary trigger.

The scan is only repeated once per table position.

By default, the images are reconstructed using data from the secondary trigger. If needed, you can still perform a second recon job using the primary trigger to check for better results. If **Flex** is activated, several series can be reconstructed at different time points to check for better results.

How do I scan patients with bradycardia?

It is recommended to scan a sequence.

Scanning a spiral is not recommended since a very low pitch would have to be set due to the slowed heart rate, and the dose would be increased. If you scan a spiral, select MinDose to reduce the dose.

How do I scan patients with bypass?

For patients with bypass, a wider scan range must be set.

You can also use a ChestPain scan protocol.

Be careful when scanning a sequence. In this case, you must consider the longer scan time as well as the timing of contrast medium application.

How can I reduce dose for patients with high heart rate variances?

Using positive absolute delays eliminates the need to predict the upcoming R-peaks for determining the placement of the pulsing window within the cardiac cycle. Therefore, the length of maximum dose plateaus will remain constant (as defined **Range** settings), independent of the heart rate variance.

On the **Trigger** parameter card, set the positive absolute delay values (ms) in the end-systolic phase for the pulsing window.

1 In the **Unit** selection list, select **ms**.

2 In the **Pulsing** selection list, select **manual**.

3 In the **Range** spin box, set **300**.

4 In the **to** spin box, set **400**.

This ensures accurate triggering of the scan at a high dose level in the systolic phase without dose increase.

The reconstruction must be performed in ms in every setting of Cardio BestPhase as well.

When do I use a BiSegment spiral?

A BiSegment spiral is recommended for increased heart rates. A high temporal resolution is not guaranteed.

- In the **Scan Protocol** selection list of the **Patient Model Dialog**, select the CoronaryCTABiSeg scan protocol.

How are the acquisition windows for spirals and sequences adapted?

For irregular heart rates, spirals and sequences automatically extend the acquisition windows, if configured. The acquisition window of a spiral is more extended than the acquisition window of a sequence, especially for low heart rates.

Alternative reconstruction time points to 70%

You can set alternative reconstruction time points for a phase start in the end-systolic phase at approximately 40% or 300 ms.

Setting Phase Start

1. In the selection list of the **Trigger** parameter card, select **ms** (absolute delay) or **%** (relative delay) as the trigger unit.
2. In the **Phase Start** spin box, set **300** (ms) or **40** (%).

Setting Cardio BestPhase

You can also use Cardio BestPhase to automatically set the optimum reconstruction time point.

1. In the **BestPhase** selection list of the **Trigger** parameter card, select **BestSyst** for automatic systole mapping.
2. In the **Unit** selection list, select **ms**.

When do I use MinDose?

Use MinDose for a cardiac spiral if you do not need to perform a functional analysis.

Are Cardio BestPhase and ECG Pulsing coupled?

No. The optimum heart phase, Cardio BestPhase, is calculated by an algorithm which analyzes and evaluates the entire range of the heart phase between 0% and 100%. This algorithm operates independently of the applied dose and the pulsing settings.

How is the automatic adaptation of the pitch calculated?

The pitch is calculated by the lowest heart rate which is found within the last ten heart cycles. An offset of eight heartbeats per minute (bpm) is subtracted from the measured value. This heart rate determines the pitch.

For scanning a sequence, when do I use Quick, when Flex?

Quick

In the basic Quick mode, the sequence acquires only a minimum amount of data which is necessary to reconstruct images. For this mode, you only have to define the start phase. The scan window is not adapted. A fixed dose is applied. Since Quick shows a limited robustness against heart rate variances, it should only be used in case of low variances.

The Quick mode is only recommended for experienced users.

Flex

In the extended Flex mode, you can set a separate start and end phase. You can extend the scan window within the diastolic phase of the cardiac cycle to enable scans for patients up to 70 bpm.

Additionally, the variance of the heart rate is considered for the calculation of the time points. The variance should not exceed 5 bpm. Consider that the flexibility to find the optimum reconstruction phase is at the expense of a higher radiation dose.

Despite the similarity to spiral ECG Pulsing, the acquisition window of a sequence with FlexPadding is less extended than the acquisition window of a spiral, especially for low heart rates.

What do I have to consider for Cardiac CT examinations with CARE Dose4D?

For cardiac scan protocols, the mAs/rot. setting is adjusted to the patient size. Additionally, ECG dose modulation is used.

Why is the Eff. mAs value not displayed in the cardiac scan protocols?

The effective mAs depends on the pitch. For cardiac scans, the pitch has no effect on the image quality since this is a gated reconstruction.

How is the ECG signal predicted?

To time the trigger, the median of the RR intervals from three preceding heartbeats is used to predict the arrival of the next heart cycle.

When do I use a TrueStack reconstruction?

With TrueStack reconstruction, the individual cardiac cycles are reconstructed without a data overlap. By performing a reconstruction with TrueStack, you can create a reconstruction without stack mixing, generating an image set with sharp boundaries.

- In the **Recon** selection list of the **Trigger** parameter card, select a corresponding entry.

Can I reduce the dose for a MinDose spiral to the same level as for a sequence?

No. Due to the pitch, even for a MinDose spiral a higher dose is applied as compared with a sequence.

2 Examination

3 Glossary

Air Kerma Kinetic energy released per unit mass of air in Gray (Gy).

Algorithm General computation procedure.

In this case: image reconstruction from the measured *raw data*.

Anode Positive electrode in the X-ray tube (source of radiation).

AP Anterior-Posterior, from front to back.

API Automatic Patient Instruction; breathing instructions to the patient.

Artifact Structure in a medical image which does not represent any anatomical structure and which impairs the representation of the anatomical structure (e.g., streaks).

Attenuation The ratio of X-ray beam intensity prior to and after passing through an attenuating object.

Attenuation profile Local distribution of attenuation values from one direction of projection of the fan beam.

Beam hardening artifact *Artifact* caused by the change in the X-ray spectrum as radiation passes through the object being scanned.

Bolus tracking A *CARE* application (optional). With the bolus tracking function you can directly monitor the contrast medium bolus in the ROIs of a reference scan defined by the user.

As soon as the preset contrast medium threshold is reached, the acquisition is automatically started.

Calibration Procedure for adjusting the sensitivity of the individual detector channels; used for correction of measurement data.

CARE CARE (Combined Applications to Reduce Exposure) aims to achieve optimum image quality while at the same time reducing the radiation and contrast medium dose for the patient.

3 Glossary

CD-R Compact Disk Recordable.

Cluster A chain of slices acquired rapidly in Sequence CT mode within a breath-hold.

Convolution Mathematical procedure for image reconstruction in computed tomography.

Coupled operation mode (optional) A mode in CARE Contrast CT (optional). The CT system and an injector are in coupled operation mode when a coupled start is activated in the **Scan** subtask card, or in the **Contrast** subtask card.

You only have to initiate the injection *or* the scanning to have both operations starting simultaneously.

CPU Central Processing Unit, part of the computer that performs the calculations.

The speed of the CPU not only determines factors such as the *RAM* configuration but also the processing speed of the computer.

CT Computed Tomography.

CTA CT Angiography Display of the vascular system using CT.

CTDI CT Dose Index, calculated as absorbed dose to PMMA (lucite) according to 21 CFR 1020:33. The Integral of the dose profile is calculated along a line perpendicular to the tomographic plane (from -7T to +7T, T is the nominal tomographic slice thickness). CTDI is calculated in mGy.

$CTDI_{100}$ CT Dose Index, calculated as absorbed dose to air according to IEC 60601-2-44. The Integral of the dose profile is calculated along a line perpendicular to the tomographic plane (from -50 mm to +50 mm).

$CTDI_{vol}$ The CT Dose Index volume (IEC 60601-2-44) is the approximation of the average dose over a single slice in the standard head or body CT dosimetry phantom, expressed in terms of absorbed dose to air (mGy).

CT value Beam attenuation characteristic of an object measured in Hounsfield Units (HU). The scale uses water as a reference with a CT value of 0 (air: CT value of -1000).

Density determination Quantitative evaluation of the *CT values* in a CT image.

Detector Component of the scanning system which measures the beam intensity after radiation has passed through the object being scanned.

Detector array System of *detectors* for acquiring radiation intensities.

DICOM Digital Imaging and Communications in Medicine. Standard for exchanging medical images.

Digital camera Camera to which image data is digitally transferred.

DLP Dose Length Product. When examining with i-Fluoro, the DLP value is displayed in the **Patient Protocol** and **Dose Report** for each tomogram scan mode.

The DLP is calculated as follows: DLP [mGy x cm] = CTDIvol [mGy] x SliceWidth x No Of Slice Positions Per Scan.

Documentation Transfer of image results to transparent film.

Dose The total effect of radiation on a defined absorption volume of the body. The effective dose (E) (mSv) is expressed as a weighted sum of the dose applied not only to the organs in the scanned range, but also to the rest of the body.

Dual Source CT CT system using two X-ray tubes and two detectors for improving the imaging performance.

Dual Topo Combination of *two Topograms* with different tube positions (AP and lateral).

DVD Digital Versatile Disk. Optical storage medium for data exchange.

Dynamic Multiscan Scanning technique of continuous data acquisition of *multiple scans* at the same slice position.

Exporting Image data can be transferred to an external medium (CD, DVD, PACS, USB storage media) for storage.

Fan beam device CT system in which an arc-shaped detector array and an X-ray tube generating a fan-shaped beam rotate about the patient.

3 Glossary

FAST Fully Automated Scanner Technology

File Unit of data stored on the storage medium in the computer. A file might be an image, a database or a program.

Flying focal spot Electromagnetic deflected focal spot for sampling each object detail from two slightly different perspectives. Used to reduce sampling artifacts.

Focal spot Focal spot of an X-ray tube.

FoV (Reconstruction) Field of View. Used as an aid to calculate the tomogram.

Gantry Scanning unit of a CT system including the X-ray tube and the *detector array*.

Hard disk Part of the computer on which data and programs are stored for quick access.

Hardware Technical physical equipment of a computer system, in contrast to software.

High contrast resolution Spatial resolution; ability to display minute structures.

Highlighting Bright display of a range of CT values during windowing.

HIS Hospital Information System.

Network for transmitting patient data and images within a hospital.

Histogram Graphic and numerical display of frequency of CT values in a selected region.

Homogeneity Characteristic of image quality which describes how accurately CT values are measured when a homogeneous object is scanned and displayed by the CT system.

Hounsfield unit Unit used to measure the *CT value*.

HU Abbreviation of Hounsfield Unit.

i-Control Component that can be used during interventional examinations to control the functionalities of the CT system or of the software.

Image data compression	Data is compressed when storing images for more efficient use of the storage capacity of the data carrier. The *image matrix* is maintained.
Image matrix	Size of a medical image in *pixels*, e.g.: 512 x 512, 1024 x 1024.
Image mode	In image mode filming, the transfer of the images to the camera takes place image by image (see also *page mode*).
Image reconstruction	Computation of the CT image from the measured *raw data*.
Image reconstruction system (IRS)	Computer for reconstruction of the CT images from the measured *raw data*.
Isocenter	Center of the *scan plane*.
kV	Kilovolt (1 kV = 1000 Volt); unit used to measure the tube voltage.
Laser camera	Camera which utilizes a laser beam for exposing images.
LED	Light Emitting Diode, semi-conductor element that lights up like a bulb.
Low contrast resolution	Resolution of minute image details when there is little differentiation in density. For example, in soft tissue.
mA	Milliampere (1 mA = 1/1000 A); unit used to measure the tube current.
mAs	Milliampere per second product; unit used to measure the product of the tube current (mA) and scan time (s). Equivalent to the applied radiation dose.
MCA	Motion Artifact Correction Algorithm: algorithm correcting motion artifacts.
Measurement field	The field from which the *detector array* acquires data in the *gantry*.
Media	Collective term for exchange media, e.g., CD, DVD.
MinIP	Minimum Intensity Projection, like *MIP* but visualization of the darkest *voxels* (areas of least absorption).

3 Glossary

MIP Maximum Intensity Projection is a method for 3D display: Along the viewing direction through a volume, the voxel with the strongest absorption is displayed in the result image in each case.

Motion artifact *Artifact* caused by patient movement during the scan.

Mouse Operating element at the computer to direct the input cursor on the monitor and to adjust window values.

Move Table Top Only mode Mode applicable for interventional examinations, providing more space between the patient table and gantry, for example, for use of a C-arm.

MPR Multi Planar Reconstruction: using an image data set, you have the ability to perform retrospective reconstruction in different planes of orientation (i.e., from axial images create coronal, sagittal and paraxial images).

MTF Modulation Transfer Function; the frequency-dependent ratio of object contrast to image contrast. The MTF permits qualitative determination of the spatial resolution of an imaging system.

Multiformat camera Camera with selectable segmented film format; allows for exposures of multiple images on a single film.

NM Nuclear Medicine. Medical imaging that uses radioactive substances for diagnosis such as PET, PET-CT or gamma cameras.

Noise Unwanted interference in the signal caused by random factors and containing no information regarding the object being scanned.

Open Interface Connector at the CT system that is capable to run any Open Interface compatible respiratory sensor system that is compatible with your CT system.

Operating system Group of computer programs required for general operation of the computer and its periphery.

Osteo CT Semiautomatic bone mineral density measurement and evaluation method for the quantitive assessment of bone mineral content in the lumbar spine.

PA Posterior Anterior, from back to front.

PACS Picture Archiving & Communication System.

Siemens network for archiving and transmitting medical images.

Page Mode In page mode filming, the entire film sheet is composed in the computer and then transferred to the camera (see also *image mode*).

Partial scan *Scan* for which only a section (240°) of the rotation of the X-ray tube is used to measure a body slice.

Partial volume artifact *Artifact* caused by dense structures (e.g., bones) which are only partially included in the slice being scanned.

Phantom Measuring object whose attenuation properties are similar to human; Reference body used for functional and quality assurance tests.

Pitch factor Term applicable only for spiral CT. It is defined as the ratio of table feed per rotation to the collimated width of the entire detector. Example: 16*0.75 mm collimation, table feed 18 mm/sec. This gives a volume pitch of 18 / 0.75 = 24 and a pitch factor of 18 / (16*0.75) = 18/12 = 1.5.

Pixel Image element of the two dimensional image.

PMM Physiological Measurement Module. Connection box on the patient table providing receptacles for different functionalities.

RAM Fast, non-permanent memory (Random Access Memory) with which the computer operates. The size of the available RAM determines other factors, including the processing speed. Data are stored long-term on *hard disk* or *CD-R*.

Raw data Preprocessed measurement data. A raw data file corresponding to each scan is used to reconstruct the CT image.

Real Time Display The display of measured images is updated at the same rate at which the scanner acquires new image data.

Real Time Recon Reconstruction synchronous to scanning with an additional delay for displaying the first image.

Reconstruction FoV see FoV.

Rendering General procedure for constructing images using a computer.

RIS Radiology Information System.

Network for transmitting patient data and displays to radiology departments, see also HIS.

ROI A region of the CT image which can be selected with respect to position, size and shape, and in which quantitative evaluations are performed (Region Of Interest).

RTD Real Time Display, see there.

Scan Acquisition of one or more slices for imaging. Prior to scanning, certain scan protocols for the corresponding body regions can be selected, and the parameters (e.g. scan time) can be defined.

Scan FoV Determines the size of the area that you expose during acquisition. The Scan FoV is the maximum possible reconstruction FoV.

Scan plane Plane in which the X-rays penetrate the patient's body.

Scan time Duration of radiation exposure during a CT scan.

Scatter radiation Radiation whose direction of dispersion is modified through the interaction with a material.

Secondary slice Calculation of a selectable slice from a series of adjacent or overlapping slices.

Sequence CT Scanning technique with single scans and optional table feed between the scans.

Slice thickness Thickness of slice to be reconstructed. The slice thickness determines the collimation during scanning.

Software Programs of a computer.

Spiral CT Scanning technique with continuous rotation, continuous data acquisition and continuous table travel.

SSD Shaded Surface Display: Rendering technique for the 3D surface construction; only *voxels* of *CT values*, which exceed a defined threshold value are considered.

Tomogram *Scan* of a slice perpendicular to the longitudinal axis of the patient.

Topogram Frontal or lateral survey *scan*, similar to a conventional X-ray exposure.

UFC Ultra-Fast Ceramic.

Detectors from Siemens with short decay time for fast *scans*.

UHR Ultra High Resolution.

Procedure for achieving a high resolution.

UPS Uninterruptible Power Supply. Ensures operation even during short power failures.

USB device Storage medium that is connected directly to the USB port of a PC.

VAR Volume Artifact Reduction.

Procedure for reducing *partial volume artefacts*.

Volume Pitch Term applicable only to *Spiral CT*. It is defined as the ratio of table feed per rotation to slice width of one detector row.

Voxel Mapped volume element determined by the pixel size of the image matrix and the slice thickness.

VRT Volume Rendering Technique.

Rendering technique for 3D visualization.

Windowing Display of a selectable portion of the CT values using optimized contrast range of the monitor.

Working memory see *RAM*.

3 Glossary

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