bk ultrasound

Advanced User Guide

bkSpecto Ultrasound System

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Contents

Chapter 1
Before You Begin

This is the advanced user guide for the bkSpecto[1] Ultrasound System.

The *bkSpecto User Guide* includes an overview of all the documentation available for the system, including different user guides.

NOTE: *You must read the Safety chapter in the bkSpecto User Guide before working with the system.*

This guide takes you deeper into the functionality and potential of the bkSpecto Ultrasound Systems.

NOTE: *Some of the functionality and options described in this guide may not be available with your version of the system.*

Questions About the System	Where to Find the Answers
What are the various parts of the monitor display?	"Getting Started" on page 11
Is there an alphabetical list of all the controls on the system?	"Controls on the Touchscreen" on page 21
How do you make measurements and calculations for an image, and what measurement tools are available?	"Making Measurements" on page 41
How do you manage the images, clips, 3D data sets, and reports that are made on the system?	"Documentation" on page 51
What imaging modes are available on the bkSpecto?	"Imaging Modes" on page 61 and "3D Imaging" on page 101
What is an examination type, and how does it help with imaging?	"Exam Types" on page 79
How does DICOM® work with the bkSpecto?	"DICOM" on page 113
What do various abbreviations mean?	"Glossary" on page 117
Can the bkSpecto be customized and how?	"Setting Up and Customizing Your System" on page 127.

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1. The bkSpecto has not been licensed by Health Canada.

Chapter 2
Getting Started

The bkSpecto System

Monitor

USB Connectors

Touch screen

Front handle with release paddles

Transducer holders

Transducer sockets

Scanning engine

Power connector

Battery Preserve Switch

Lockable wheels
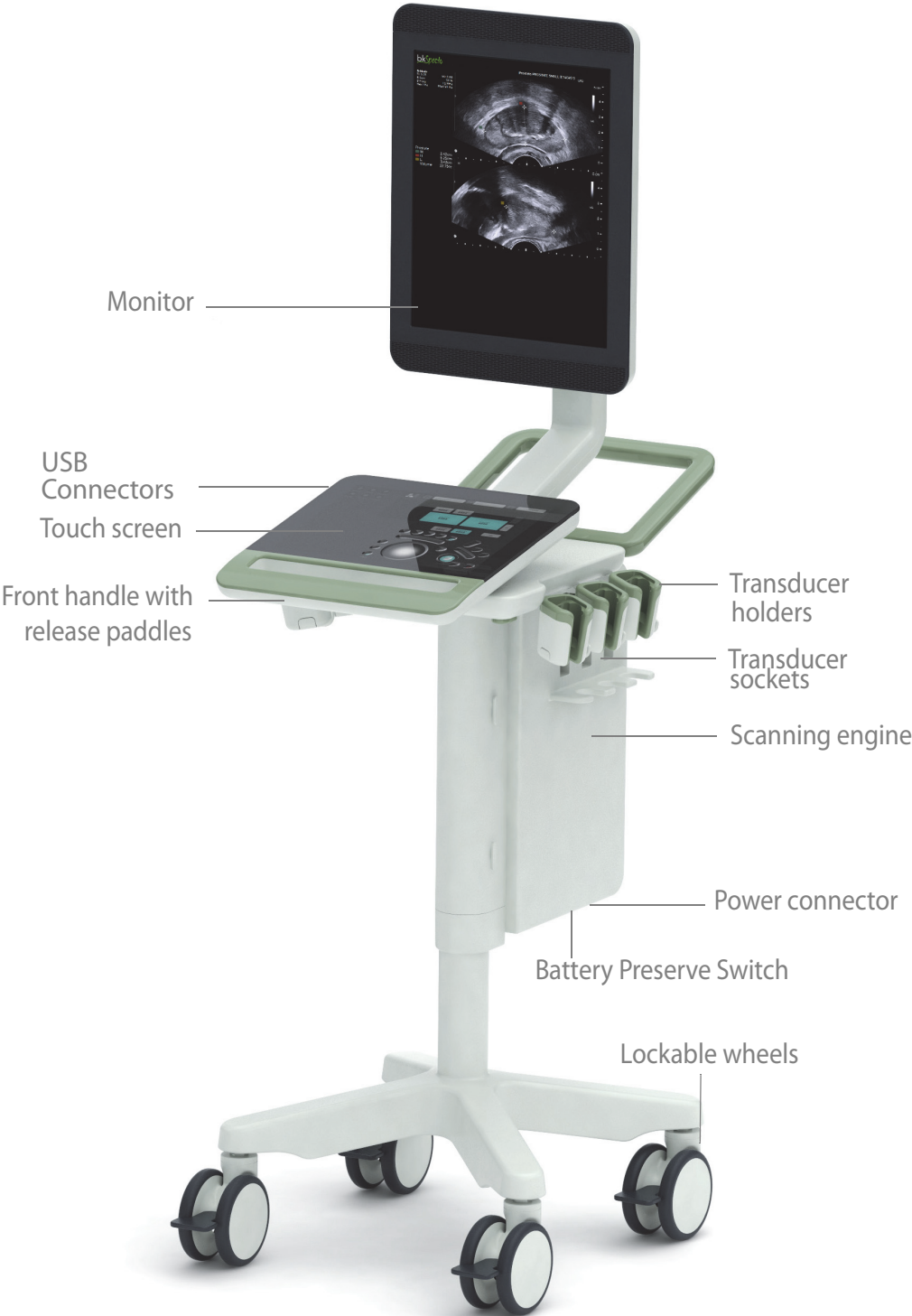
Before You Start

Before you turn on the system, make sure that the installation has been approved by a qualified electrician or by hospital safety personnel. Plug the power cord into a grounded wall outlet and make sure that you can get to it easily when you need to turn off/unplug the system.

Height Adjustment

The paddles underneath the keyboard lets you adjust the height and the angle of the system. Lift the right paddle to adjust the height ⌐⋯╎, and the left paddle ⟲ to turn the system so you can operate it without the wheels getting in your way.

Turning System On and Off

When you turn the system on or off, you must give the system enough time to save and recover open files and unsaved data. Otherwise, a serious system failure may occur that requires technical support.

The system has two power buttons, one on the monitor and one on the scanning engine:
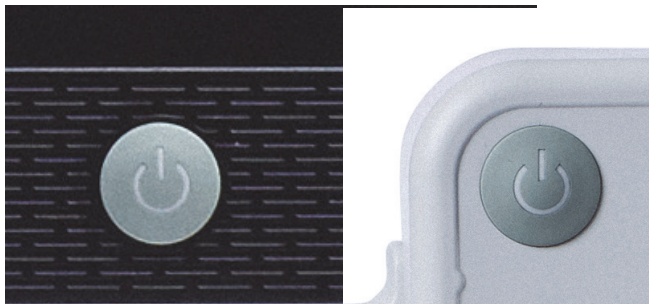
Figure 2-1. The power button on the monitor and on the scanning engine, respectively.

This switch helps you to preserve the battery when the system is stored or otherwise not in use for a period.

To turn the system on:

Press the power button *once*, then wait until startup screen disappears.

To turn the system off:

Make sure system is running. Press the power button *once*.

Note that if you purchase the battery version of bkSpecto, it also has a **Battery Preserve Switch** located underneath the scanning engine:

Figure 2-2. Battery Preserve Switch. See location at "The bkSpecto System" .

Connecting Transducers

Figure 2-3. Transducer sockets.

To connect:

1   Insert transducer plug into socket with locking lever to the right.

2   Turn locking lever on socket to the left.

To disconnect:

1   Freeze image.

2   Turn locking lever on socket to the right.

3   Remove plug from socket.

⚠	**WARNING** Exam-w2b
	If, after beginning an exam without entering any Patient information, you want to save an image, you must verify that the system auto-created a properly configured Patient ID before exiting the exam. Whenever possible, BK recommends that you also enter a complete Patient Name.

Creating a User

Only system administrators can create new users. See "Security Window" on page 146.
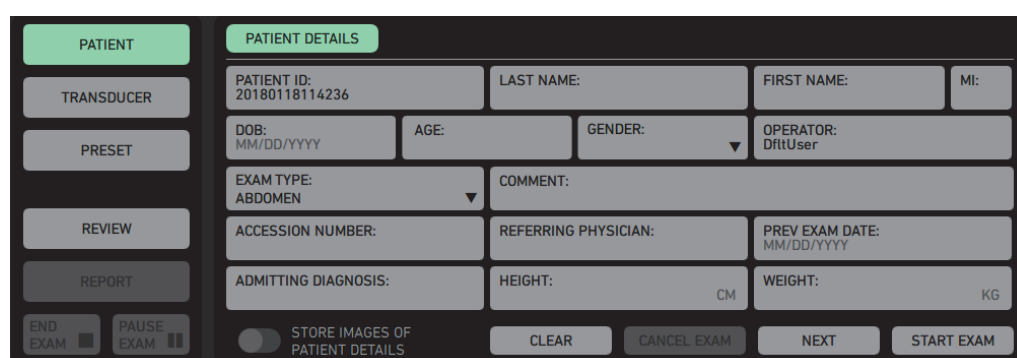
Starting an Exam

The first 3 steps for imaging are:

1   Enter the patient information.
2   Select a transducer.
3   Select an exam type and a preset.

Do as follows:
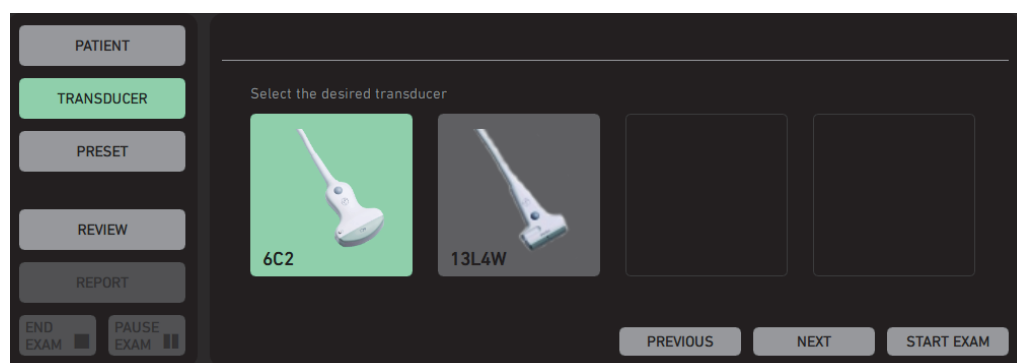
1   Tap the **Patient** button on the touch screen.
2   Enter patient information. The **Patient ID** is filled in automatically with a date/timestamp, but you can change this to a relevant ID.

Figure 2-4. Patient window.

3   If you select **Store Images of Patient Details**, an image of the patient details will be stored in the document browser and the review window.
4   Tap **Next** to select transducer. All connected transducers will be displayed in the **Transducer** window.

Figure 2-5. Transducer window.

5   Tap **Next** to select **Exam Type** and **Preset** in the **Preset** window.
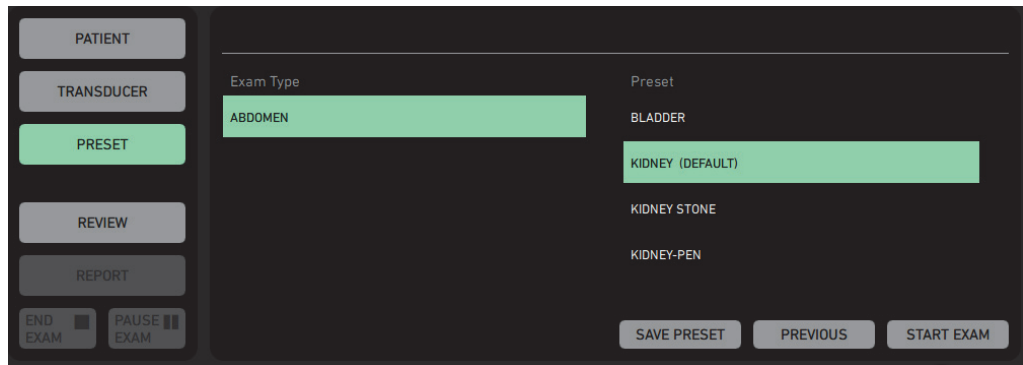
Figure 2-6. Preset window.

6 Tap **Start Exam** to start the exam.

You can also start the exam immediately after entering **Patient Details**. Tap **Start Exam** and select transducer using the transducer control button. The system will use the default exam type and preset.
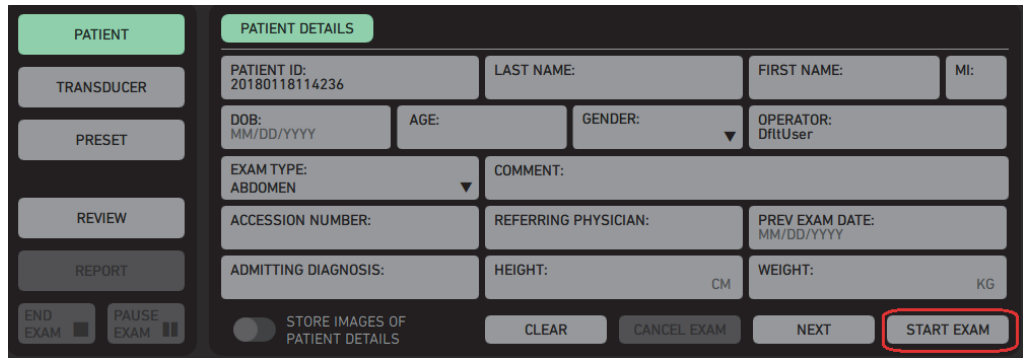
Figure 2-7. Start Exam

The exam ends when you tap **End Exam**:
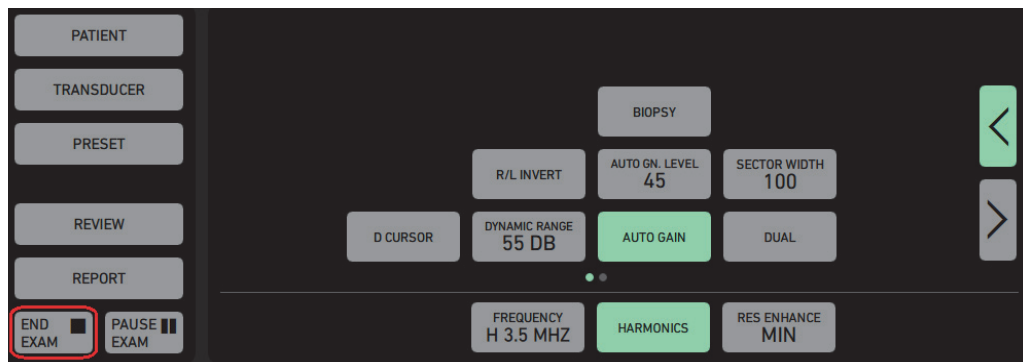
Figure 2-8. End Exam.

Monitor and Touch Screen Display

Figure 2-9. Monitor (clinical display).

1 Patient

2 Hospital name (logo)

3 Exam type/transducer

4 Image data

5 Measurement data

6 Document Browser

7 Wi-Fi and Storage Indicators

Figure 2-10. Touch screen.

Basic Monitor Buttons

Figure 2-11. The basic monitor buttons on the touch screen

Button	Functionality
3D	Turn on 3D imaging. Double-tap to turn off.
PW	Turn on Pulsed Wave Doppler. Double-tap to turn off.
COL	Turn on Color mode. Double-tap to turn off.
2D	Turn on 2D imaging. Double-tap the 2D button to exit all modes and return to 2D mode only.
Home 🏠	Tap the Home button to return to default settings for the current exam type.
TGC	Displays the TGC sliders.
Depth	Flick the bar to adjust image depth. Flick backward to increase depth and forward to decrease it. Tap either end to increase/decrease incrementally.
Focus	Flick the bar to adjust focus. Tap either end to adjust incrementally.
Gain	The Gain bar is located underneath the mode buttons. Slide this bar to adjust Gain.
Cine bar	Slide the Cine bar to scroll forwards and backwards. Tap either end to move one image at a time.
Optimize	Resets the TCG and optimizes Doppler.
Dual View ▪	Toggles between the two images in dual mode. Only appears when dual mode is active.
Trackpad	Positions the pointer, measurement calipers and labels.
Measure	Generic measurements. Tap the trackpad once to place each caliper.
Calc	Specific measurements for the individual presets. Tap the trackpad once to place each caliper.
Label	Opens the Keyboard region with virtual keyboard, labels, bodymarks and arrows to label the clinical images.
Clear	Clears a measurement or a calculation. Only appears when Measure or Calc is active.
Back Trace	Erases backwards on a freehand drawing. Only appears when a freehand trace is active.
Print	Only appears when a printer is attached.
Freeze	Freezes/unfreezes live imaging.
Pointer	Displays a pointer on the monitor. Use the trackpad to move the pointer.
Store	Tap Store to save an image. When the image is stored, it will be displayed as a thumbnail at the bottom of the monitor.
Clip	Tap Clip to record a video clip. After recording, it will be displayed as a thumbnail at the bottom of the monitor.

Table 2-1. Basic Monitor Buttons explained.

- You select or deselect a button by tapping it.
- The buttons and window elements are highlighted in green when selected.

Mode Button Backlight

The mode buttons are backlit according to their state:

	Mode selected. Note the white line from the mode button to the Gain bar.
	Mode button enabled, but not selected. This mode is part of a combination mode.
	Mode not selected.
	Mode not available.

Table 2-2. Mode button backlight

Documents

For information about using the Documents, see Chapter 6, "Documentation" on page 51.

Measurements and Image Data

For information about making and using measurements on the system, see Chapter 5, "Making Measurements" on page 41.

For information about working with the image, see Chapter 4, "Working with the Image" on page 33.

Review

After acquiring the image and making measurements, tap **Review** for archiving, copying, reviewing or deleting the images and reports you made.

Chapter 3
Controls on the Touchscreen

This chapter contains a list of the buttons in the context area of the touchscreen in alphabetical order. Some buttons only appear when the system has been set up to display them. See "Configure Layout Window" in Appendix C, "Setting Up and Customizing Your System" on page 143. Not all of the buttons in the list can be configured by the user.

The basic monitor buttons are listed in Table 2-1, "Basic Monitor Buttons explained.," on page 18.

2D Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
2D Filter	Speckle reduction algorithm. 2D Filter can be set at 5 different levels ranging from subtle speckle reduction (level 1) to strong reduction (level 5). The default level i 3, level 0 turns 2D Filter off.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.
Auto Gain	Auto gain makes it possible to have the same brightness across different patients and body parts.
Auto Gn. Level	Displays the level for Auto Gain.
Auto Mode	Defines the way Auto Gain is adjusted.
Biopsy	Displays a puncture line or brachy matrix.
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
Compounding	Reduces speckle and optimizes the ultrasound image.
D Cursor	Doppler cursor.
Depth	Displays tissue depth of the image.
Dual	Activates/deactivates split screen.
Dual Layout	Displays split screen either side by side or top/bottom.
Dynamic Range	Adjust contrast. Lower dynamic range = higher contrast. Higher dynamic range = lower contrast.
Edge	Edge enhancement. Emphasize contours in image so that edges stand out more clearly.
Focal Length	Sets the length of the focal zone. A shorter focal length gives you finer focusing.

Touchscreen Control	Function
Frequency	Select imaging frequency. The current imaging frequency is displayed on the button.
Harmonics	Tissue harmonic imaging on and off. When you turn it off, imaging resumes with the frequency, gain, dynamic range, etc. that you were using previously.
Image Size	The size of the image on the monitor.
Linked Dual	Automatically transfers the parameters from screen A to screen B (and vice versa).
Live Dual	Simultaneous imaging.
Map	Grayscale map
MI	Set the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Enhance	Activates the Needle Enhancement function for best needle visibility.
Needle Guide	Displays the needle guide(s) available for the selected transducer.
Needle Str	Adjusts the visibility of the needle. This button is only visible if you have selected Needle Enhance.
Persistence	Set persistence level of the image.
Power Doppler	Power Doppler ultrasound displays information about the number of particles moving, rather than their velocity.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Sector Width	Allows you to expand and reduce the sector width.
Steer	Change the angle of the Doppler line.
SV Size	Resize the Doppler gate.
TI	Sets the Tissue Index. The current value is displayed on the button.
TI Type	Select Tissue index type. The current value is displayed on the button.
Tint	Sets the tint of the image. The current value is displayed on the button.
U/D Invert	Inverts the image up/down.

Color Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.

Touchscreen Control	Function
Auto Scale	Automatic Scale/PRF adjustment.
Baseline	Repositions the baseline (offsets the Doppler Color scale) to help with aliasing problems.
Biopsy	Displays a puncture line or brachy matrix.
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
Color Mode	Sets the color mode. The current value is displayed on the button.
Color Priority	Adjust the priority given to color (flow information). High color priority gives color in more areas; low color priority reduces the number of areas that are colored.
D Cursor	Doppler cursor.
Dual	Activates/deactivates split screen.
Dual Layout	Displays split screen either side by side or top/bottom.
Frequency	Select imaging frequency. The current imaging frequency is displayed on the button.
Hide Color	Removes color from the image.
Image Size	The size of the image on the monitor in %.
Invert	Invert color coding of flow information so that flow towards the transducer appears blue and flow away from the transducer appears red.
Live Dual	Simultaneous imaging.
Map	Color map.
MI	Set the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Guide	Displays the needle guide(s) available for the selected transducer.
Persistence	Sets persistence level of the image.
Power Doppler	Activates/deactivates Power Doppler.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Scale	Vary the PRF (pulse repetition frequency) to select the range of Doppler velocities (frequencies) that are displayed in the spectrum and/or color-coded.
Smoothing	Softens the colors.
Steer	Change the angle of the Doppler line.
SV Size	Resize the Doppler gate.
TI	Sets the Tissue Index. The current value is displayed on the button.

Touchscreen Control	Function
TI Type	Select Tissue index type. The current value is displayed on the button.
Tint	Sets the tint of the image. The current value is displayed on the button.
U/D Invert	Inverts the image up/down.
Wall Filter	Adjust the wall filter. The current value is displayed on the button.

PW Doppler Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.
Auto Scale	Automatic Scale/PRF adjustment.
Baseline	Reposition the Doppler mode baseline to help with aliasing problems. The frequency axis is updated to match the spectrum.
Biopsy	Displays a puncture line or brachy matrix.
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
D Cursor	Doppler cursor.
Dual	Activates/deactivates split screen.
Dual Layout	Displays split screen either side by side or top/bottom.
Frequency	Select imaging frequency. The current imaging frequency is displayed on the button.
Full Size	Maximize the size of the image.
Image Size	The size of the image on the monitor in %.
Invert	Inverts the spectrum on the monitor.
Layout	Sets the layout for a Doppler (split) screen: top/bottom or side by side
Layout Size	Select large, medium or small for the ultrasound image.
Live Dual	Simultaneous imaging.
Map	Color/Grayscale Map.
MI	Set the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Guide	Displays the needle guide(s) available for the selected transducer.

Touchscreen Control	Function
Power Doppler	Activates/deactivates Power Doppler.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Scale	Vary the PRF (pulse repetition frequency) to select the range of Doppler velocities (frequencies) that are displayed in the spectrum and/or color-coded.
Smoothing	Softens the colors.
Steer	Change the angle of the Doppler line.
SV Size	Resize the Doppler gate.
Sweep Speed	Sets the number of cycles of the spectrum displayed on the full time axis. The current value is displayed on the button.
Sync Steer	Synchronizes the steering of box and gate.
Threshold	Doppler sensitivity.
TI	Sets the Tissue Index. The current value is displayed on the button.
TI Type	Select Tissue index type. The current value is displayed on the button.
Trace	Activate automatic Doppler curve tracing and specify the type: Peak, Mean+Peak, or Mean.
Triplex	2D/Color image and Doppler spectrum both active.
U/D Invert	Inverts the image up/down.
Volume	Adjust the volume of the audio signal in Doppler mode.
Wall Filter	Turn the wall filter on and set the cut-off frequency.

M-Mode Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.
Biopsy	Displays a puncture line or brachy matrix.
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
D Cursor	Doppler cursor.
Dual	Activates/deactivates split screen.

Touchscreen Control	Function
Dual Layout	Displays split screen either side by side or top/bottom.
Full Size	Maximize the size of the image.
Image Size	The size of the image on the monitor in %.
Layout	Sets the layout for an M-mode (split) screen: top/bottom or side by side
Layout Size	Select large, medium or small for the ultrasound image.
Live Dual	Simultaneous imaging.
M Sync Gain	Synchronizes Gain in relation to 2D image.
MI	Set the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Guide	Displays the needle guide(s) available for the selected transducer.
Power Doppler	Activates/deactivates Power Doppler.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Sweep Speed	Sets the number of cycles of the spectrum displayed on the full time axis. The current value is displayed on the button.
TI	Sets the Tissue Index. The current value is displayed on the button.
TI Type	Select Tissue index type. The current value is displayed on the button.
U/D Invert	Inverts the image up/down.

Elastography Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.
Biopsy	Displays a puncture line or brachy matrix.
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
D Cursor	Doppler cursor.
Dual	Activates/deactivates split screen.

Touchscreen Control	Function
Dual Layout	Displays split screen either side by side or top/bottom.
Dynamic Range	Adjust contrast. Lower dynamic range = higher contrast. Higher dynamic range = lower contrast.
E Reject	Increase visibility of cysts.
Enhance	Enhances the mode.
Frequency	Select imaging frequency. The current imaging frequency is displayed on the button.
Image Size	The size of the image on the monitor in %.
Live Dual	Simultaneous imaging.
Map	Color map.
MI	Sets the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Guide	Displays the needle guide(s) available for the selected transducer.
Opacity	Overlay of 2D and elastography.
Persistence	Set persistence level of the image.
Power Doppler	Activates/deactivates Power Doppler.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Resolution	Change the elastography resolution.
Steer	Change the angle of the Doppler line.
SV Size	Resize the Doppler gate.
TI	Sets the Tissue Index. The current value is displayed on the button.
TI Type	Select Tissue index type. The current value is displayed on the button.
U/D Invert	Inverts the image up/down.

Power Mode Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.
Biopsy	Displays a puncture line or brachy matrix.

Touchscreen Control	Function
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
Color Priority	Adjust the priority given to color (flow information). High color priority gives color in more areas; low color priority reduces the number of areas that are colored.
D Cursor	Doppler cursor.
Dual	Activates/deactivates split screen.
Dual Layout	Displays split screen either side by side or top/bottom.
Frequency	Select imaging frequency. The current imaging frequency is displayed on the button.
Hide Color	Removes color from the image.
Image Size	The size of the image on the monitor in %.
Invert	Inverts the spectrum on the monitor.
Live Dual	Simultaneous imaging.
Map	Color map.
MI	Sets the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Guide	Displays the needle guide(s) available for the selected transducer.
Persistence	Sets persistence level of the image.
Power Doppler	Activates/deactivates Power Doppler.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Scale	Vary the PRF (pulse repetition frequency) to select the range of Doppler velocities (frequencies) that are displayed in the spectrum and/or color-coded.
Smoothing	Softens the colors.
Steer	Change the angle of the Doppler line.
SV Size	Resize the Doppler gate.
TI	Sets the Tissue Index. The current value is displayed on the button.
TI Type	Select Tissue index type. The current value is displayed on the button.
U/D Invert	Inverts the image up/down.
Wall Filter	Turn the wall filter on and set the cut-off frequency.

3D Controls

Touchscreen Control	Function
0/60 Degree	Angle correction line in Doppler mode, fixed intervals -60, 0, 60.
3D Acquire	Acquires a 3D volume. A progress circle appears during acquisition.
3D Direction	Sets the 3D direction L-R or R-L.
3D Distance	Sets the distance the transducer will travel to acquire the 3D volume in mm. The current value is displayed on the button.
3D Spacing	Sets spacing between frames in mm. The current value is displayed on the button.
3D Sweep Mode	Move the transducer freely to acquire a 3D image - set Untracked Linear or Untracked Fan.
Angle Correct	Angle correction line in Doppler mode, 1 degree increments from -89 to 89.
Biopsy	Displays a puncture line or brachy matrix.
Cine Play	Shows the Cine sequence, that you have selected using the trim buttons.
Cine Trim End	Places the end marker on the Cine sequence.
Cine Trim Start	Places the start marker on the Cine sequence.
D Cursor	Doppler cursor.
Dual	Activates/deactivates split screen.
Dual Layout	Displays split screen either side by side or top/bottom.
Image Size	The size of the image on the monitor in %.
Live Dual	Simultaneous imaging.
MI	Sets the Mechanical Index. The current value is displayed on the button.
Motion Comp	Algorithm to compensate for movement.
Needle Guide	Displays the needle guide(s) available for the selected transducer.
Power Doppler	Activates/deactivates Power Doppler.
R/L Invert	Inverts the image right/left.
Res Enhance	Adjusts the balance between resolution and frame rate, e.g. Min gives 1 focus point and a high frame rate.
Steer	Change the angle of the Doppler line.
SV Size	Resize the Doppler gate.
TI	Sets the Tissue Index. The current value is displayed on the button.
TI Type	Select Tissue index type. The current value is displayed on the button.
Time	Set duration of a 3D data acquisition. The current value is displayed on the button.
U/D Invert	Inverts the image up/down.

3D Rev. Mode

Touchscreen Control	Function
3D Animate	Activates/deactivates rotation of the 3D volume.
3D Brightness	Set the brightness of the 3D volume. The current value is displayed on the button.
3D Color Level	Adjust the color level of the 3D volume.
3D Contrast	Set the dynamic range of the 3D volume. The current value is displayed on the button.
3D Filter	Set threshold so pixels not as bright as threshold are not displayed. Can help eliminate noise in 3D volumes.
3D Gray Level	Adjusts transparency in grayscale values.
3D Hue	Set a color hue for the 3D volume.
3D Label	Type a label for the 3D volume. Use the trackpad to place it and tap to set the label.
3D Luminance	Controls the brightness of structures within the volume.
3D Opacity	Sets the opacity of the 3D volume, allowing visualization of structures beneath the surface.
3D Photorealistic	Adjusts the photorealistic characteristics of the 3D volume.
3D Sculpture	Turns sculpting of the 3D cube on and off.
3D Thickness	Sets thickness in photo and non-photo mode in 3D.
3D View	Select how the 3D volume is displayed. The current value is displayed on the button.
3D Zoom	Zoom 3D Volume.
Animation Span	Sets the extent of the rotation of a 3D volume.
Animation Speed	Sets the speed of the rotation of a 3D volume
Arrow	Displays an arrow on the 3D volume.
Clear Labels	Delete any labels that you have typed on the 3D volume.
Clear Measurements	Delete any measurements you have made on the 3D volume.
Clear Sculpture	Clears 3D sculpting.
Default	Restores the acquired image, removing any changes.
HWL	Measure volume by HWL.
Measure Area	Measure Area in 3D.
Measure Dist.	Measure distance in 3D.
New Volume	Returns to the Review window.
Next	Steps forward through images in the volume
Orientation	Displays or hides orientation markers in 3D volumes.

Touchscreen Control	Function
Prev	Steps backward through images in the volume.
Redo Label	Restore the most recent label that has been undone.
Redo Measurement	Restore the most recent measurement that has been undone.
Rotation	Sets the 3D volume to rotate horizontally or vertically.
Sculpture Depth	Sets the penetration of the sculpting tool.
Sculpture Display	Displays the result of the sculpting.
Sculpture Method	Select between cutting a hole inside the volume, cutting away the outside of the volume or using the shave tool.
Stitch Angle	Sets the stitch angle for the 3D transducer.
Store Volume	Stores the most recent changes to the volume.
Undo Label	Remove the most recent label from the 3D volume.
Undo Measurement	Remove the most recent measurement from the 3D volume.
Undo Sculpture	Remove the most recent sculpture of the 3D volume.
Volume	Draw planimetry on each image to create a volume.
Wireframe	Turns the wireframe around the 3D volume on or off.

Chapter 4
Working with the Image

You can work with an image (measuring, resizing, etc.) using the touchscreen.

Selecting the Imaging Plane

If you are using a transducer with more than one plane, you can select the imaging plane (**T** for transverse, **S** for sagittal, or **E** for endfire). The current imaging plane (**T**, **S,** or **E**) is displayed at the top of the monitor next to the transducer name.

To select the imaging plane:

- Press the appropriate button on the transducer. For details, see the user guide for the transducer.

or

- Tap **T**, **S,** or **E** on the touch screen.

NOTE: *When you change image orientation U/D, you may need to adjust the TGC settings for the B-mode image. See "TGC" on page 63.*

Freezing the Image

When you tap **Freeze**, all images on the monitor are frozen. If you tap **Freeze** again, the image returns to its previous state.

NOTE: *Some functions are not available when the image is frozen and some are available **only** when the image is frozen. If a control you want to use is missing, try freezing or unfreezing the image.*

Partial Freeze and the Dual View Button

You can only do a partial freeze when you are imaging in Doppler mode as well as one or more 2D modes (B-mode, color, and power) – duplex or triplex imaging. In partial freeze, *either* the Doppler image *or* the 2D-mode image is frozen. You can toggle between the two images in a partial freeze.

To start partial freeze:

- Tap the dual view ▣ button.

  The partial freeze state starts with all 2D-modes frozen and Doppler mode imaging.

While the partial freeze is active, tap the dual view button to toggle the display between the 2 states, which are

- Doppler mode frozen; 2D-modes imaging.
- 2D-modes frozen; Doppler mode imaging.

To unfreeze both views:

• Tap the **Triplex** button..

Split Screen

You can split the screen horizontally or vertically to display 2 views side by side or one over the other.

• If you are using a single-plane transducer, the 2 views contain the same imaging view.

• If you are using a biplane transducer, each view displays the image from one imaging plane.

• If simultaneous imaging is turned on, both views can be imaging.

To split the screen or remove a split:

1 Tap **Dual**.

2 Tap **Dual Layout** and select **Side By Side** or **Top/Bottom**.

To select one of the views:

• Tap the dual view button to toggle between the views.

Simultaneous Imaging

The 2 views in a split screen can both be imaging simultaneously; in this case, freezing and unfreezing affect both images.

To turn simultaneous imaging on and off:

• Tap **Live Dual**.

NOTE: *In simultaneous split-screen imaging, only one of the views can contain Color or Power mode. Therefore, if one view has 2D+Color or 2D+Power, the other view contains only a 2D image.*

You can save a simultaneous split setup (which image is in which part of the monitor) as part of a preset.

Linked Dual

Linked Dual is enabled as a default setting on all Exam Types. During split screen imaging, the Linked Dual function automatically transfers the parameters from screen A to screen B (and vice versa). Color and power mode can be in only one screen.

To use Linked Dual:

1 Adjust the image parameters in screen A, then tap **Linked Dual** and the button to transfer the parameters to screen B.

2 Use the same method to transfer the parameters from screen B to screen A.

To disable Linked Dual:

- Tap **Linked Dual**.

NOTE: *The functionality of the Linked Dual button can be saved as part of a preset.*

NOTE: *In Linked Dual imaging, only one of the views can contain Color or Power mode. Therefore, if one view has 2D+Color or 2D+Power, the other view contains only a 2D image.*

Labels, Bodymarks and Arrows

In addition to annotating an image during an examination, you can add annotations (labels, bodymarks and arrows) to archived images and to individual frames of archived clips from the same type of ultrasound system.

NOTE: *Labels change color when being manipulated. When the cursor hovers over them, they are orange. They are green when you are able to move them. When in position, and the cursor is not nearby, they are white.*

Labels

Labels provide a practical way to identify or explain an image. You can:

- Place text labels anywhere on the ultrasound image.
- Add more than one label to an image.
- Type labels directly on the image or select a pre-defined label. When you type, pre-defined labels are suggested to you on top of the keyboard.
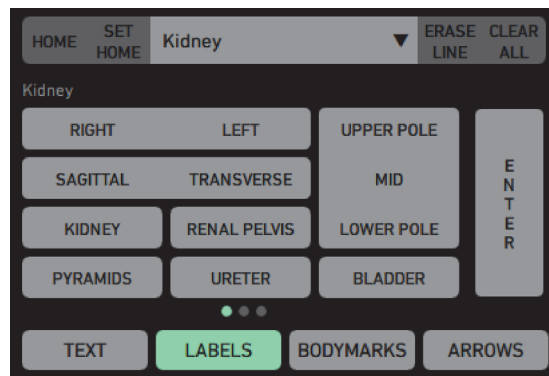- Add an arrow to denote a specific area of interest.

Figure 4-1. Label selector.

To select a label:
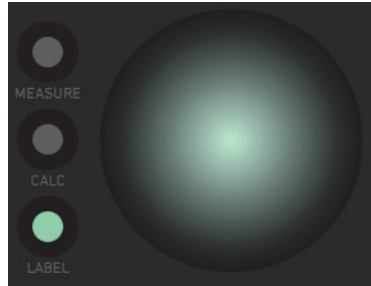
1 Tap the **Label** button.

*Figure 4-2. The **Label** button next to the trackpad.*

2 From the drop-down menu, select the relevant application. The displayed labels will reflect the selected application.

3 Swipe the label selector to see all labels.

4 Select the label by tapping it.

5 Use the trackpad to move the label and then tap when it is in the correct position.

*You can select where labels show up on the screen per default. Tap **Set Home** when you have placed your label. The next label you tap will show up in the same place.*

Linked labels:

Opposed labels are linked. This means that if you have selected **Right** and afterwards tap **Left**, the label name will change to left. Linked labels are located on the same background, see *Fig 4-1*.

Type and edit your own labels on screen:

1 Tap **Keyboard** in the input region.

2 Type the text you want for the label.

You can move the label while you are typing it.

3 Tap to accept the label text and position.

To move a label that you have already positioned:

• Tap it and drag it to the new position. Tap again when the label is where you want it.

To remove a label:

1 Tap the label you want to remove. The label turns green.

2 Tap **Erase Line** in the input area.

To remove all labels from an image:

• Tap **Clear All** in the input area.

To edit a label on the image:

• Tap the label on the image and type the changes you want.
Note that you can only edit your own labels.

Bodymarks

Bodymarks are small bitmaps depicting parts of the body. You can place a bodymark anywhere on the ultrasound image.

An imaging plane indicator is placed on the bodymark to show the imaging position.

Figure 4-3. Bodymark with imaging plane indicator.

The imaging plane indicator consists of a long bar. The orientation of the bar indicates the orientation of the transducer array on the body.

Using Bodymarks
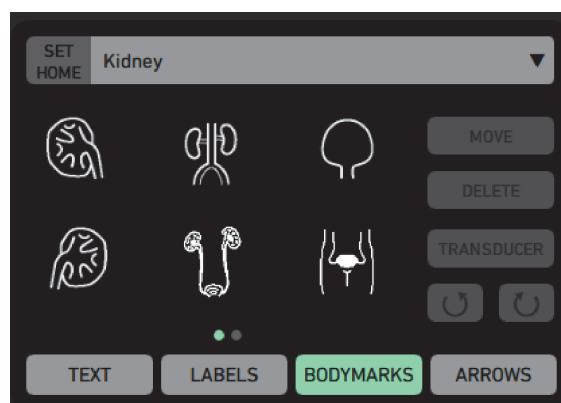
Figure 4-4. Bodymark selector.

To place a bodymark on the image:

1 Tap the **Label** button.

2 Tap the **Bodymarks** button. From the drop-down menu, select the relevant application. The displayed bodymarks will reflect the selected application.

3 Select the bodymark you want. (If you don't see the one you want, swipe the input region to see more bodymarks.) The bodymark appears on the monitor with a highlightedimaging plane indicator.

4 Drag the imaging plane indicator to position it; and use the directional buttons to rotate it.

To move a bodymark:

1 Tap the **Move** button. A green frame appears around the bodymark.

2 Drag it to the position you want, and tap again.

To replace a bodymark:

To replace an existing bodymark with a different one, tap the new bodymark.

To remove a bodymark from the monitor:

• Tap the **Delete** button.

Unless you delete it or replace it with a new one, a bodymark will remain on the monitor until you change Preset or begin to image a new patient.

Adjusting the Imaging Plane Indicator

To adjust the imaging plane indicator:

When you place a bodymark on the image, the imaging plane indicator is green and can be adjusted as follows:

1   Drag the imaging plan indicator with the trackpad.
2   Rotate left or right by pressing ⟳ or ⟲ buttons.
3   Tap again when the imaging plane indicator is the way you want it.

The imaging plane indicator turns orange and can no longer be adjusted.

If you decide to further adjust the indicator, tap the **Transducer** button in the input region. The indicator turns green again.

Arrows

Figure 4-5. Arrow selector

You can place arrows on the image to mark areas of special concern.

To place an arrow on the image:

1   Tap the **Label** button.
2   Tap the **Arrows** button and select the arrow you want. The arrow appears highlighted on the monitor.
3   Drag the arrow to the position you want, and tap again.
4   You can add another arrow by selecting it.

To delete an arrow, tap **Delete**. To delete all arrows from the image, tap **Clear all**.

Cine

Cine (image review) lets you review a series of the most recently recorded 2D, B+Color mode, or B+Doppler mode images.

Freeze the image and slide the Cine bar to scroll backward or forward through the series.

Images are constantly being saved and stored for review. When storage capacity is reached, the oldest images are discarded as new ones are stored. The number of images that can be stored for review varies, depending on such factors as image resolution and size.

Images in a clip must be comparable. Therefore, changing certain parameters that affect the image will cause already-stored images to be discarded. If this happens, there will not be a full set of images to be reviewed until the storage has had time to fill again.

You can change some of the settings for the **Cine** function.

Using Cine

To use the Cine function:

- Freeze the image, and slide the cine bar to scroll through the frames.

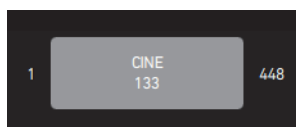 Cine frame numbers appear on the bottom center of the monitor.

Figure 4-6. Cine frame numbers, indicating that frame no. 133 of 448 is being displayed.

Cine Trim

You can set start and stop markers to indicate the range of images to be displayed in **Cine Play**.

- Freeze the image and scroll back through the frames using the cine bar.
- Select where you want the start marker and tap **Cine Trim Start**.
- Select where you want the stop marker and tap **Cine Trim End**.
- Tap **Cine Play** to see your selected frames.

The current frame and the total number of frames are displayed on the monitor. The start and end frame numbers are displayed on the touchscreen Cine buttons. After the newest image has been displayed, **Cine Play** will begin to play the loop again.

Figure 4-7. Touchscreen buttons for trimming cine.

Using Cine in Doppler Mode

When cine is activated while imaging in Doppler mode, a vertical cine cursor is displayed overlaying the Doppler image.

The 2D image displayed is always the one that corresponds to the position of the Doppler cursor. The image (frame) number in the **Frame** indicator corresponds to the B-mode image.

To make measurements on a cine image or save it:

1   When the desired image is displayed, tap **Measure**.

2   Make measurements on the image or save it in the usual way.

NOTE: *When you move a cine image after you make a measurement, the measurement result and markers disappear (because the underlying image is different).*

Video Display

The image can be displayed on an auxiliary video monitor. You can select the video output mode (including OFF). See more about video setup in the System window "Misc Tab" on page 130.

Chapter 5
Making Measurements

Measurements and Calculations

Each Exam Type contains the measuring tools that you need for the calculations contained in the package. You use these tools to measure different aspects of the ultrasound image (and thus the underlying tissue); these measurements are used for various calculations.

You can make measurements on archived images from the same type of ultrasound system. The images must be in DICOM format, not .bmp. For information about the format of stored images, see "HIPAA Compliance and Exporting Data" on page 53. You cannot make measurements on video clips.

For calculation formulas and information about the accuracy of different types of measurements, see "Clinical Measurements: Ranges and Accuracies" in the *bkSpecto User Guide* and the Technical Data (BZ2100).

To view the list of measurements:

- Tap **Measure**.

  The parameter area shows the available measurements for the selected preset.

Making a Measurement – General Procedure

Figure 5-1. Touchscreen when measurement is active.

The following sections contain detailed descriptions for using the various measuring tools.

NOTE: *The image will be frozen when you tap measure to make measurements.*

To make a measurement:

1 Tap the name of the measurement.

   A caliper appears on the image.

2 Drag the caliper to the position you want and tap.

   If the measurement requires 2 calipers, another one appears.

3 Drag the second caliper to the position you want and tap.

4 Repeat this until you have positioned all the calipers for the measurement.

NOTE: *The look of the calipers themselves and of any lines that connect them depend on what you are measuring.*

What the Measurements Indicate

- **Results** – The results of the measurement are displayed (continuously updated) on the monitor.

- **Depth** – While you are positioning the first caliper for a distance measurement in a 2D or Color mode image, the displayed measurement is the depth of the caliper (distance from the caliper to the transducer surface along the scan line). When a second caliper is positioned, the depth is replaced by the appropriate measurement result.

Clearing a Measurement

To clear a measurement

- Tap **Clear**.

B-Mode and Color Mode Measuring Tools

This section describes how to make the following types of measurements:

- Distance
- Angle
- Hip tool
- Circle
- Ellipse
- Freehand drawing of shapes

Distance Measuring Tool

Two calipers can be positioned to measure a distance, for example, the length or width of a structure. When the first caliper is positioned, a second one appears for you to position.

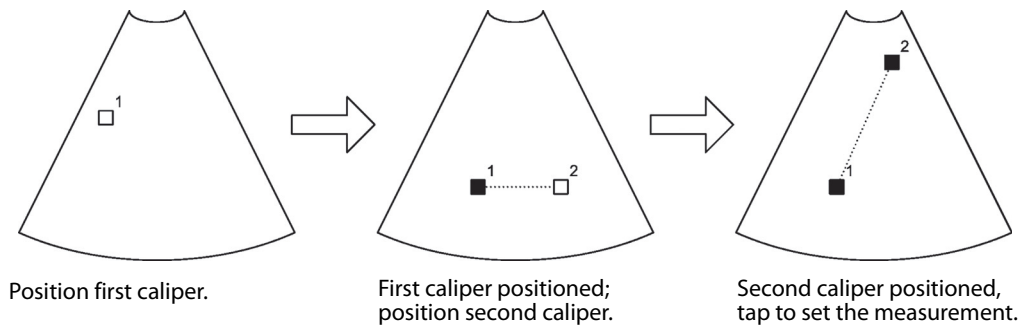NOTE: *Tapping* **Measure** *starts a distance measurement.*

Position first caliper. First caliper positioned; position second caliper. Second caliper positioned, tap to set the measurement.

Figure 5-2. Positioning 2 calipers on a B-mode or Color mode image.

NOTE: *The small numbers (1 and 2) shown in Fig 5-2 indicate the order in which the calipers appear. The numbers do not appear like this on the monitor.*

To move a caliper after they have all been positioned:

1 Use the pointer to tap any caliper and move it to change the length or orientation of the line.

2 Tap again to set the measurement.

To move the entire measurement after positioning:

1 Tap the line and drag it to the new position

2 Tap again to set the measurement.

Angle Measuring Tool

On a 2D or Color mode image, you can measure angles.

To measure an angle:

1 Tap **Angle**.

A caliper appears.

2 Position the caliper and tap.

A second caliper appears, with a line connecting the two calipers.

3 Position caliper 2 to change the angle of the line. Tap to place the second caliper.

A third caliper appears.

4 Position caliper 3 and tap.

A fourth caliper appears, with a line connecting it to caliper 3.

5 Position caliper 4 to change the angle of the line. Tap to place the fourth caliper.

Angle **alpha** between the two lines is indicated on the image, and the size of the angle appears as a measurement to the left of the image.

To change the angle measurement after all the lines are positioned:

1 Use the pointer to tap any caliper and move it to change the length or orientation of one of the lines.

2 Tap again to set the measurement.

Hip Tool Measuring Tool

The hip tool measuring tool works slightly different from the other measuring tools, but in general as the angle tool described above. There are, however, three lines and thereby two angles to measure.
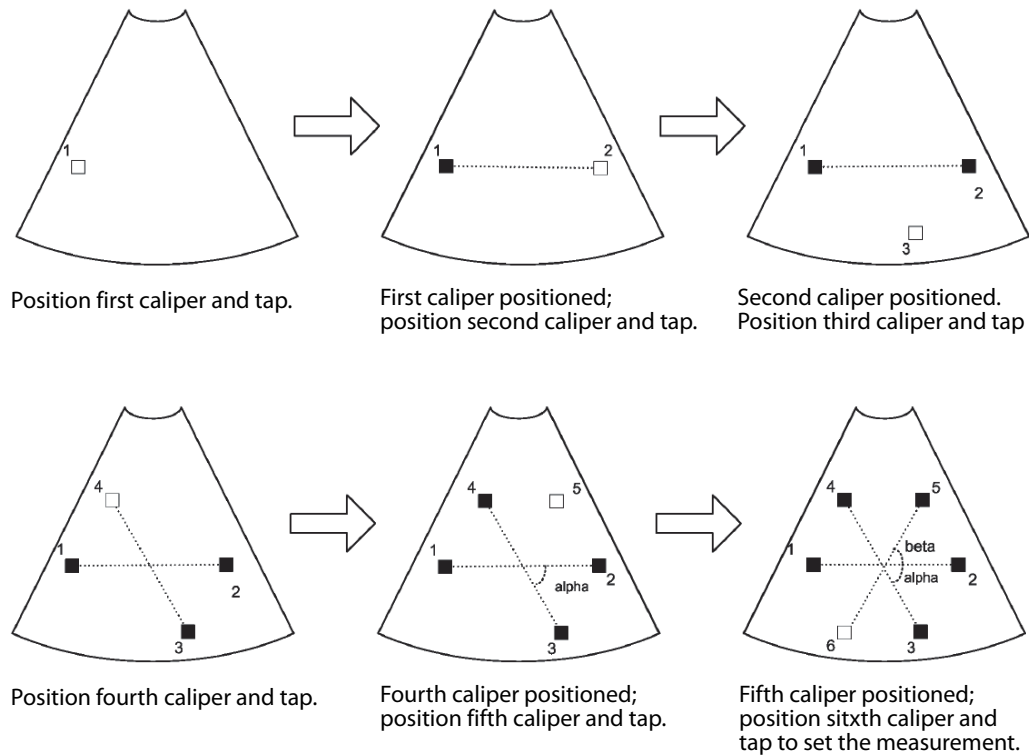

Position first caliper and tap.

First caliper positioned; position second caliper and tap.

Second caliper positioned. Position third caliper and tap

Position fourth caliper and tap.

Fourth caliper positioned; position fifth caliper and tap.

Fifth caliper positioned; position sitxth caliper and tap to set the measurement.

Figure 5-3. Using the Hip Tool to measure two angles.

To use the Hip Tool:

1   Tap **HipTool**.

A caliper appears.

2   Position the caliper and tap.

A second caliper appears, with a line connecting the two calipers.

3   Position caliper 2 to change the angle of the line. Tap to place the second caliper.

A third caliper appears.

4   Position caliper 3 and tap.

A fourth caliper appears, with a line connecting it to caliper 3.

5   Position caliper 4 to change the angle of the line. Tap to place the fourth caliper. Angle **alpha** between the two lines is indicated on the image, and the size of the angle appears as a measurement to the left of the image.
Caliper 5 appears.

6   Position caliper 5 and tap. Caliper 6 appears, with a line connecting it to caliper 5.

7   Position caliper 6 to change the angle of the line. Tap to place the sixth caliper. Angle **beta** between the first and last lines is indicated on the image, and the size of the angle appears as a measurement to the left of the image.

If you just tap and do not move any calipers, the default angles are 60º.

To change the hip tool measurement after all the lines are positioned:

1   Use the pointer to tap any caliper and move it to change the length or orientation of any of the lines.

2   Tap again to set the measurement.

Circle Measuring Tool

On a B-mode or Color mode image, you can position 2 calipers to measure a circle. Use the **Ellipse** measure. Position the calipers in the usual way. As you move the second caliper, the circle is continuously redrawn on the monitor.
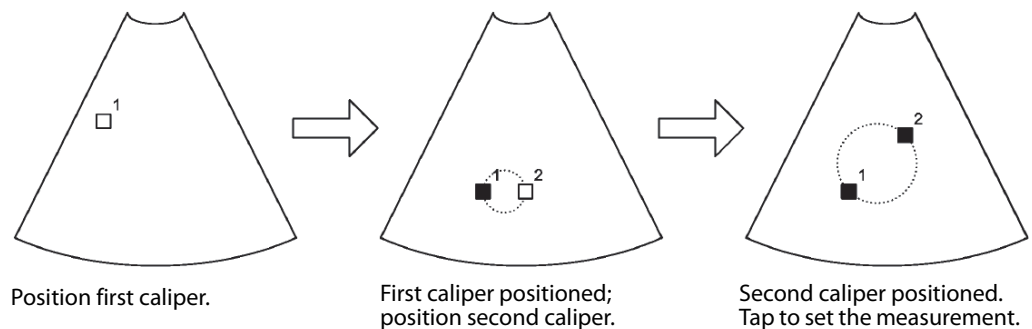

Position first caliper.   First caliper positioned;   Second caliper positioned.
                                 position second caliper.   Tap to set the measurement.

Figure 5-4. Using the circle measuring tool.

To move the entire circle without changing its size:

1   Tap inside or on the circle.

The circle turns green and a symbol (a plus sign with arrows) appears as shown in the center image of Fig 5-5. This symbol means you can move the circle.

2   Drag it.

3   Tap again to set the circle.

All calipers positioned.   Entire circle selected.   Entire circle repositioned.
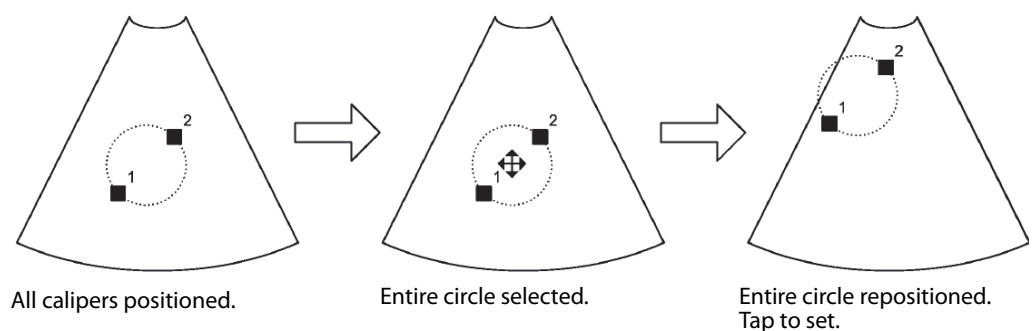   Tap to set.

Figure 5-5. Moving an entire circle without changing its size.

Ellipse Measuring Tool

On a B-mode or Color mode image, you can use two calipers to measure an ellipse. Position the calipers in the usual way.

Position first caliper.

First caliper positioned; position second caliper.

Second and third caliper positioned. Position the third caliper to draw the ellipse. Tap to set.
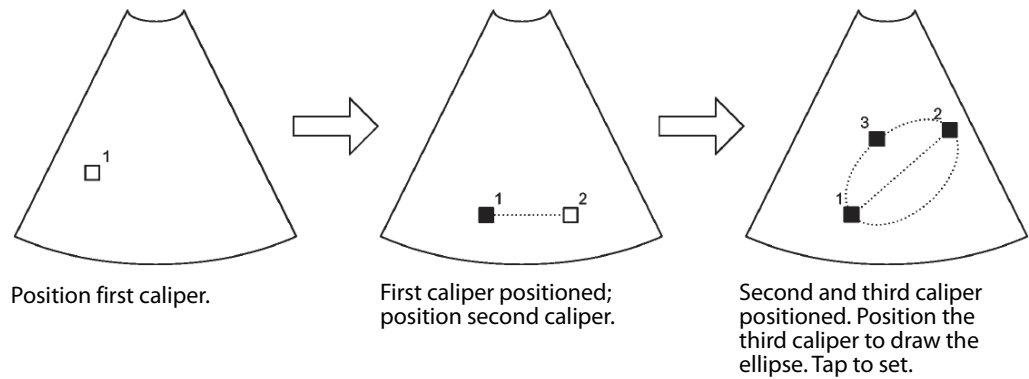
Figure 5-6. Drawing an ellipse.

The 2 calipers determine a line that is used as the axis of rotation if you use the ellipse to measure volume. A circle will be drawn on the monitor. Use the trackpad to move the third caliper and widen or lengthen the circle into an ellipse.

NOTE: *The axis of rotation critically affects the calculated volume. Consider the basic shape of the structure of interest and make sure to place the 2 calipers so that they define the correct axis of rotation. See Fig 5-7.*
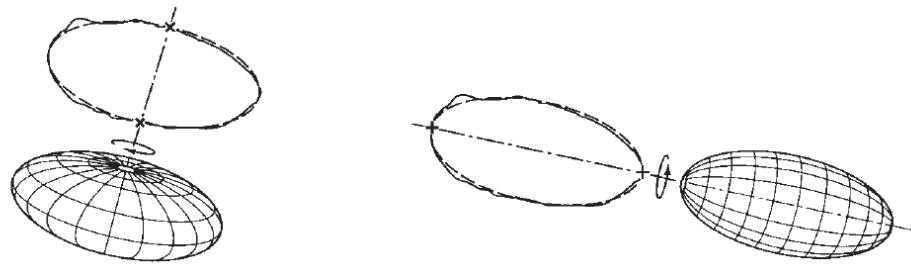
Using the shorter distance as axis of rotation results in an estimated volume of the shape shown here.

Using the longer distance as axis of rotation results in an estimated volume of the shape shown here.

Figure 5-7. The effect of the rotation axis on volume determination.

The third caliper is always equidistant from the first 2. Moving it makes the ellipse broader or narrower. As you move the third caliper, the ellipse is continuously redrawn on the monitor.

After the calipers have been set, you can move any of them using the pointer by tapping and dragging to a new position.

To move the entire ellipse without changing its size or orientation:

1   Using the pointer, tap inside or on the ellipse.

   The ellipse turns green and a symbol (a plus sign with arrows) appears as shown in the center image of Fig 5-8. This symbol means you can move the ellipse.

2   Drag it.

3   Tap again to set the ellipse.

Not all of the ellipse has to lie within the ultrasound image.

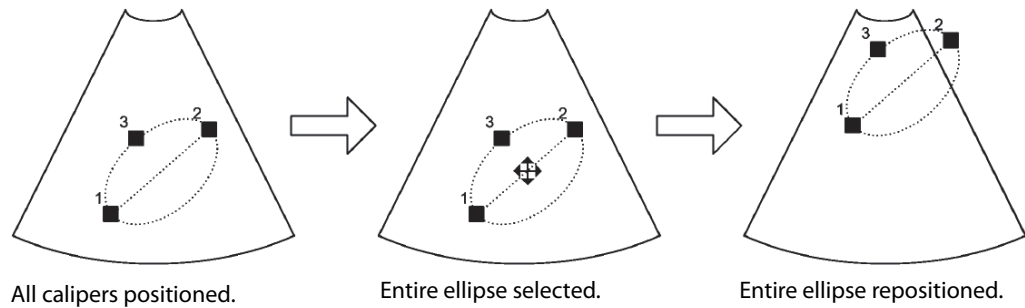All calipers positioned.   Entire ellipse selected.   Entire ellipse repositioned.

Figure 5-8. Moving an ellipse.

Freehand Drawing on a B-Mode or Color Mode Image

On a B-mode or Color mode image, you can draw a closed shape freehand.

To draw freehand:

1 Tap **2D Trace**.

A caliper appears.

2 Drag it to where you want to start drawing. Tap.

The caliper changes into a drawing cursor.

3 Drag it to draw the shape you want.

To delete backward from the cursor, tap **Back Trace**. The cursor is automatically moved back.

4 When you have finished drawing, tap the trackpad.

The shape is automatically closed by a straight line from the drawing caliper to the first caliper (starting point).
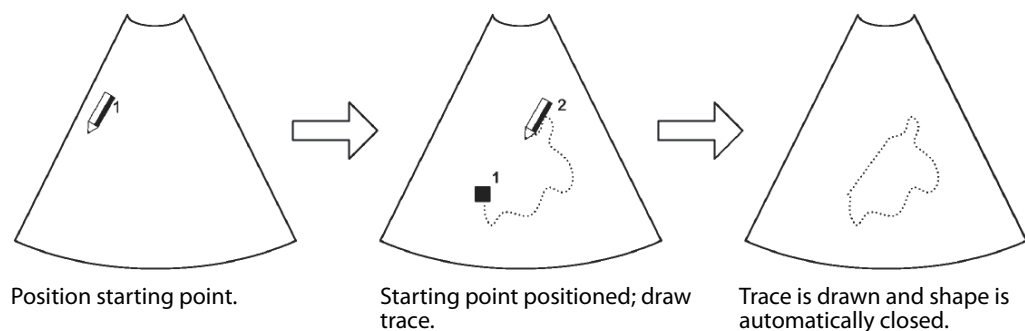

Position starting point.   Starting point positioned; draw trace.   Trace is drawn and shape is automatically closed.

Figure 5-9. Drawing a freehand shape.

You can move the shape to any location in the view:

1 Using the pointer, tap inside or on the shape.

The shape turns green and a symbol (a plus sign with arrows) appears as shown in the center image of Fig 5-10. This symbol means you can move the shape.

2 Drag it.

3 Tap again to set the shape.

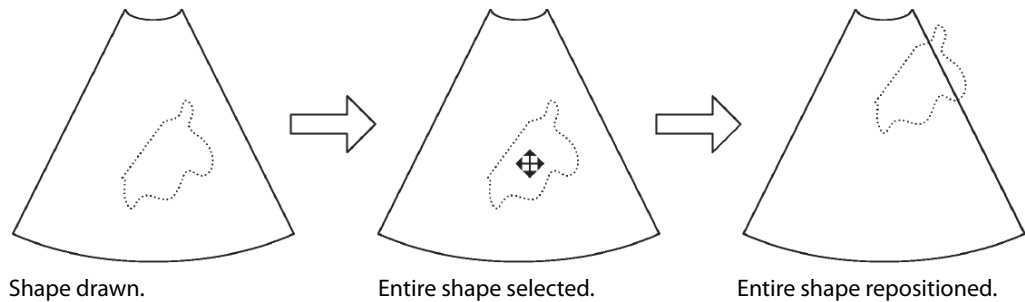Shape drawn. Entire shape selected. Entire shape repositioned.

Figure 5-10. Moving a shape you have drawn freehand.

Doppler Mode Measuring Tools

Making measurements on a Doppler mode image is different from measuring on a B-mode or Color mode image because the Doppler mode image has *time* as a dimension. To avoid getting a negative result, successive calipers must be positioned to the right, not the left, of any already-positioned calipers.

Positioning 2 Point Calipers on a Doppler Mode Image

While you are positioning a caliper, 2 cursor lines are displayed. One is horizontal and one vertical, intersecting at the caliper position.
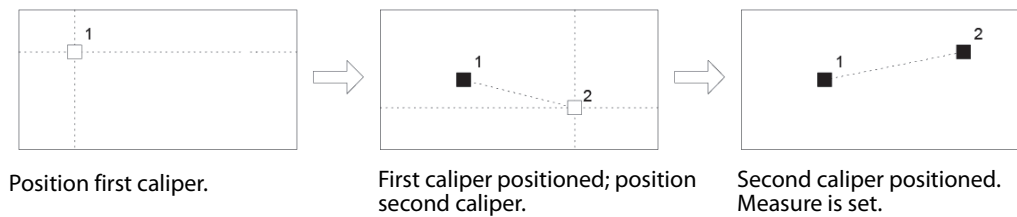

Position first caliper. First caliper positioned; position second caliper. Second caliper positioned. Measure is set.

Figure 5-11. Positioning 2 point calipers on a Doppler mode image.

After you position the calipers, you can move one of them by using the pointer and tapping and dragging it. Tap again if you want to reposition the second caliper and tap when you are done positioning.
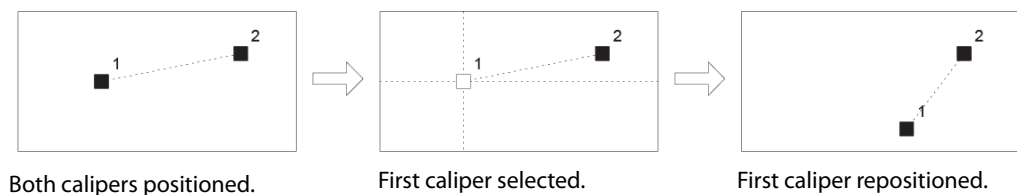

Both calipers positioned. First caliper selected. First caliper repositioned.

Figure 5-12. Moving a caliper you have placed on a Doppler mode image.

You can position the calipers anywhere in the Doppler mode image.

The appearance of the calipers and whether they are connected by a dotted line depends on what you are measuring.

Positioning 1 Point Caliper on a Doppler Mode Image

If you are measuring something that needs only one caliper, position the caliper in the same way as for 2 calipers.

Positioning 2 Vertical Line Calipers on a Doppler Mode Image

Two vertical line calipers can be positioned on a Doppler mode image to measure intervals.

To position the vertical calipers:

1   Tap the **HR** measure button.

A line caliper appears on the image.

2   Drag this to the position you want. Tap.

Another line caliper appears.

3   Drag it to the correct position.

The measurement is set.

Position first line.   First line positioned; position   Second line positioned;
                               second line.   measurement set.
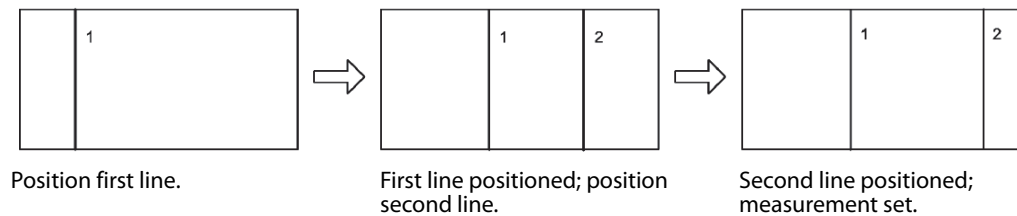
Figure 5-13. Positioning vertical calipers on a Doppler mode image.

After you have positioned the lines, you can move them to a new position:

- Use the pointer to tap any of the lines and move it to change the position.
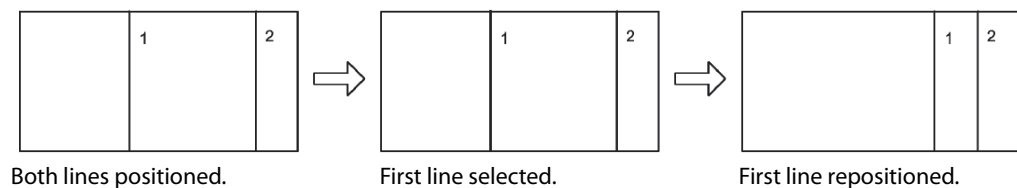

Both lines positioned.   First line selected.   First line repositioned.

Figure 5-14. Moving a vertical line caliper you have placed on a Doppler mode image.

Drawing an Outline Curve on a Doppler Mode Image

On a Doppler mode image, you can draw an outline curve freehand.

To draw freehand:

1   Tap the **Doppler Trace** measure button:

A caliper appears.

2   Drag it to where you want to start drawing. Tap.

A drawing cursor appears where you tapped.

3   Drag the drawing cursor to draw the shape you want. (You can only drag to the right; you cannot drag to the left.)

To delete backward from the cursor, tap **Back Trace**. The cursor is automatically moved back.

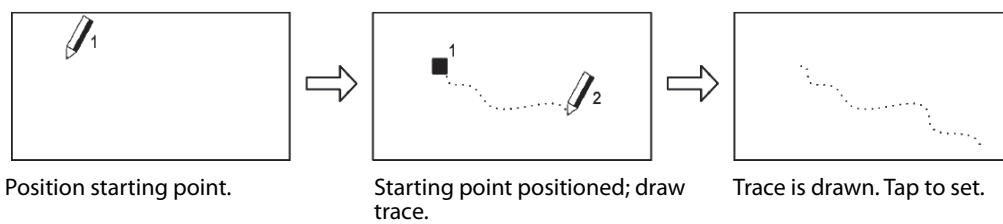**4**   When you have finished drawing, tap to set the doppler trace.

Position starting point.

Starting point positioned; draw trace.

Trace is drawn. Tap to set.

Figure 5-15. Drawing a freehand curve on a Doppler image.

Chapter 6
Documentation

What are Documents?

This chapter describes ways to save, view and delete documents.

There are four different types of documents:

- Images (2D and 3D)
- Clips
- 3D data sets
- Reports

In this chapter, the term "document" refers to all of these types of documents unless a particular type is specified.

HIPAA Compliance

HIPAA (the American Health Insurance Portability and Accountability Act of 1996) sets standards for handling patient data and medical records in a way that ensures the privacy and security of all health-care related data. Each hospital or office must set up procedures to make sure that all information that identifies an individual remains confidential and safe. Always follow the procedures that have been established for your workplace.

Information relating to HIPAA compliance can be found in the various parts of this chapter:

- "HIPAA Compliance and Exporting Data" on page 53
- "Deleting Documents or Exams from the System" on page 55
- "Password Protection of the Patient Archiving System" on page 56

Saving Documents – Capturing Images and Video Clips

You must have a patient ID entered in order to capture images and clips. Normally, the Patient ID field will be populated with a date/timestamp, but you can enter a specific ID before you start the exam if you want to.

Capturing Images

When you have started the exam, tap **Store** to capture an image and **Clip** to capture a clip. If you tap **Store** or **Clip** and an exam is not running, the system returns you to the **Patient Details** where you can start the exam by tapping **Start Exam**.

Local Patient Archiving System

The local patient archiving system contains information about patients and examinations, including comments about patients or documents.

When you capture an image or save a document during an examination, it is saved directly into the patient archiving system. The document browser is automatically updated to show the saved documents from the current examination.

NOTE: *The patient archiving system can be password-protected. See "Password Protection of the Patient Archiving System" on page 56.*

Reviewing Documents

The Review Window

Use the **Review** window to review and manage images and other documents stored in the patient archiving system. Open the documents on the **Patient List** by double-tapping the examination you want to view.

To change the order of the saved images, tap **Change Order**, tap and drag the image to where you want it.

You can view the documents on the monitor or you can export or delete them. Select a document to view or one or more documents to export or delete.

In the same way, you can also review examinations from a **CD/DVD** or a **USB**.

Viewing Exported Documents on an External Computer

Formats of Exported Documents

Copied Images Images copied to a CD or USB storage device are stored in DICOM or .bmp format. In .bmp format, they are labeled with a code that specifies the date and time the image was captured. For example, 12022003-1234_20171117_134202_0000.bmp would be the label on an image of patient 12022003-1234 that was captured on November 17, 2017 at 1.42.02 PM. (13:42:02). The label on a DICOM file is the same except that the file extension is .dcm.

Copied Video Clips Video clips can be copied in .avi or DICOM format.

Archived Images and Video Clips Archived images and video clips (including ones archived on the system) are stored in DICOM format.

Viewing Images on a Computer

NOTE: *DICOM format requires a DICOM viewer on your computer.*

Copied images have been exported in DICOM or bmp. format. You select the file you want to view.

All *archived* images, whether on the system or on a CD, network drive or PACS system, are stored in a DICOM format; you will not be able to read externally archived documents on a computer unless you have a DICOM viewer.

Viewing Video Clips on a Computer

If the video clip has been exported in DICOM format, you can view it with a DICOM viewer.

· If the video clip is not saved in DICOM format, you can still view it on a PC, but you must have a codec installed on the PC. You can set up the system to export the codec to an external storage medium. The codec is exported to a folder called **Codec**.

To install the codec on your PC:

1   Use Windows® Explorer to view the contents of your external storage medium.
2   Open the folder called **Codec**.
3   Double-click the file called **LagarithSetup_1327.exe** and install the codec.
     NOTE: *Lagarith version 1.3.27.0 is required.*

Exporting Data

HIPAA Compliance and Exporting Data

To preserve patient confidentiality when you copy patient data, select the option to copy images and other documents to a CD or USB storage device *without the identifying patient information*: **De-identify Patient Data.**

If you archive to a CD/DVD or network drive, the archive is password-protected, but you must still be aware that you are exporting confidential data from the system.

Exporting documents

You can copy documents associated with a patient to a CD/DVD, USB storage device or PACS. When you tap **Export**, you can select where to export data to, image format, clip format and whether you want to export the documents without identifying the patient information.

To copy an examination:

1   Tap **Patient list**.
2   Tap the patient, whose examination you want to copy.
3   Tap **Export**.
4   Select the destination, format and patient data identification and tap **Export** again. **De-identify Patient Data** is recommended for patient security.
5   The data is copied to the selected destination.

To copy documents from an examination:

1   Tap **Patient list**.
2   Double-tap the patient, whose documents you want to copy.
3   Select one on several documents (use the **Select Multiple** button).
4   Tap **Export**.

5 Select the destination, format and patient data identification and tap **Export** again. **De-identify Patient Data** is recommended for patient security.

6 The data is copied to the selected destination.
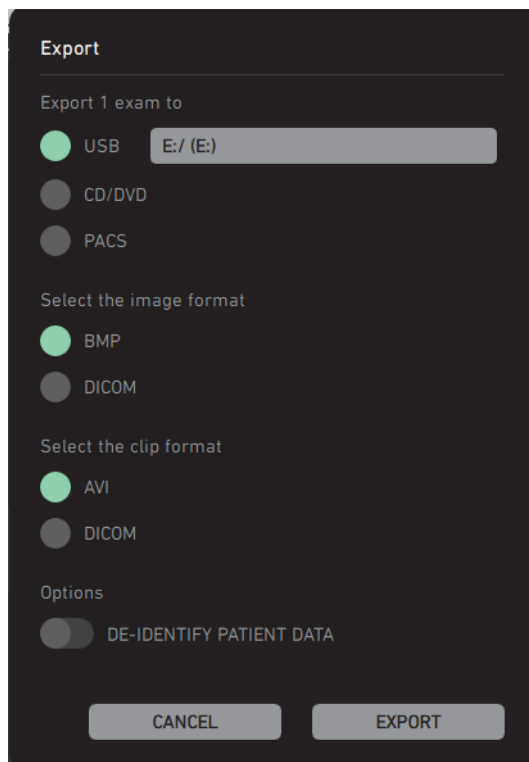
Figure 6-1. Export options

You can make more than one copy of a document.

NOTE: *Do not delete documents from the local patient archiving system until you have verified that they have been externally archived successfully.*

Patient List

The **Patient List** contains patient IDs, names, and other information about patients in the patient archive, including the date of the last examination.

You can search through the patient list using the search field above the list.

You can sort the listed patients according to the information in one of the columns by tapping the column heading. For example, if you tap the **Last Name** column, the listed patients will be sorted alphabetically by last name.

To see documents from a particular examination, tap the row containing the examination. To continue a previous exam, tap the relevant row and select **Append Exam**.

From the **Patient List** you can also export (see "Exporting documents" above) and delete exams. You can select more than one by tapping the **Select Multiple** or **Select All** buttons.

Deleting Documents or Exams from the System

You can delete documents and patient records from the system.

NOTE: *You cannot delete a document that is in a queue to be sent to a DICOM device.*

To delete one or more documents (archived or non-archived) from the system:

1   Double-tap to open the examination on the **Patient List**.

2   Tap **Review** to open the Review window.

3   Select one on several documents (use the **Select Multiple** button).

4   Tap **Delete** and confirm that you want to delete the documents.

The selected documents are deleted. If they were archived before they were deleted, the examination record, with a reference to where the documents are archived, remains on the system.

To delete all documents associated with an examination:

1   Double-tap to open the examination on the **Patient List**.

2   Tap **Select All**.

3   Tap **Delete** and confirm that you want to delete the documents.

The documents associated with the selected examination are deleted.

NOTE: *The examination record itself is never deleted (unless you delete the patient).*

To delete an exam with no externally archived documents:

1   Tap the exam on the **Patient List**.

2   Tap **Delete**.

You are asked to confirm that you want to delete the exam.

3   Tap **Delete** again.

All local documents for the exam are deleted. The exam is deleted in the patient archive if documents for the patient have not been externally archived (that is, if they only appeared locally in the patient archiving system).

To delete the entire Patient List:

See "General Tab" on page 150 in the Setup and Customizing section.

Pausing and Later Resuming an Examination

It is possible to pause an exam (for example, while you examine a different patient) and then resume the exam with the first patient.

To pause an examination:

•   Tap **Pause Exam**.

To resume a paused examination:

1   Tap **Patient** to open the **Patient** window.

2   Tap **Paused Exams**.

3   Select the exam you want to resume and tap **Resume Exam**.

Password Protection of the Patient Archiving System

To help comply with HIPAA standards, the patient archive database on the system can be password-protected with a user-specific ID (username) and password.

NOTE: *If you archive documents to a CD, the database copy on the CD is protected with a different password. See "Viewing Exported Documents on an External Computer" on page 52.*

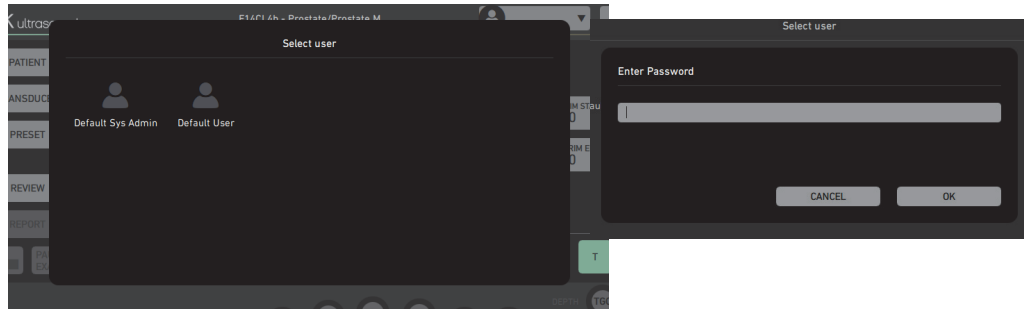If the database on the system is password-protected, when you turn on the system, a login window appears:

Figure 6-2. The Select User and Login window.

Select user, enter password and click **OK**.

Hard Disk Quota

The system hard disk does not have unlimited storage capacity.

The system checks the space on the hard disk each time you enter a new patient ID. If the hard disk is getting full, you will be notified:

- when there is less than 2 GB available space on the hard disk.
- when there is less than 1.5 GB available on the hard disk.
- when there is less than 1 GB available on the hard disk. At this point, you will not be allowed to save any more information to the hard disk.

To clear space on the hard disk, you must delete some documents. You can archive them to a USB, CD/DVD, or PACS (if you have DICOM installed) before you delete them from the hard disk.

NOTE: *If you have archived the documents to a CD/DVD, wait to delete them from the hard disk until you have successfully exported them. See "Exporting documents" on page 53. If you have archived them to a PACS, make sure that they have been transferred successfully into the system before you delete them from the system hard disk.*

Reports

Reports are defined for each Preset. A report contains information about the patient and the measurements you have made. You can add assessment, images, patient history and comments to a report.

You can save a report to the patient archiving system and view, save or archive it in the same way as you view or save other documents. See above for more information.

Creating a Report

To create a report:

- In the Exam Management area, tap **Report**. The **Report** window is displayed.

The contents of the report will vary, depending on the Preset and the measurements you have made.

If the report has more than one page, slide up and down to navigate through the pages.

Patient comments are included in a report. You can also add additional remarks.

Adding Measurements to a Report

- Tap **Measurements** to see the measurements you have saved for this patient. Measurements are automatically added to the report.

Assessment

- Tap **Assessment** and use the toggle buttons to note your assessments. You have the possibility to **Check All**, and then un-check the toggle buttons for non-relevant assessments.

Adding Images to a Report

To add selected images to a report:

1   Start the exam and save images, clips, etc.
2   Tap **Report**
3   In the **Report** window, tap **Images**. The images are displayed in the Input Region.
4   Select a thumbnail image by tapping and holding it. The image icon shrinks and you can now drag it using the trackpad.
5   Drop the image in one of the image frames of the **Report** window.
    Do this for all the images you want to add to the report.

The images you have selected to include in the report will be marked by a green checkmark.

Adding Patient History

1   Tap **Patient.**

2   Use the keyboard to type your notes into the fields, and use the dropdown menus for additional info.

*Note that you only get individual pages under Patient, if you have made calculations in these areas. E.g., you will not see the page **Kidney Patient History** if you have made no calculations of the kidneys.*

Adding Additional Comments

1   Tap **Comments**.

2   Add any additional comments to your assessment.

Editing a Report

You can edit a report before you save it.

To delete or edit a measurement in a report:

1   On the **Measurements** tab, scroll or slide till you reach the measurements taken.

2   Tap the measurement you want to edit.

3   Use the keyboard to edit or delete the measurement.

The measurement is updated. In this way, you can edit all information in the report on the individual tabs until you end the exam.

Preview the Report

1   In the **Report** window, tap **Preview**. The first page is displayed on the monitor and the touchscreen.

2   Swipe upwards on the touchscreen report to see additional pages.

Tap **Close** when you are done.

Printing a Report

To print a report:

1   Tap **Preview**.

2   Tap **Print.**

The current page of the report is printed on the report printer (See "Printers Tab" on page 144). If the report has more than one page, click **Next Page** or **Previous Page** to view other pages of the report and print them.

NOTE: *Reports can be saved as documents or captured as images but cannot be printed directly from the thumbnails. In either case, open the thumbnail to print from the monitor.*

Saving a Report to the Local Patient Archiving System

To save the report to the local patient archiving system:

•   Tap **Store Report Image** on the report. The report is stored as a DICOM image, and you can see it again by tapping **Review.**

Printing Documents or Images on the Monitor

You can print documents on a local printer or, if DICOM is installed on your system, send them to be printed on a DICOM printer. You can also set up an office printer on a network.

You cannot use an office printer directly with the USB connector on the system. The only printers you can connect directly to the system are ones listed as approved in the Product Data information. See also the Safety chapter in the *bkSpecto User Guide*.

⚠	**Caution** Print-c1
	The quality of a printed ultrasound image may vary, depending on the printer.

Printing Thumbnail Images

To open a thumbnail image and then print it:

1   Tap **Review**.

2   Select the image you want to print.

3   Tap the **Print** button (bottom left) on the touchscreen.

To set a different printer as default for the Print button:

See Settings for Store/Network "Printers Tab" on page 144.

Printing Images Displayed on the Monitor

To print an image displayed on the monitor:

To print an image displayed on the monitor:

• Tap the **Print** button (bottom left) on the touchscreen.

Chapter 7
Imaging Modes

Imaging Modes

The bkSpecto has various imaging modes:

- 2D (B-mode) gives real-time 2D information about the anatomical structure of soft tissues. Includes tissue harmonic imaging.

- Color mode (CFM, color flow mapping, color Doppler) ultrasound displays color-coded, real-time information about direction and velocity of flow in tissue.

- Power mode (power Doppler) ultrasound displays information about the number of particles moving, rather than their velocity.

- Doppler mode (spectral Doppler mode) imaging displays information about the spectrum of flow velocities as a function of time.

NOTE: *You cannot change imaging modes when the image is frozen.*

Adjusting the Thermal Index Limit

Before you use the system, check that the TI settings are appropriate. The current TI tissue type and limit are displayed in the top left corner of the monitor.

The absolute TI limit for each tissue type is set by the factory to conform to FDA guidelines and international standards (AIUM/NEMA and IEC) (see the acoustic output section in the *bkSpecto User Guide*), but you may want to set a lower TI limit for some purposes. There are 2 types of settings you can vary:

- Tissue type (TIS – soft tissue, TIC – cranial, TIB – bone)

- TI limit (not exceeding the factory-set limits)

To select tissue type:

- Tap **TI Type** and select **TIB**, **TIC**, or **TIS**:
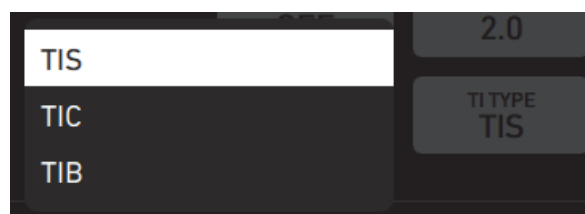
Figure 7-1. TI Type button.

To adjust the TI limit:

- Touch and slide the **TI** scale button to adjust the limit.

2D (B-Mode)

Focus

The ultrasound image is focused sharply within a selected zone.

The **Focus** indicator to the left of the image shows the extent (range) of the focal region as well as the point of best focus.
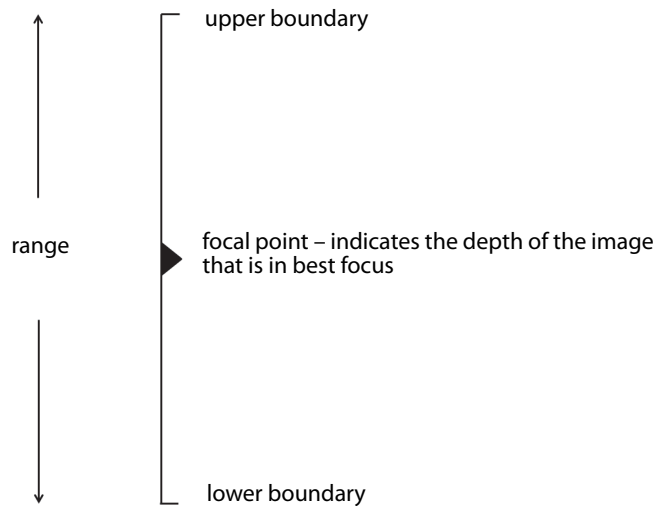
Figure 7-2. The Focus indicator.

The focal point triangle indicates the depth of the image that is in best focus – the focal point.

You can adjust the position of the area in best focus.

To adjust focus position:

Flick the **Focus** bar to move the focus up or down on the image.

Tru-Focus

Selected transducers are equipped with Tru-Focus. This focus enhancement gives you full focus in the entire depth of the image. With Tru-Focus, it is not possible to further adjust the focus position.

Gain

You can control the overall gain of an imaging mode by sliding the **Gain** bar.
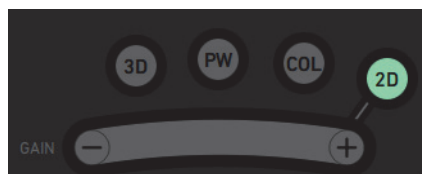
Figure 7-3. The Gain bar is located beneath the mode buttons.

TGC

The TGC (Time Gain Compensation) curve determines variable amplification applied to echoes from different depths in the tissue. The TGC function compensates for attenuation and scattering of the ultrasound beam in the tissue.

When you select a transducer, if all TGC sliders are in the center position, imaging starts using a default TGC curve optimized for the transducer. (The default is either the one set at the factory or one you have set up yourself.)

The **TGC** sliders adjust the relative gain of the image at different tissue depths. Each slider adjusts a specific part (1/8th) of the TGC curve; the topmost control adjusts the top 1/8th of the image.

NOTE: *The sliders operate relative to their center position; when they are all centered, the default TGC is used.*

To adjust the TGC curve:

1   Tap **TGC**.

2   Slide the **TGC** sliders to the right or left to adjust the TGC curve.

The shape of the TGC curve is temporarily displayed to the right of the image as a curved vertical line. This indicates the modification that is applied to the default TGC curve.

To reset the TGC sliders to their central position:

•   Tap the **Reset** button.

By default, the TGC slider window disappears after 3 seconds.

NOTE*: The TGC curve operates on the monitor image, not on the ultrasound echo. Therefore, if you move or resize the image, you may have to readjust the TGC curve.*

NOTE: *With 360° transducers, the top slider adjusts the part of the image that is most central – that is, closest to the transducer.*

Auto Gain

You can also choose to use Auto gain. With Auto gain, a selected preset defines the brightness for this particular type of scan (also depending on the transducer). Auto gain makes it possible to have the same brightness across different patients and body parts.

To activate/deactivate Auto gain:

•   Tap the **Auto Gain** parameter button to toggle between on and off:
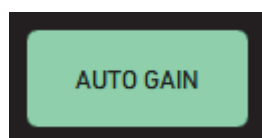
Figure 7-4. The Auto Gain parameter button.

When you activate or deactivate **Auto Gain**, a message pops up bottom center of the monitor informing you of the setting.

It is still possible to adjust the Auto Gain setting. You do this by tapping and sliding the **Auto Gn. Level** button.

The Auto gain level is displayed on the button, and bottom center of the monitor as you slide the button.

Zoom

To zoom in or out on the area you are interested in, adjust the Zoom box and then make the part of the image that is inside the box fill the monitor.

NOTE: *To zoom in on a small part of the image, make the box smaller.*

To use the Zoom box (zoom on different parts of the image):

1   Tap **Zoom**. A green zoom box appears on the image.

2   Tap the trackpad to activate the zoom box. Now only one corner is green.

3   Drag this corner to adjust the size of the zoom box.

4   Tap **Zoom** again to zoom in on the image.

To return to the original image:

•   Tap **Zoom**.

You can also zoom a frozen image.

Depth

With a full 2D image, you adjust the depth to cut out parts below the part you are interested in. The image always includes the transducer surface, so this key changes the magnification of the image, stretching, or compressing it.

Adjusting the depth of a zoomed image changes the magnification even though the transducer surface is not necessarily visible at the top of the image.

To adjust the depth:

1   Flick the **Depth** bar backward to increase depth. You can also tap the near end to increase depth incrementally.

2   Flick the **Depth** bar forward to decrease depth. You can also tap the far end to decrease depth incrementally.

Note that you can change the direction for increasing/decreasing Depth in the User Preferences. See page 148.

Grayscale Map

Several gray scales can be used to display a 2D image. Different gray scales may make various aspects of the image clearer.

To adjust the gray scale:

•   Touch and slide the **Map** scale button:
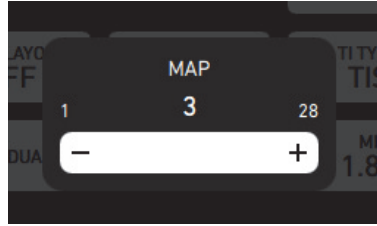
Figure 7-5. Map scale button.

Combination Modes

2D (B-mode) can be used in combination with other modes. (The terms *duplex* and *triplex* imaging refer to combinations of 2 or 3 modes.)

The available combinations are:

- 2D+Color
- 2D+Power
- 2D+Doppler
- 2D+Elasto

- 2D+Color+Doppler
- 2D+Power+Doppler
- 2D+3D
- 3D+Color

To return to imaging with 2D alone after you have been using it in combination with other modes, double-tap **2D** or tap Home 🏠 .

To add another imaging mode:

- Tap **Col**, **Pw** or **3D**.

To remove an imaging mode from the combination:

- Double-tap the mode you want to remove.

To return from a combined mode to B-mode only:

- Double-tap **2D**.

Tissue Harmonic Imaging (True Echo Harmonics – TEH)

Tissue harmonic imaging can reduce noise and improve the clarity of the ultrasound image.

In normal 2D imaging, the transducer uses essentially the same frequency range for both transmitting and receiving. In harmonic imaging, the image is created by receiving higher frequencies (harmonics) that are multiples of the transmitted frequency (f). Tissue harmonic imaging in the bkSpecto is based on the 2nd harmonic (2f) spectrum and pulse inversion.

Using TEH

TEH can be used only with transducers that support harmonic imaging.

Each preset that permits TEH has default settings for overall gain, TGC gain, contour level, and contrast level for tissue harmonic imaging.

Restrictions

- TEH is available only for certain transducers.

Advantages

- Better images with difficult-to-image patients.
- Increased contrast resolution.
- Reduced effect of grating lobes.

To turn TEH on or off:

Make sure that you are imaging in 2D (imaging is not frozen).

- Tap the **Harmonics** parameter button to toggle between on and off.

When you turn harmonic imaging off, 2D imaging resumes with the frequency, gain, dynamic range etc. that you were using previously.

Displayed Frequencies for Tissue Harmonic Imaging

When TEH is turned on, the letter **H** appears next to the displayed frequency, which is the receiving frequency – double the transmitted frequency.

Needle Enhancement

Needle Enhancement uses an adjustment of compounding plus improved focusing to help the user see the needle during interventional procedures. A needle icon indicates where you will get the best visibility.

⚠️ **WARNING** GS-w1

Before you attempt to use BK Medical equipment, you should be trained in ultrasonography or be under the supervision of someone who is trained in ultrasonography. You should also be thoroughly familiar with the safe operation of your ultrasound system: read all the user documentation that accompanies it.

In addition, if your system interacts with other equipment directly or indirectly, you need to be trained in making sure the interactions are both safe and secure.

No further training is required, but BK offers training in how to use the system. Consult your BK representative for information.

⚠️ **WARNING** P-w4

The puncture line on the image is an indication of the expected needle path. To avoid harming the patient, the needle tip echo should be monitored at all times so any deviation from the desired path can be corrected.

Needle Enhancement is available as an option (license).
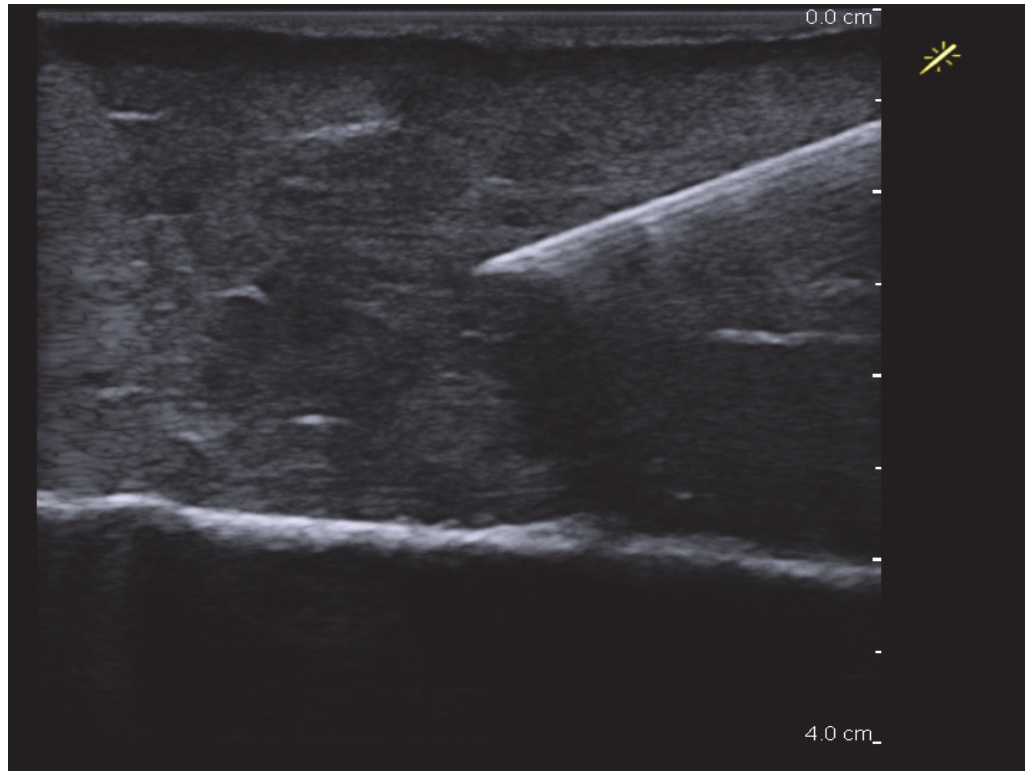
Figure 7-6. Image showing the Needle Enhancement icon and inserted needle.

In 2D, you can access Needle Enhancement on the parameter buttons.

A dropdown displays the 3 options:

- **Left**
- **Off**
- **Right**

Left and **Right** switches sides on the image and **Off** returns you to default 2D image quality.

Activate Needle Enhancement

Do as follows:

1   Ensure that **2D** is active.

2   Tap **Needle Enhance** to select from which side you enter the needle:
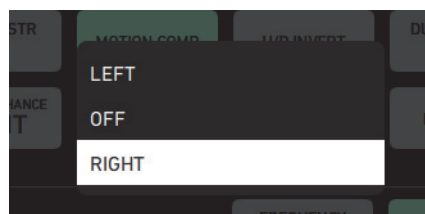
Figure 7-7. Needle Enhance dropdown menu.

NOTE: *Make sure that you adjust the icon* *to match your needle insertion side.*

3   If needed, for example in steep needle angles, you can adjust the balance between the needle strength echo and image quality. For this, touch and slide **Needle Str**. Increase the number to increase the needle shaft visibility. Decrease the number to improve image quality over needle visualization.
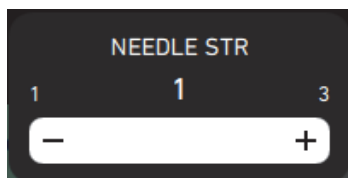
Figure 7-8. Needle strength scale button.

Note that the **Needle Str** scale button will only be active when Needle Enhancement is activated.

Color Mode and Power Mode

Color mode (CFM) ultrasound displays color-coded real-time information about direction and velocity of flow in the tissues.

Power mode displays color-coded information about the amount of flow but not the direction.

Power Doppler has a separate parameter button.

Color Submodes

Tap the **Col** mode button to activate color mode. You can then select the submode you want. The view must be imaging when you do this.

Two submodes are available when you tap **Color mode** imaging:

* **Velocity** (standard color mode)
* **Tru-Color**. Tru-Color is an alternative to normal color mode without the persist function. It has less averaging and is therefore able to maintain a significantly higher temporal resolution. In this way, you can more easily visualize the hemodynamics, including differences between systole and diastole.

Color Coding of Flow

In a Color mode image, the frequencies of the reflected ultrasound waves are measured to show the velocity and direction of the blood flow. The result is displayed in color on the monitor.

Flow Direction	Default Color
Toward the transducer	Red
Away from the transducer	Blue

Table 7-1. Default color coding in Color mode.

It is possible to invert this color-coding or select a different one.

Independent D-Mode/C-Mode Steering

Independent steering of PW Doppler and CFM is possible using the **Sync Steer** button. To enable independent steering, tap **Sync Steer** to deactivate it. Then use the **Steer** scale button to change the angle of the doppler line.

NOTE: *This feature is only available for certain transducers and exam types.*

Color Box

When Color mode or Power mode imaging is turned on, a color box is superimposed on the B-mode image. The color box outlines the area of the tissue in which flow information is available.

You can adjust the position and size of the color box to examine flow in various parts of the B-mode image. The view must be imaging when you do this.

To move the color box:

• Drag it with the trackpad.

To resize the color box:
1 Tap the trackpad. The corners of the color box turns white.
2 Drag right or down to increase the box in width and height.
3 Drag left or up to decrease the box in width and height.
4 Tap the trackpad to set the size.

Color Scales

Various color scales can be used to display a Color mode or Power mode image or a Doppler spectrum.

To select the color scale:

• Touch and slide the **Map** scale button to select the color scale you want.

NOTE: *When you image in Color or Power mode, you cannot use the color bar to change the B-mode gray scale because it is used to control the color mapping.*

Elastography

Elastography is a medical imaging mode using manual tissue compression or motion from e.g. patient cardiac movement or respiration, in order to evaluate tissue stiffness. Elastography requires a software license from BK Medical and is available with selected transducers only, see the *bkSpecto Product Datasheet*.

Before using elastography, you should be adequately trained in ultrasonography.

⚠ Proper Training	**WARNING** GS-w1
	Before you attempt to use BK Medical equipment, you should be trained in ultrasonography or be under the supervision of someone who is trained in ultrasonography. You should also be thoroughly familiar with the safe operation of your ultrasound system: read all the user documentation that accompanies it.
	No further training is required, but BK Medical offers training in how to use the system. Consult your BK Medical representative for information.

To activate elastography mode:

- Tap the **E** mode button to toggle between on and off.
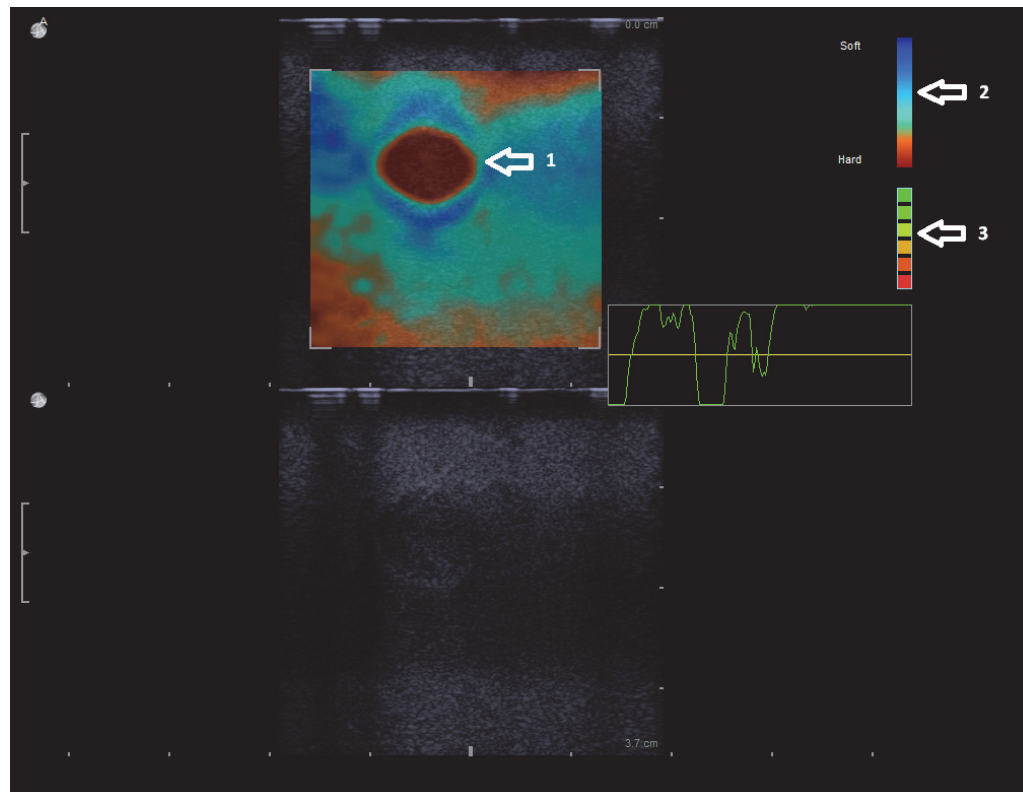
Figure 7-9. Elastography imaging (default horizontal view).

1   Region of interest (ROI)

2   Color Map

3   Quality Indicator

Color Box

When elastography mode imaging is turned on, a color box is superimposed on the B-mode image. The color box outlines the area of the tissue in which information is available.

You can adjust the position and size of the color box to examine various parts of the B-mode image. The view must be imaging when you do this.

To move the color box:

- Drag it with the trackpad.

To resize the color box:

1 Tap the trackpad. The corners of the color box turns white.
2 Drag right or down to increase the box in width and height.
3 Drag left or up to decrease the box in width and height.

Color Map

The color map represents the variants in levels of relative hardness/softness. The default setting is red = hard, and blue = soft. If you touch and slide the **Map** parameter button, you can choose from a set of different color codes.

Quality Indicator

The quality indicator displays the amount of pressure being placed on the transducer. If the green indicator is at the top, transducer compression is at the optimum level, but even if the indicator shows only one square, the image can be useful. A good image is one that can be reproduced.

Strain Ratio Measurement

Strain ratio measurements can be used to quantify the relative stiffness between the region of interest (ROI) and the surrounding tissue. To perform a strain ratio measurement:

1 Tap **Measure** and select **Strain Ratio.**
2 Tap inside the ROI and then slide the trackpad to create a measurement circle. When the circle is the required diameter, tap again to set the measurement circle on the screen.
3 Repeat the measurement process outside the ROI.

The strain ratio appears in the measurement data to the left of the image.
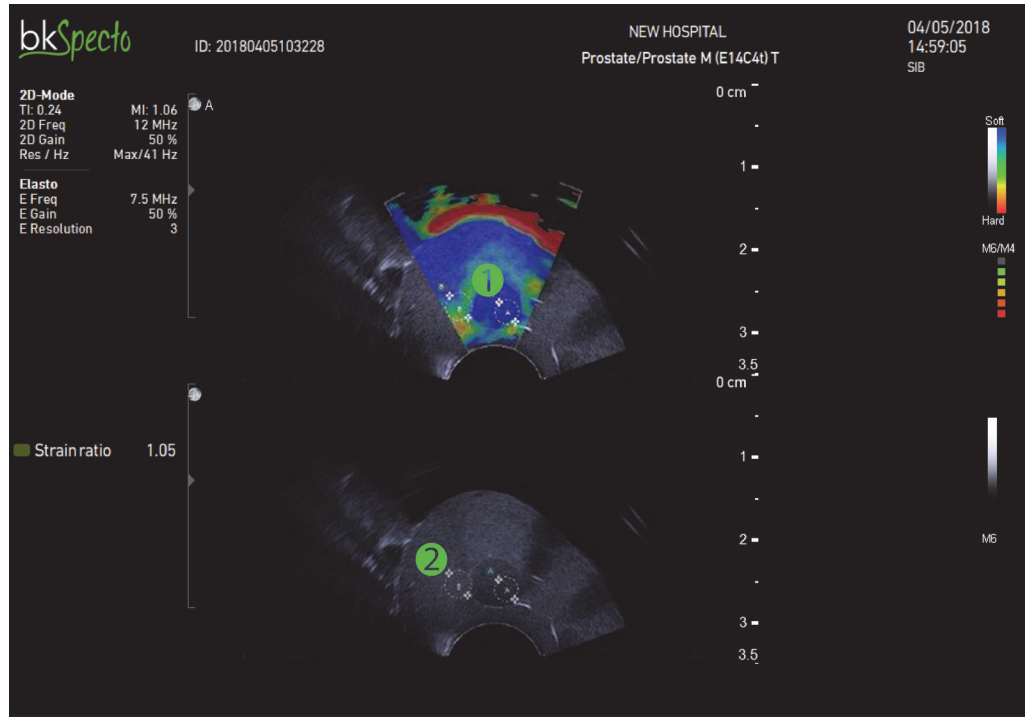
Figure 7-10. A strain ratio measurement.

1. A measurement circle inside the ROI (elastography screen)

2. A measurement circle outside the ROI (2D screen)

Diameter Comparison Measurement

The elastography diameter of an ROI can be compared to the 2D diameter.

1   Tap **Measure** and select **E/B Ratio**.

2   Tap on the edge of the ROI in the elastography screen and slide the trackpad to the opposite side of the ROI. Tap again to place an E-diameter line.

3   Repeat the measurement process in the 2D screen to place a B-diameter line.

The E/B Ratio appears in the measurement data to the left of the image.
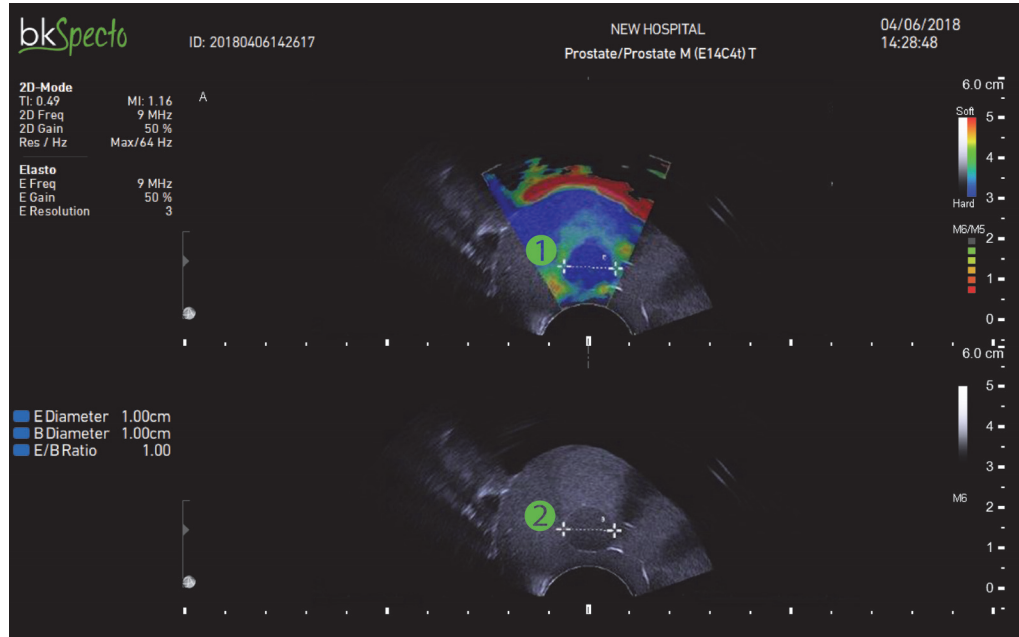
Figure 7-11. A diameter comparison measurement.

1. A diameter line inside the ROI
(elastography screen)

2. A diameter line inside the ROI
(2D screen)

Doppler Mode – Spectral Doppler

Doppler mode (spectral Doppler mode) imaging displays information about the spectrum of flow velocities as a function of time. It is sometimes called FFT (Fast Fourier Transform) because the information is presented as a frequency spectrum indicating velocity components.

Turning Doppler Mode On or Off

When you turn Doppler mode on, 2D must be imaging.

To turn on Doppler mode:

• Tap **PW**.

 The Doppler indicator, including both the Doppler line and the Doppler gate, appears superimposed on the 2D image and the Doppler spectrum appears.

To position the Doppler gate on a 2D image, use the trackpad.
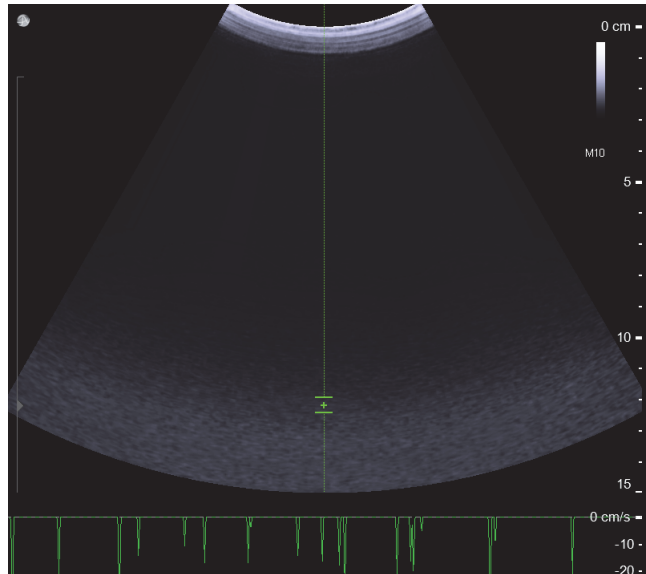
Figure 7-12. The Doppler indicator (line and gate) superimposed on a B-mode image.

Fig 7-13 shows information available in Doppler indicators.
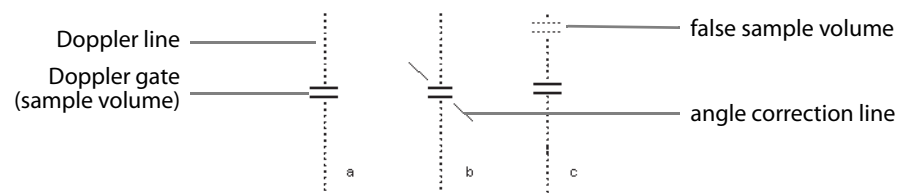
Figure 7-13. Doppler indicators (three examples).

Fig 7-13 (a)   The dotted line represents the Doppler line. The lines at right angles to that show the Doppler gate.

Fig 7-13 (b)   A diagonal line (relative to the Doppler line) indicates a sample volume with angle correction.

Fig 7-13 (c)   The horizontal dotted lines show the false sample volume in HPRF (see page 75).

To turn off Doppler mode:

•   Double-tap **PW**.

Adjusting the Doppler Mode Image

Doppler Indicator

When Doppler mode imaging is turned on, the Doppler indicator is superimposed on the B-mode image.

You can adjust the position and size of the Doppler gate to get information from sample volumes in various parts of the B-mode image. The image must not be frozen when you do this.

To move the Doppler gate:

• Drag the Doppler gate using the trackpad.

The sample volume line moves along with the gate.

To resize the Doppler gate:

• Touch and slide **SV size**.

Independent D-Mode/C-Mode Steering

Independent steering of PW Doppler and CFM is possible using the **Sync Steer** button. To enable independent steering, tap **Sync Steer** to deactivate it. Then use the **Steer** scale button to change the angle of the Doppler line.

NOTE: *This feature is only available for certain transducers and exam types.*

Doppler Trace (Automatic Curve Tracing)

The system can automatically calculate and display a curve that traces the mean or peak values of the Doppler spectrum. See "Doppler Measurements" on page 81 for a description of the curves. You can also choose to have both the peak and mean curves displayed.

To change which curve is displayed or to turn off the display:

• Tap **Trace** to select **Off**, **Peak**, **Mean+Peak**, or **Mean**.

To measure higher flow speeds (high range setting) in a sample volume placed deep in the tissue, HPRF (high PRF) is automatically used. When HPRF is active, the Doppler line shows the actual sample volume, and false sample volumes (shown dotted). See Fig 7-13 on page 74.

The false sample volumes should always be placed outside a vessel.

Sweep Speed

You can adjust the sweep speed to change the number of cycles of the spectrum displayed on the full time axis. The available values range from 2 (slowest) to 12 (fastest).

To select the sweep speed:

• Touch and slide **Sweep Speed** and select the required value.

The time axis is updated.

M-Mode

To turn M-mode on:

• Tap **M**.

To turn M-mode off:

- Double-tap **M**.

NOTE: *M-mode is only available for certain Presets.*

M-mode (motion mode) ultrasound is produced by slowly sweeping one line of a 2D image across the monitor. The M-mode image illustrates a time series of images along this line.

M-mode can only be used in combination with 2D. Selecting any other mode will turn off M-mode.

You can return to imaging with 2D alone by double-tapping **2D**.

M-mode uses the same imaging frequency and focus settings as 2D.

NOTE: *Only a single focal zone is possible in M-mode.*

Zooming and panning do not work directly in the M-mode image. When you make changes in the 2D image, they are applied to the M-mode image.

The M-Mode Image

When M-mode is selected, the monitor is divided into two windows (see Fig 7-14). You can adjust how the two windows are displayed. The window with the vertical M-mode line shows the 2D image.
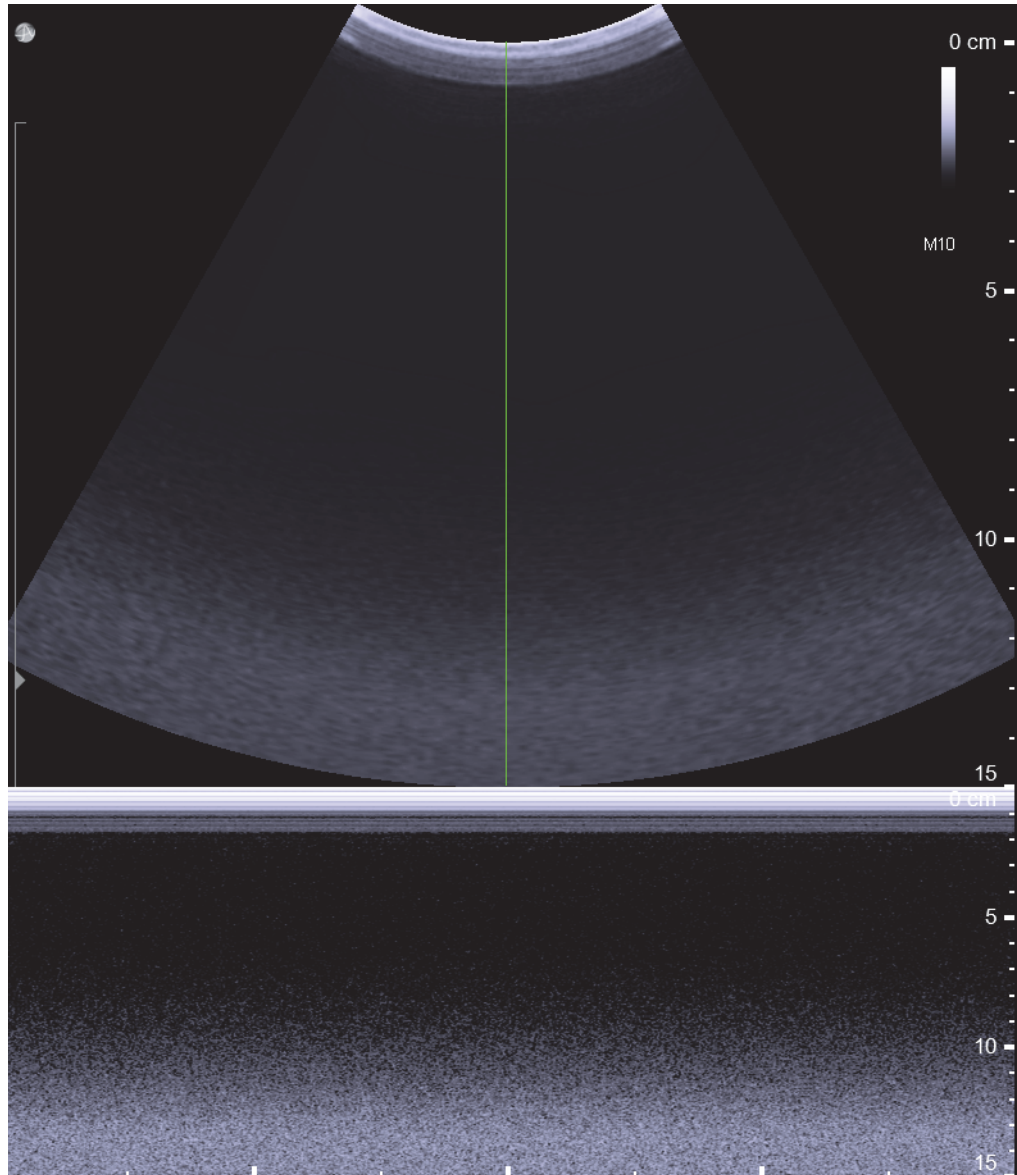
Figure 7-14. M-mode image.

M-Mode Line

The M-mode line (see Fig 7-14) shows the path of the M-mode image in the 2D window. You can adjust the path of the image by moving the M-mode line (drag it using the trackpad).

M-Mode Image Ruler

The M-mode image ruler scales the ruler range of the 2D image to the M-mode image. Any given value will represent the same position on both the M-mode and 2D images.

It is not possible to change the ruler.

Saving a Preset

When you have changed the setup, you can save it as a new preset.

To save a preset:

1 Tap the **Preset** button in the Exam Management area.

2 Tap **Save Preset**.

The **Save Preset** window appears.
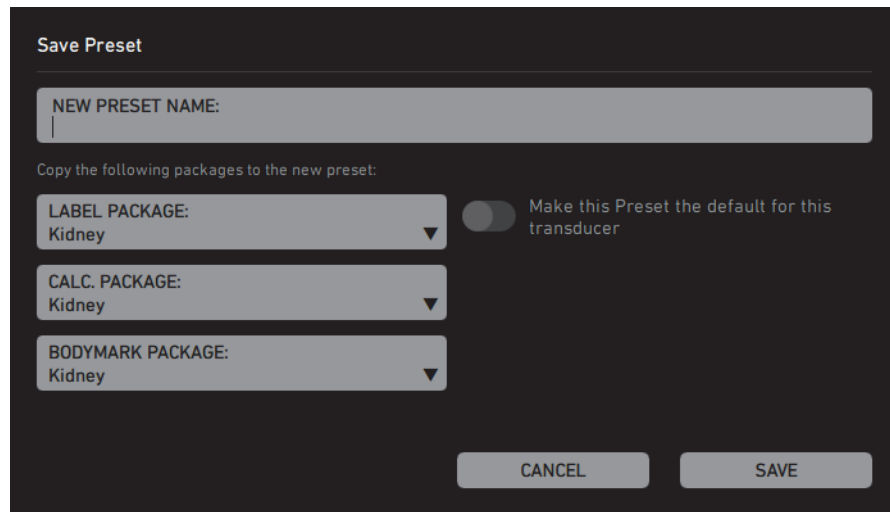
Figure 7-15. The Save Preset window.

3 Enter a name for the preset and select the options you want from the drop-down menus.

4 Tap **Save**.

Default Exam Types and Presets

You can change the default Exam Type and preset for a transducer. When creating a new preset as in "Saving a Preset" above, tap the toggle button **Make this Preset the default for this transducer**.

Chapter 8
Exam Types

Before You Begin

The information in this user guide may not correspond to the exam types on your system as Exam Types can be customized.

Before reading about the Exam Types, you should already be familiar with:

- Working with images on the system (Chapter 4, "Working with the Image").
- Making measurements with the system (Chapter 5, "Making Measurements").
- Documenting the image and its results (Chapter 6, "Documentation").

The tables and formulas that the system uses for calculations are in the *Technical Data (BZ2100)*.

If You Perform a Puncture Procedure

Before you perform any puncture procedure, including therapy, make sure you have read the warnings in the Puncture and Brachytherapy section of the Safety chapter in the bkSpecto User Guide.

⚠	**WARNING P-w1** Before you start imaging, verify that the type number or name of the transducer and the type number or description of the needle guide you are using match the number displayed on the monitor. Also make sure that the needle guide is positioned correctly. If the numbers do not match, or if the needle guide position is not correct, the puncture line on the monitor may not correspond to the true puncture path in the tissue. In case of any inconsistency, stop imaging, turn off the system, and contact your BK service representative.

What Is an Exam Type?

An Exam Type is a pre-defined configuration for the layout and user interface of the monitor. There are different Exam Types for different types of examinations.

Your choice of Exam Type determines:

- Patient information fields needed for the examination
- Specialized presets
- Layout of buttons on the touchscreen (including which buttons are available)
- Labels and bodymarks
- Reports
- Measuring tools and predefined calculations

Presets

A preset is a pre-defined setup that optimizes the image for a particular type of imaging. It includes suitable settings for gain, frequency, etc.

The Examination Type you can select on the system is a combination of an Exam Type and a preset.

The following Exam Types are available on the system:

- Abdomen
- Brachytherapy

- Small Parts
- Prostate

The information in the first part of this chapter applies to all Exam Types. Any additional information that applies to Brachytherapy is described in the following section:

- "Using the Brachytherapy Exam Type" starting on page 85.

Measurements

Figure 8-1. Touchscreen showing available measurements.

Each Exam Type contains a set of measurements and calculations that are appropriate for a specific type of examination. Measurements vary according to the specific Exam Type, but the general instructions for making a measurement are the same.

To make a measurement:

1 Tap **Measure**.
2 Tap the name of the measurement.
   A caliper appears on the image.
3 Drag the caliper to the position you want and tap.
   If the measurement requires 2 or more calipers, another one appears.
4 Drag the second caliper to the position you want and tap.
5 Repeat this until you have positioned all the calipers for the measurement.

NOTE: *The look of the calipers themselves and of any lines that connect them depend on what you are measuring.*

After you have positioned all the calipers, the result appears at the left side of the monitor:

Figure 8-2. Measurement results.

Doppler Measurements

Many Exam Types contain Doppler measurements, as most vascular calculations involve making measurements on a Doppler (FFT) spectrum.

You can fit a curve to the spectrum either automatically (see "Doppler Trace (Automatic Curve Tracing)" on page 75) or manually and then make measurements on the curve.

Two curve types are generally used.

This type of curve	is a trace of...
Peak (Max)	maximum points of the spectrum (those farthest from the baseline).
Mean	mean points of the spectrum.

Table 8-1. Two types of Doppler curves.

> ⚠ **WARNING M-w2**
>
> Drawings of Doppler curves, manual and automatic, are meant as tools for positioning cursors so that measurements based on the curves can be calculated automatically. The system has no facilities for checking whether the automatic measurements are reasonable. Curves drawn on very noisy spectra may lead to misplacement of measurement cursors. Make sure that measurement cursors are positioned so that the results are reasonable. If they are not, you must adjust the position of the cursors manually.

Fig 8-3 depicts a Doppler spectrum with two cycles. A cycle starts at the *start systole* (when the heart starts to contract) and ends at the *end diastole* (when the heart is resting and filled with blood). The correct placement of vascular calculation markers is indicated in the figure; their abbreviations are as follows:

SS	Start systole	**MD**	Minimum diastole
PS	Peak systole	**ED**	End diastole
ES	End systole		
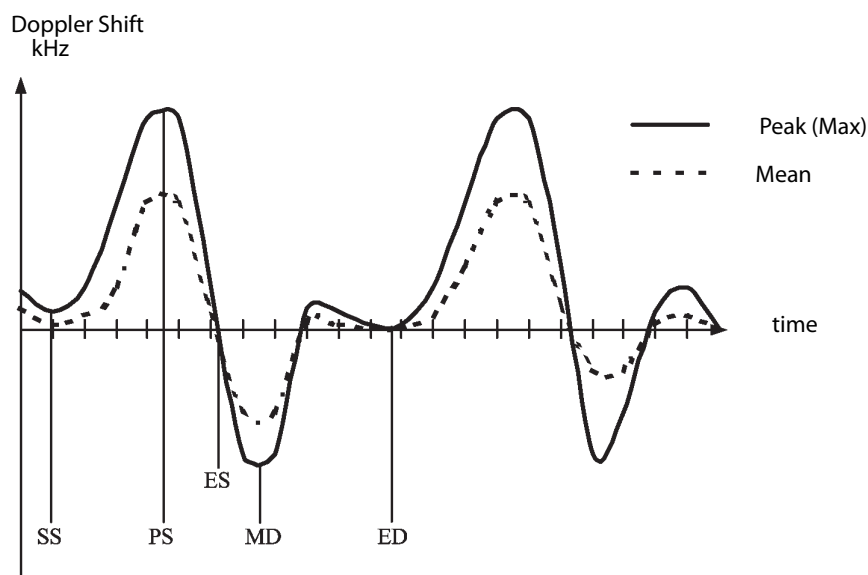
Figure 8-3. Doppler spectrum including vascular calculation markers.

The calculations and the way in which they are presented on the monitor depend on whether the Doppler angle is active or not.

Doppler Angle Active? (Yes/No)	Velocity or Frequency
No	Frequency measured at intersection of marker line and Doppler curve.
Yes	Velocity measured, and frequency parameters replaced by corresponding velocity parameters, (dF by dV, FACC by ACC, F1 and F2 by V1 and V2.)

When the Doppler angle is turned off or altered, the results are recalculated.

Reduction

The **%Reduction** measurement uses the area of the vessel before or after the stenosis and the area of the vessel at the stenosis (residual lumen) to calculate the degree (%) of stenosis. You can base the stenosis calculation on the distance across the vessel or the area of the vessel lumen.

To find the reduction measurement, freeze the image, tap **Measure** and select **%Reduction**. After you select the measurement type, tap on the image to place your measurement points.

Reduction Based on Ellipses

When you use areas to calculate stenosis, make one area measurement to measure each of the following:

1   Tap **%Reduction** and measure the total lumen of the vessel.
2   Tap to set the measurement. A new caliper is displayed inside the ellipse or circle.
3   Measure the residual lumen of the vessel.
4   Tap to set the measurement.

The result on the monitor is continuously updated while you position the second ellipse or circle.

RI and PI (Resistance Index and Pulsatility Index)

The resistance index (Pourcelot index) is based on the peak systolic velocity (V_{max}) and the end-diastolic minimum velocity ED (V_{ed}) in a supply vessel. RI indicates the level of impedance to blood flow; a high RI suggests increased peripheral vascular resistance.

The pulsatility index represents the hemodynamic conditions in a vessel. It is based on the peak systolic velocity (V_{max}), the maximum velocity at minimum diastole ($V_{min-diast}$), and the average (V_{mean}) of the peak (max) flow velocity curve. PI describes the elasticity of the vessel combined with the level of peripheral resistance.

The A/B ratio (Stuart index) is calculated as the ratio between PS (V_{ps}) and ED (V_{ed}).

The advantage of using indices rather than absolute velocities is that the indices are independent of the insonation angle.

Index	Formula
A/B ratio	PS/ED
Resistance index	(PS-ED)/PS
Pulsatility index	(PS-MD)/Mean

Table 8-2. Formulas for the main Doppler indices.

The correct placement of markers for measuring RI and PI is indicated in Fig 8-3. "Mean" in the Pulsatility index formula is the averaged max flow velocity.

All main Doppler indices are measured together.

PS, ED, RI, PI, S/D

You can measure the Doppler indices in different ways:

• Automatic – the Doppler curve is drawn automatically and you position markers on it.

• Manual – you draw the Doppler curve manually (freehand).

• Real-time – the system calculates and displays the indices automatically in real time.

To measure the Doppler indices automatically:

1 Tap **Measure** and select **Auto.**

2 Position one marker at the *start systolic* (SS) frequency.

3 Position the second marker at the *end diastolic* (ED) frequency.

The Ps, Ed, PI, RI and S/D measurements are displayed to the left of the image.

Minimum two cycles must be included between the time cursors, and the calculated index is an average over the cycles.

NOTE: *Make sure that the trace appears to be a good fit to the spectrum so that the basis for the automatic calculation is correct.*

To measure PI manually:

1 Select **Doppler Trace Freehand**.

2 Position the marker on the *start systolic* (SS) frequency and tap.

3 Draw a curve that traces a line along the whole maximum spectrum through the *peak systolic* (PS) frequency, the *minimum diastolic* (MD), and onto the *end diastolic* (ED) frequency.

4 Tap.

The Ps, Ed, PI, RI and S/D measurements are displayed.

If the traced curve covers more than one cycle, the PI is calculated as the average of each cycle.

Real-Time Measurements

The following measurements are displayed when **Trace** is on in real time, so that they are continually updated during imaging:

- PS
- ED
- RI
- PI

Note that it takes a few cycles before the real-time measurements are displayed.

Calculations

The calculation formulas and accuracies, along with the tables and formulas used by the system, are in the *Technical Data (BZ2100)*.

Using the Brachytherapy Exam Type

The Brachytherapy Exam Type is designed for ultrasound-guided brachytherapy and cryotherapy for prostate cancer. This Exam Type helps you measure the volume of the prostate.

NOTE: *If you have the VariSeed or Live Image Transfer licenses activated, the image size is locked by default for the Brachytherapy exam type.*

NOTE: *Before you perform any puncture procedure, including brachytherapy, make sure you have read the warnings in the Puncture and Brachytherapy section of the Safety chapter in the bkSpecto User Guide.*

For information about calculating PSAD see Chapter 9, "Urology Prostate Exam Type".

Patient Setup

The **Patient** window for this Pro Package contains a PSA field for PSA Score parameters:

Parameter	Range allowed
PSA	0 – 1000

Table 8-3. Brachy parameters in the Patient window.

Calculating Volumes

Organ volumes can be calculated in several ways. For the formulas used for each of these calculations, and information about their accuracy, see the *Technical Data (BZ2100)*.

NOTE: *A volume calculation based on a measured ellipse is critically dependent on the axis of rotation that you choose. See page 46.*

Planimetry (Contouring)

For this method, you record several parallel B-mode images that cover the organ to be measured. On each image, you draw a curve that traces the outline of the structure, thereby creating a set of parallel section measurements of the structure.

These parallel sections (the outline measurements) are used to estimate the volume of the structure based on several equally spaced slices.

The accuracy of this method depends on starting the measurements in the correct place. Start at one end of the organ, where the image shows an area of as close to 0 as possible. After each step, trace the outline of the structure on the image. The system calculates the volume of the structure between the starting point and each new image (see Fig 8-4). This is continued until the whole organ has been covered and a total volume obtained.
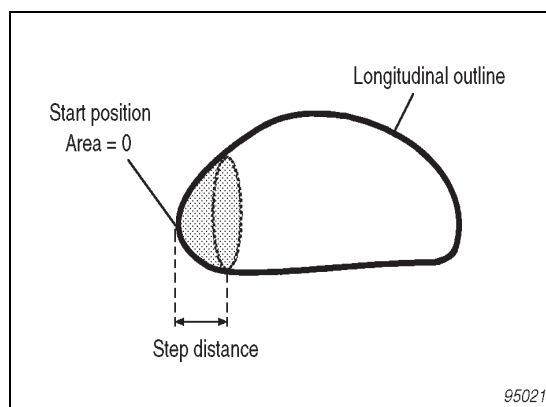
Figure 8-4. Longitudinal outline of organ showing the start position for planimetry.

Different stepping units to control the spacing between the sections are available for use with different transducers.

To use this method to calculate the volume of a particular organ, use the Planimetry (Ellipse) or Planimetry (Freehand) measurements in the submenu for that organ volume. The planimetry method is only available for the prostate and adenoma.

To make a planimetry calculation:

1   Record a 2D image at the far end of the organ.

2   Move the transducer back one step.

3   Freeze the image.

4   In **Calc**, tap **Planimetry Freehand**.

5   Draw to outline the prostate.

6   Draw an outline around any other structures of interest, such as the rectal wall or ureter.

7   Unfreeze the image.

8   Repeat steps 2 through 6 until you have covered the entire organ. The step numbers and measurements will be registered on the monitor.

   The prostate volume is displayed (updated after each measurement is drawn) at the bottom of the data area to the left of the image.

9   Tap to set the measurement.

Performing a Biopsy or Puncture Procedure (including Brachytherapy)

NOTE: *It is important to verify that you are using the correct needle guide. The number of the guide is displayed on the monitor. Make sure the number corresponds to the guide you are using. If it doesn't, tap **Needle Guide** to select the proper needle guide.*

When you use a transducer (such as the E14CL4b for brachytherapy, a brachytherapy needle guide matrix (brachy matrix) is superimposed on the image.

To superimpose a brachy matrix on an ultrasound image:

•   Tap **Biopsy**.

   The default brachy matrix appears.

To set a different brachy matrix to be the default:

•   After you have selected the brachy matrix you want (and made any other setup changes you want), save your settings as a new preset. Specify that you want the new setup to be your default. See "Saving a New Preset" on page 98.

To select a different needle guide or brachy matrix:

•   Tap the **Needle Guide** button and select the new needle guide number or brachy matrix name.

To remove the brachy matrix from the monitor:

•   Tap **Biopsy**.

Programmable Needle Guide

If you are using a programmable needle guide, you can change the setup to move it to the left or right or in or out.

Brachy Ruler with Sagittal Plane Imaging

You can set up the system so that a brachy ruler is displayed when you image in the sagittal plane with the E14CL4b transducer, in situations where a brachy matrix appears in the transverse imaging view.
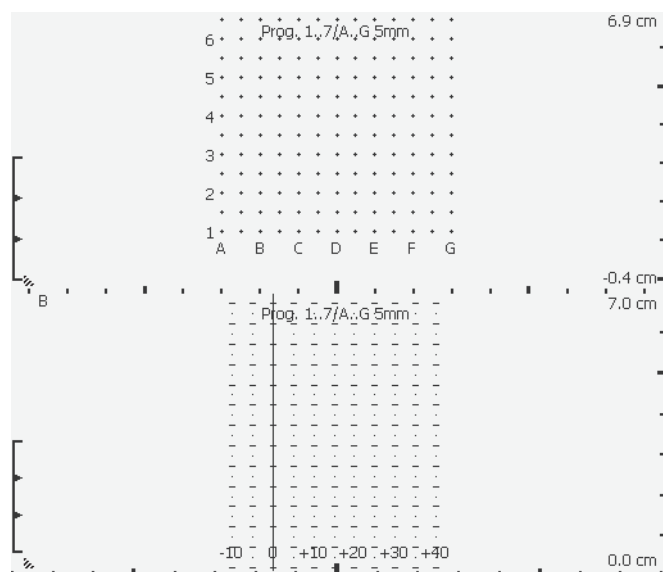
Figure 8-5. A split-screen view with transverse brachy matrix above and sagittal brachy ruler below. Ruler has vertical line to mark 0.

The sagittal brachy ruler is sometimes displayed with a 2-dimensional grid, to make it easier for you to see the horizontal position of the needle no matter where it is in the vertical direction.

To move the ruler to the left or right:

1   Open the Needle Guide setting as described in "Needle Guide Tab" on page 136.

2   Use the pointer to tap on the dropdown menu for **Move left/right**.

3   Select your preferred value and check **Display ruler on sagittal views**.

The vertical line disappears and the ruler markers appear in their new positions.

NOTE: *By checking **Display vertical line with sagittal ruler**, you can set up the system so that a vertical 0 line is always visible, along with the markers as shown in Fig 8-5.*

User-Definable Brachy Matrix and Ruler

You can also define your own brachy matrix and ruler. See "Needle Guide Tab" on page 136 in the Setup and Customizing chapter.

Chapter 9
Urology Prostate Exam Type

This exam type contains information useful for basic urology imaging, including prostate imaging.

Important:

- Please see Chapter 2, "Getting Started" for basic controls.
- Read transducer user guides for more information before doing biopsies.
- Read *Care and Cleaning* for sterilization instructions.
- Read *bkSpecto User Guide* before system use.

Contents

- Diagnostic Presets
- Setting up the Patient – Patient ID
- Imaging Controls
- Annotations – Labels and Bodymarks
- Measurements and Calculations
- User Reports
- Capturing and Documenting Images
- Customization Examples
- Links to Additional Information

Diagnostic Presets

Once you have selected your transducer, tap **Preset** and select the appropriate **Exam Type** and **Preset**. These will vary with each transducer.
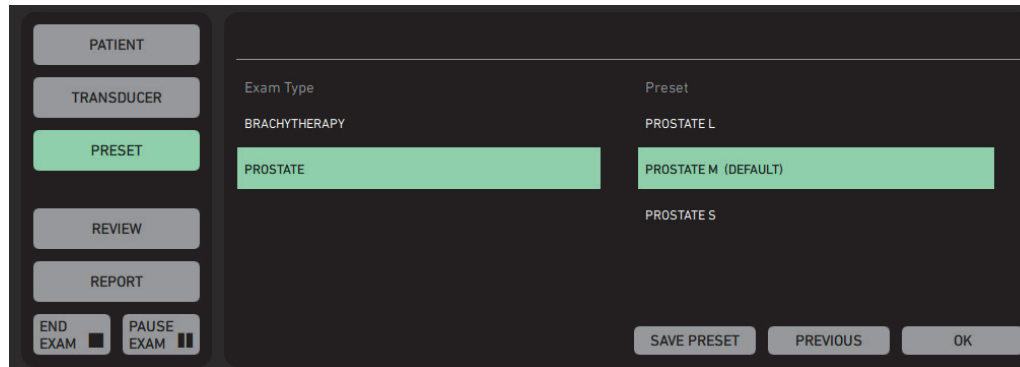
Figure 9-1. Preset window for E14CL4b.

- Prostate L= 6 Mhz,
- Prostate M = 9 Mhz,
- Prostate S = 12 Mhz.

Setting up the Patient – Patient ID

You must have a patient ID in order to save images.

1   Tap **Patient** on the touchscreen.

2   Enter data in the **Patient details** window.

3   Tap **Start Exam** (below the **Patient details** window).

NOTE: *It is recommended to enter the PSA (Prostate Specific Antigen) before you image.*

Imaging Controls

2D (B-mode)

Imaging starts in 2D.

To return to imaging with 2D alone after you have been using it in combination with other modes, double-tap **2D**.

Overall Gain:

- Adjust gain by sliding the gain bar on the touchscreen (when the image is not frozen).

Different gain at different image depths: adjusting the TGC curve:

- Tap **TGC** and move the **TGC** sliders on the touchscreen to the right or left to adjust the TGC curve (differential gain).

  The shape of the TGC curve is temporarily displayed to the right of the image as a curved vertical line.

Split Screen

Linked Dual is enabled as a default setting for all Exam Types. During split screen imaging, the Linked Dual function automatically transfers screen-A image parameters to screen-B (and vice versa). Color and power mode can be in only one screen.

To use split screen:

1 Tap **Dual**.

2 Image in screen-A.

3 Use the dual view button to transfer the parameters from screen-A.

4 To go back to full screen, tap **Dual** again.

To Change Transducer Planes

If you are using a transducer with more than one plane, you can change the imaging plane (**T** for transverse, **S** for sagittal, or **E** for endfire). The current imaging plane (**T**, **S,** or **E**) is displayed at the top of the monitor next to the transducer name.

To select the imaging plane:

• Press the appropriate button on the transducer. For details, see the user guide for the transducer.

or

• Tap **T**, **S,** or **E** on the touch screen.

NOTE: *When you change image orientation U/D, you may need to adjust the TGC settings for the B-mode image. See "TGC" on page 63.*

Biopsy

To display a puncture line on the image for biopsy guidance:

Tap **Biopsy** on the touchscreen.

Remember to check that you are using the correct needle guide. The number of the guide is displayed on the monitor. Make sure the number corresponds to the guide you are using. If it doesn't, tap **Needle Guide** for a drop down list of needle guides.

⚠️ Verify transducer type number	**WARNING P-w1** Before you start imaging, verify that the type number of the transducer or the description of the needle guide you are using match the number displayed on the monitor. Also make sure that the needle guide is positioned correctly. If the numbers do not match, or the needle guide position is not correct, the puncture line on the monitor may not correspond to the true puncture path in the tissue. In case of any inconsistency, stop imaging, turn off the system, and contact your BK service representative.

⚠️ Verify puncture guide type number	**WARNING P-w2** Verify that the type number of the needle guide displayed on the monitor corresponds to the needle guide that you are actually using. If the number is incorrect, the puncture line on the monitor may not correspond to the true puncture path in the tissue.

⚠️ Watch the needle tip	**WARNING P-w4** The puncture line on the image is an indication of the expected needle path. The needle tip echo should be monitored at all times so any deviation from the desired path can be corrected.

NOTE: *If the image depth is set very low (to see tissue close to the transducer with high magnification), the needle tip echo can be outside the displayed image area. To see the needle tip in this case, zoom out so the full needle path is visible or pan the image to the side (to keep the high magnification).*

⚠️ Offset changes	**WARNING P-w3** Changes you make to the offset of a programmable needle guide or brachy matrix will affect ALL programmable needle guides and brachy matrixes. This could lead to incorrect puncture lines or matrix positions for a different guide than the one you wanted to change.

Annotations – Labels, Bodymarks and Arrows

Labels, bodymarks and arrows are activated when you tap **Label**.

Labels
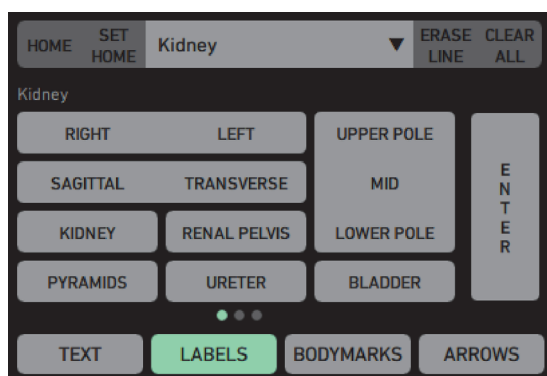
Figure 9-2. Label selector.

To select a label:

Tap the **Label** button.
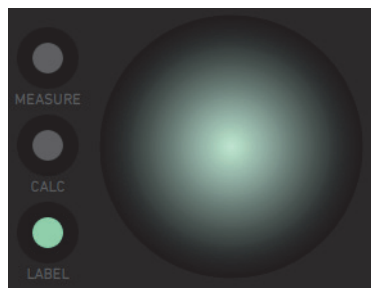
*Figure 9-3. The **Label** button next to the trackpad.*

1 From the drop-down menu, select the relevant application. The displayed labels will reflect the selected application.

2 Swipe the label selector to see all labels.

3 Select the label by tapping it.

4 Use the trackpad to move the label and then tap when it is in the correct position.

*You can select where labels show up on the screen per default. Tap **Set Home** when you have placed your label. The next label you tap will show up in the same place.*

Linked labels:

Opposed labels are linked. This means that if you have selected **Right** and afterwards tap **Left**, the label name will change to left. Linked labels are located on the same background, see *Fig 9-2*.

Type and edit your own labels on screen:

1 Tap **Keyboard** in the input region.

2 Type the text you want for the label.

You can move the label while you are typing it.

3 Tap to accept the label text and position.

To move a label that you have already positioned:

• Tap it and drag it to the new position. Tap again when the label is where you want it.

To remove a label:

1 Tap the label you want to remove. The label turns green.

2 Tap **Erase Line** in the input area.

To remove all labels from an image:

• Tap **Clear All** in the input area.

To edit a label on the image:

• Tap the label on the image and type the changes you want.
Note that you can only edit your own labels.

Bodymarks

Figure 9-4. Bodymark selector.

To place a bodymark on the image:

1   Tap the **Label** button.

2   Tap the **Bodymarks** button. From the drop-down menu, select the relevant application. The displayed bodymarks will reflect the selected application.

3   Select the bodymark you want. (If you don't see the one you want, swipe the input region to see more bodymarks.) The bodymark appears on the monitor with a highlightedimaging plane indicator.

4   Drag the imaging plane indicator to position it; and use the directional buttons to rotate it.

To move a bodymark:

1   Tap the **Move** button. A green frame appears around the bodymark.

2   Drag it to the position you want, and tap again.

To replace a bodymark:

To replace an existing bodymark with a different one, tap the new bodymark.

To remove a bodymark from the monitor:

•   Tap the **Delete** button.

Unless you delete it or replace it with a new one, a bodymark will remain on the monitor until you change Preset or begin to image a new patient.

Adjusting the Imaging Plane Indicator

To adjust the imaging plane indicator:

When you place a bodymark on the image, the imaging plane indicator is green and can be adjusted as follows:

1   Drag the imaging plan indicator with the trackpad.

2   Rotate left or right by pressing ⟲ or ⟳ buttons.

3   Tap again when the imaging plane indicator is the way you want it.

The imaging plane indicator turns orange and can no longer be adjusted.

If you decide to further adjust the indicator, tap the **Transducer** button in the input region. The indicator turns green again.

Arrows

Figure 9-5. Arrow selector

You can place arrows on the image to mark areas of special concern.

To place an arrow on the image:

1 Tap the **Label** button.

2 Tap the **Arrows** button and select the arrow you want. The arrow appears highlighted on the monitor.

3 Drag the arrow to the position you want, and tap again.

4 You can add another arrow by selecting it.

To delete an arrow, tap **Delete**. To delete all arrows from the image, tap **Clear all**.

Measurements and Calculations

Measurements are generic measurements that you can do on any region of interest. Calculations are predefined measurements intended for measuring organs or ROIs within a particular preset.

Calculation of Prostate Volume

To measure prostate volume (width, height and length):

1   Tap **Calc**.

2   Tap **Prostate V W*H*L**.

    The width (W) caliper appears automatically.

3   Position the first caliper and tap.

4   Position the second caliper and tap.

    The height (H) caliper appears automatically.

5   Repeat measurement.

    Length (L), the last set of measurements, appears automatically.

6   Repeat measurement.

7   When you have finished measuring, the volume calculation appears automatically.
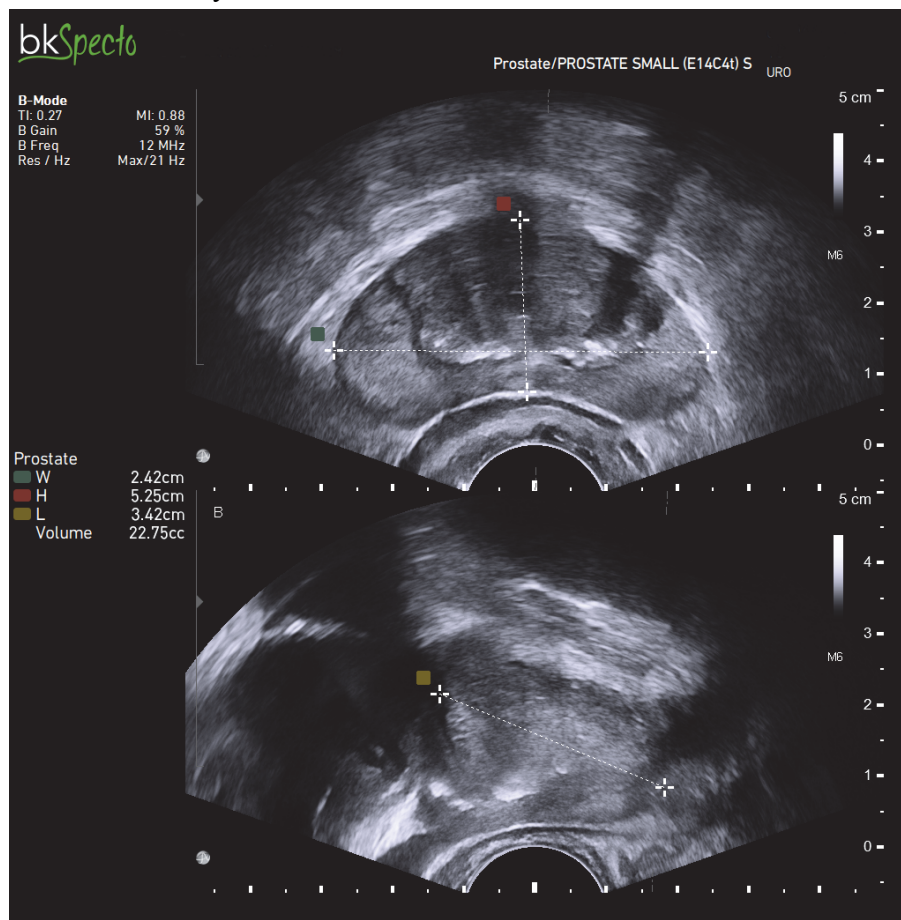
Figure 9-6. Prostate volume in split screen view.

PSAD measurements:

The PSAD (Prostate Specific Antigen Density) will be calculated after the PSA has been entered and prostate volume has been measured.

To erase measurements:

- Tap the **Clear** button next to the trackpad.

User Reports

Making and printing a report:

When you have finished making measurements and selecting assessments, add any images you want in the report:

1   Tap **Images** in the **Report** window.
2   Tap and hold the images in the Input Region until they shrink and drag them into the image frames in the **Report** window.
3   Comments put in **Patient** and **Comments** appear in the report.
4   Tap **Print** to print the report on the report printer (see "Printers Tab" on page 144) before saving it.
5   Tap **Store Report Image** to save the report.

Capturing and Documenting Images

Cine Review

To use cine review:
1   Freeze image.
2   Use the cine bar to scroll back through imaging.

Capturing Images

Capturing Frozen Images

Saving (capturing) images to system hard disk:
1   Freeze the image.
2   Tap **Store**.
     Thumbnail of saved image appears in the document browser at the bottom of the monitor.

Capturing Clips (Unfrozen Images)

To capture clips:
1   Tap **Clip** to start recording.
     The **Clip** button is highlighted during recording.
2   Tap **Clip** again to stop recording.

Thumbnail of image appears at the bottom of the monitor. (Thumbnails of clips show film reel markings top and bottom.)

Copying and Archiving

Copying or Archiving Images and Clips

To copy or archive images and clips:

1   In the **Review** window, select thumbnail images. Use the buttons **Select Multiple** and **Select All** if required.

2   Tap **Export** and select where to export the images.

Printing Images

Printing Images Displayed on the Monitor

To print an image displayed on the monitor:

•   Tap the **Print** button (bottom left) on the touchscreen.

Printing from Thumbnail Images

You must open the images in order to print them.

To open a thumbnail image and then print it:

1   Tap **Review**.

2   Select the image you want to print.

3   Tap the **Print** button (bottom left) on the touchscreen.

To set a different printer as default for the Print button:

See Settings for Store/Network "Printers Tab" on page 144.

Customization Example

Saving a New Preset

When you have changed the setup, you can save it as a new preset.

To save a preset:

1   Tap the **Preset** button in the Exam Management area.

2   Tap **Save Preset**.
    The **Save Preset** window appears.
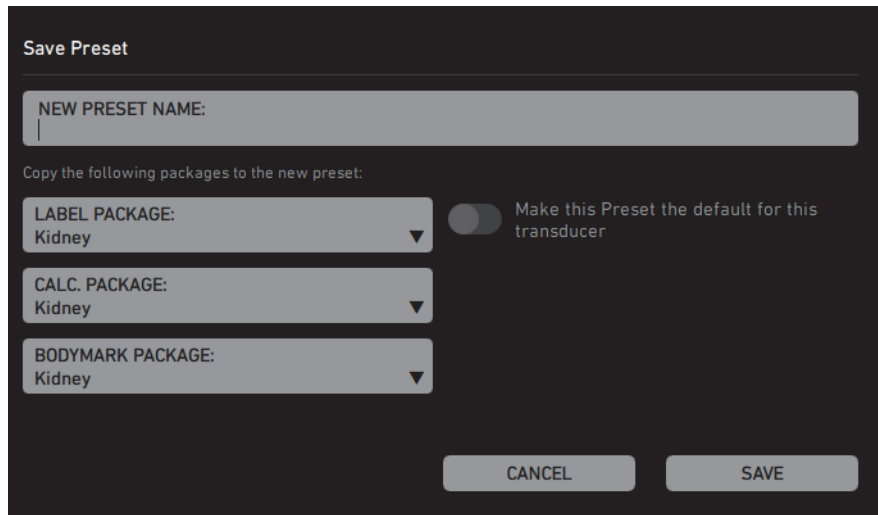
Figure 9-7. The Save Preset window.

3 Enter a name for the preset and select the options you want from the drop-down menus.

4 Tap **Save**.

Default Exam Types and Presets

You can change the default Exam Type and preset for a transducer. When creating a new preset as in "Saving a New Preset" above, tap the toggle button **Make this Preset the default for this transducer**.

Where to Find More Information

For more information about different topics, you may want to refer to the following chapters:

- Layout of controls on the monitor and how to use them (Chapter 2, "Getting Started").
- Names of screen controls and what they do (Chapter 3, "Controls on the Touchscreen")
- Working with images (Chapter 4, "Working with the Image").
- Making measurements (Chapter 5, "Making Measurements").
- Documenting the image and results (Chapter 6, "Documentation").
- Using different imaging modes (Chapter 7, "Imaging Modes").
- List of all measurement abbreviations with full name (Appendix B, "Measurement and Calculation Abbreviations").
- Setting up and Customizing the System (including creating custom keys on the keyboard) (Appendix C, "Setting Up and Customizing Your System").

The tables and formulas that the system uses for calculations are in the *Technical Data (BZ2100)*.

Chapter 10
3D Imaging

Introduction to 3D Ultrasound

The basic concept of 3D[1] ultrasound is to collect a data set of 2D ultrasound images (black & white or color) while tracking and storing the location of each individual 2D image. The data set is then reconstructed into a single 3D volume that can be displayed on the monitor and manipulated. The reconstructed 3D volume can be rotated, sliced, rendered, or displayed in multiplane cross-sections.

Imaging Modes

On bkSpecto, you can use 3D with 2D, Color mode, or Power mode imaging. However, you cannot use 3D with the following modes and functions:

• Doppler mode (spectral PW Doppler)

• 2D Tint

NOTE: *Turning on one of these modes or functions while you are using 3D will turn off 3D. If you are already using one of these modes, turning on 3D will turn the mode or function off, and turning off 3D will not turn it on again.*

NOTE: *Acquiring a 3D volume with some color maps may result in faulty colors for some pixels. To avoid this, the system selects a default pure grayscale instead.*

Making measurements on a 3D cube is not the same as making measurements on a 2D image, as described in Chapter 5, "Making Measurements".

3D License

The 3D function of the bkSpecto can be purchased as an option. For more information, see the *bkSpecto Product Data Sheet* that accompanies this user guide.

To run the 3D software, you must have a license from BK Medical. For information about activating the 3D option, see "License Tab" on page 150.

Controlling Transducer Movement

The 2D images in the data set are imaged with the transducer in different positions. The transducer can be moved in the following way:

• With a system-controlled positioning device (external or built into the transducer)

• Untracked freehand (see warning below).

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1. 3D imaging on bkSpecto is not licensed by Health Canada.

System-Controlled Positioning

If the transducer is moved with a system-controlled positioning device, you can make measurements on the reconstructed 3D volume. You can use the magnetic wheel mover for the E11C3b, E14C4t and E14CL4b transducers.

The Magnetic Wheel Mover

The magnetic wheel mover (UA 0513) is designed for use with the E11C3b, E14C4t and E14CL4b transducers. The mover is a system-controlled positioner that pulls the transducer back to produce a set of parallel images. The magnetic wheel mover must be used with the connector adapter (UA 2356), which connects to a transducer socket.

For information about setting it up, using it and caring for it, including important safety warnings, see the magnetic wheel mover user guide (BB1894).

Untracked Freehand Acquisition

Untracked linear and fan acquisitions (freely moving the transducer while you acquire a 3D data set) are allowed with any transducer. However, certain combinations of motion and transducer will not produce a sensible 3D volume.

Imaging Direction

You must select the imaging direction that you plan to move the transducer in **3D Direction**. The **3D View** you choose gives the system information about how to reconstruct the 3D volume. If there is a mismatch, the resulting volume can be mirrored.

After you acquire the image, you must check the reconstructed volume to make sure that it is a correct representation of the data.

Measurements Not Accurate

⚠	**WARNING 3D-w2** You cannot make accurate measurements on a 3D data set acquired using the untracked freehand method.

If you start to make a measurement on a 3D data set acquired using the untracked freehand method, a warning appears in red on the monitor to remind you that the measurement will not be accurate.

3D Imaging Overview

The 3D imaging process has the following steps:

- Preparations – see page 103
- Adjust settings – see page 103
- Acquisition – see page 104
- Viewing – see page 105
- Working with the 3D image – see page 106

Preparations

Before you start the 3D image acquisition:

1   Check all the connections. Connect the mover, if needed.

2   Choose the preset you want.

3   Optimize the 2D image.

NOTE: *You cannot turn on 3D if the image is frozen.*

NOTE: *You cannot acquire 3D data sets unless you have entered a patient ID. If you have not entered a valid patient ID, you will be prompted to do so. The default patient ID is the current time and date.*

Adjusting the Image Capture Settings

ROI (3D Region of Interest)
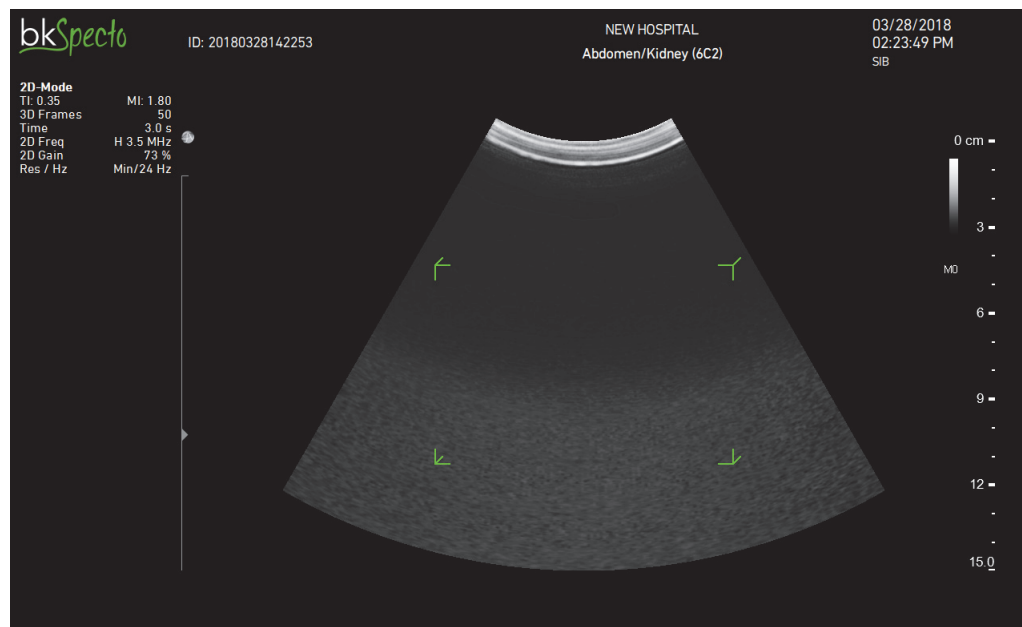
Figure 10-1. The 3D Region of Interest.

When you tap **3D**, 3D ROI markers (see Fig 10-1) appear in the image area to indicate the area that will be captured in the 3D data set.

NOTE: *You cannot tap* **Zoom** *to activate the 3D ROI box. The* **Zoom** *button continues to work in the normal way for the 2D image.*

To move the 3D ROI box to a different part of the image, drag it with the trackpad.

To resize the box (increase or decrease the area covered by the 3D acquisition), tap the trackpad. Now only one corner is green. Drag this corner to adjust the size of the box.

3D Capture Settings

You can set various 3D capture settings using the **3D** buttons:

- **3D Spacing** sets the spacing between frames in mm.
- **3D Distance** sets the distance the transducer will travel to acquire the 3D volume.
- **3D Direction** sets the direction to **L-R** (left to right) or **R-L** (right to left).
- **3D Sweep Mode** sets the freehand sweep mode to **Untracked Linear** or **Untracked Fan**.
- **Time** sets the duration of the recording.

Imaging Direction

Untracked freehand

Before you acquire an untracked freehand data set, it is essential to select the appropriate imaging direction so that the 3D volume will be reconstructed correctly. Be especially careful if you have changed the orientation (right/left or left/right) of the 2D image (changed its orientation). In this case, the system will not make any automatic adjustments of orientation before 3D acquisition. The effect of a flipped 2D image on the resulting 3D volume can be confusing, so we recommend that you do *not* change the default orientation of the 2D image before acquiring a 3D data set.

You must select the imaging direction to match the direction that the transducer will move during acquisition.

NOTE: *If the patient is not lying on his or her back, be very careful when you choose the imaging direction because the directions are defined relative to a patient lying face-up.*

Acquisition

To start a 3D acquisition:

- Tap **3D Aquire**.

A progress circle appears during acquisition, and a pop-up on the touchscreen allows you to stop the progressing acquisition.

3D review buttons appear when you have acquired the 3D volume.

After you have acquired a 3D data set, it is displayed as a volume on the monitor. You can select various ways of viewing the volume, and you can use various tools and settings to enhance the image.

Viewing a 3D Data Set

When viewing a 3D data set, there are different buttons for enhancing the 3D view. These are described in detail later in this chapter.

Enhancing a 3D View

When a 3D view is displayed, you can use different buttons to enhance the appearance of the 3D volume and make it easier to see the structures you are interested in:

- **3D Brightness**
- **3D Contrast**
- **3D Zoom**
- **3D Opacity**
- **3D Luminance**
- **3D Hue**
- **3D Photorealistic**

Presets

After you have set **Brightness**, **Contrast,** and **Zoom**, and any other **3D** settings, you can save your settings as a **Preset**. Do as follows:

1 Tap **Preset**.
2 Select **Save Preset.**
3 Type in a name for your preset.
4 Keep or change the Label, Calc and Bodymark packages.
5 Decide if the preset should be the default for this transducer.
6 Tap **Save.**

3D Layout Options

When you view the acquired volume, you can change the layout of the monitor using the following buttons:

- **Orientation** – Turns the orientation marker on and off. The orientation marker is positioned on the first frame in the volume.
- **Wireframe** – Shows or hides the wire frame on the volume.
- **Measure Dist.** (only in Cube view) – Shows or hides the measurement lines or boundaries on the volume, the **Measurement** menu (on the right side of the monitor), and **Measurement** results (on the left side of the monitor).

Working with the 3D Image

Manipulating the Volume

You can use the trackpad to manipulate the volume in various ways. The form of the cursor is different, depending on what you are doing.

Rotating

To rotate a volume in any direction:

1   Point outside the volume.

The cursor looks like this:

2   Tap and use the trackpad to drag the cursor and rotate the volume.

3   Tap to end rotating.

You can also rotate the intersecting planes view in the 4-Up and 6-Up views.

Moving a Plane In and Out of the Volume

You can move a selected plane in and out of the volume to "slice" the volume so that a plane inside the original volume is displayed as a face of the transformed volume. This new face is called a "cut plane". The cut plane can be parallel to a one of the original faces of the volume or at an angle (tilted) relative to the axes of the volume.

To slice the volume:

1   Move the cursor onto one of the volume faces.

The cursor looks like this:

2   Tap and use the trackpad to drag the cursor to move the plane through the volume until the cut face you want is visible.

3   To restore parts of the volume that you have sliced away, drag the cut plane back through the volume.

4   Tap to end slicing.

Tilting a Plane

You can tilt a plane to see views that are not parallel to one of the original faces of the volume. (This often creates additional planes.)

To tilt a plane:

1   Tap the edge of a plane to select it.

The cursor looks like this   , and the wire frame around the plane becomes red.

2   Use the trackpad to drag the cursor to tilt the cut plane.

You can then move the tilted cut plane in and out (slice) as described before.

3   Tap to end tilting.

Animating the Volume

To make the volume rotate automatically:

- Tap **3D Animate**.

  The volume rotates.

To stop the rotation, tap **3D Animate** again.

You can select how to rotate the volume using the following buttons:

- **Animation Speed**
- **Animation Span** – the extent of the rotation
- **Rotation** – horizontal or vertical.

Annotating a 3D View

As with 2D images, you can annotate a 3D view with a label or arrow. You cannot use a bodymark.

You can add as many labels or arrows to a 3D view as you want. When you have finished, you can save the annotated image as a view that you name. You can save the image both as a 2D snapshot and as a 3D cube.

To add a label to a 3D view:

1   Tap **3D Label**.

     A writing cursor appears, and the keyboard is displayed on the touchscreen.

2   Move the cursor to where you want the label.

3   Type the label.

4   Tap. (You can drag the label to reposition it before you tap; however, after you tap, you cannot edit the label, only delete it.)

     You can add additional labels.

5   When you have added all the labels you want, tap **3D Label** again.

6   Tap **Store Volume**.

To add an arrow to a 3D view:

1   Tap **Arrow**.

     The cursor appears on the 3D volume with an arrow.

2   Drag the arrow to change its direction and place it where you want it. Tap.

     An arrow is placed on the image.

3   A new arrow appears at the cursor. Repeat the process above.

4   When you have added all the arrows you want, tap **Arrow** again.

5   A window appears for you to name the view with the annotation. You can update the current view to include the annotation, or you can give it a new name.

NOTE: *After you have positioned an annotation on the image and tapped, you cannot edit the annotation or move it. You can only delete it. To delete an annotation, tap* **Undo Label***. The most recent annotation is deleted. You can tap* **Undo Label** *several times to remove more than one annotation. You can also click* **Clear Labels** *to remove them all.*

The 6 3D Views

There are 6 different ways you can view the 3D data set:

- **Cube**
- **Render**
- **4-up**
- **MIP**
- **6-up**
- **Transp.**

Cube View

This is a texture-mapped representation of the volume. It is the default view.

Making Measurements in a Cube View

In a Cube view, you can measure the hight, length, width and volume of a pathology, if you have used a system-controlled positioning device to acquire the data set. (You cannot make accurate measurements on data sets acquired using untracked freehand. See the warning on page 102.)

NOTE: *Making measurements on a 3D cube is not the same as making measurements on a 2D image, as described in Chapter 5, "Making Measurements". After you have tapped to position a point to make a 3D measurement, you cannot move the point. You can only complete the measurement (if it requires more points) and then delete the measurement and make a new one.*

To make a 3D distance measurement:

1 Tap **Measure Dist.**

2 Tap to position the points of the measurement.

The measurement is displayed underneath the 3D volume.

Measuring Volumes

To make an HWL measurement

1 Tap **HWL**.

2 Make a measurement of the height of the pathology.

The measurement is displayed underneath the 3D volume with the number of the measurement and **H** (e.g. 1-H).

3 Tap **HWL** again and measure the width of the pathology. The measurement is displayed underneath the 3D volume with the number of the measurement and **W** (e.g. 1-W)

4 Tap **HWL** again and measure the length of the pathology. The measurement is displayed underneath the 3D volume with the number of the measurement and **L**, along with the volume of the pathology displayed with **HWL**.

To make a Planimetry measurement

You can also measure a volume by drawing polygons around the area of interest on slices taken throughout the Cube.

1 Tap **Volume**.

2 Draw a polygon around the area of interest by tapping points on the perimeter. When you have come to the last point, double-tap to set the area.

3 Tap **Next** to move through the volume by the chosen step size or **Prev** to go to the previous step.

4 Outline the area of interest in the new slice.

5 Repeat steps 2, 3, and 4 for each slice until the area of interest is no longer visible (the volume measurement is completed).

The system updates the accumulated volume (in cm^3) as each polygon is completed.

6 Tap **Volume** again to finish the volume measurement.

Deleting Measurements

To delete a measurement:

• Tap **Undo Measurement**. The most recent measurement is deleted.

You can undo several times to remove more than one measurement. You can also **Redo Measurement** if you have used the **Undo Measurement** button.

To delete all measurements:

• Tap **Clear Measurements**.

NOTE: *For information about accuracy of measurements on acquired and reconstructed planes, see the bkSpecto User Guide.*

⚠ **WARNING 3D-w1**

Measurements obtained with the 3D system and used in diagnosis must be carefully and thoughtfully performed to ensure accurate quantitative assessment. Before you perform a calculation, make sure that all necessary calibrations and measurements are made.

If you suspect that the 3D system's calibration is inaccurate (that is, the measurements are not as expected), contact your BK service representative to check and confirm the system's proper operation.

Render View

Rendering dramatically improves 3D visualization. It is useful for looking in detail at soft tissues such as fistulas and abscess cavities. In this view, for gray scale volumes only, you can use sculpting tools to remove obstructing portions of the volume so you can better see the areas of interest.

Render Settings

You can change the way a Render view looks by using the buttons available:

- **3D Photorealistic** – Adjusts the photorealistic parameter used in the rendering. This can only be used on gray scale volumes.
- **3D Opacity** – Specifies the transparency (opacity) of a structure.
- **3D Thickness** – Determines how far you can look into the volume.
- **3D Filter** – Sets a threshold so that pixels that are not as bright as the threshold are not displayed.

Sculpting Tool

The Sculpting tool let you remove unwanted data from a Render view. The Sculpting tool can only be used on gray scale volumes – when there is no color in the volume.

There are two sculpting tools:

- The cutting tool (which you can use to cut away the outside of the volume or to cut a hole inside the volume)
- The shaving tool

To use the sculpting tool:

1   Tap **3D Sculpture**.
2   Tap **Sculpture Method** to select **Inside**, **Outside** or **Shave**.
3   If you select **Inside**, you can adjust how deep you want to cut. Tap **Sculpture Depth** and move the slider to adjust the percentage that is removed when you move the cutting tool.
4   Use the different tools as described below.
5   To turn off the sculpting tools, tap **3D Sculpture**.

To use the cutting tool (inside):

1   Tap on one plane of the volume.
2   Drag the ✎ to draw a closed curve on the volume plane.
3   Tap again when you are done.
    If you have selected 100% **Depth**, a hole appears extending through the volume.

To use the cutting tool (outside):

1   Tap on one plane of the volume.
2   Drag the ✎ to draw a closed curve on the volume plane.
3   Tap again when you are done.
    The area outside the curve disappears.

To use the shaving tool:

1   Tap on one plane of the volume.
2   Move the ▢ cursor over the area to be shaved.
    The more you move the cursor over the surface, the more surface is removed.
3   Tap again when you are done.

Displaying Sculpture Results

Tap **Sculpture Display** to toggle between a view showing the result of sculpting and the unsculpted view.

MIP View

Maximum Intensity Projection (MIP) emphasizes the pixels with the highest intensity in the volume. If the highest intensities are mapped to the highest blood flow velocities, this mode accentuates and reveals the peak velocity regions of a volume. It is useful for:

- Looking at maximum flow jets
- Visualizing skeletal structures beneath tissue
- Looking at vascularization

Transparency View

Transparency rendering (which is only possible when you have acquired the 3D volume using Color or Power mode) lets you adjust the relative transparencies of the color and the gray scale parts of the volume. This can allow hidden features to become visible.

Render Settings

You can change the way a Transparency view looks by adjusting the render settings using the 3D buttons. See "Render Settings" on page 110.

4-Up View

This view has three orthogonal plane views and a view showing the positions of these intersecting planes within the volume. The planes can be moved by adjusting them in the intersecting view.
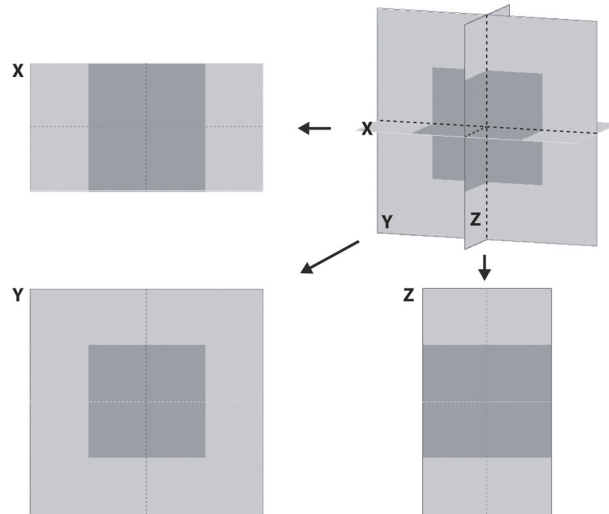
Figure 10-2. The 3D 4-Up View window.

Move the **XYZ** planes in the intersecting view to see the different planes, **X**, **Y** and **Z**, respectively.

6-Up View

In addition to the views in the 4-Up view, this view contains a Cube view and a sixth view, which is the view most recently displayed (MIP, Render, Transparency, or Cube).

Chapter 11
DICOM

DICOM on the System

DICOM is not installed as a default on the system. When it is installed, it is set up specially to match your DICOM system and procedures.

NOTE: *Changing the DICOM setup can cause your system to not work properly. For example, you may be unable to print to a DICOM printer. All changes to the DICOM setup should be made by qualified service personnel only. Do not try to change the DICOM setup yourself.*

New Patient Information from a DICOM Worklist

The system may be set up so that you can retrieve a worklist of patients and then select a patient from the worklist.

Depending on how your DICOM system is set up, the worklist may appear as soon as you open the **Patient** window. If the worklist is blank, you can retrieve the information.

To retrieve a worklist:

1   Use the drop-down window in the upper right corner to select the dates you want the list to include.

2   Tap **Update**.

    The worklist appears in the window. If there are more patients than can fit in the window, you can scroll down to see the rest of the list.

To select a patient from the worklist:

1   Double-tap the row that contains the patient.

    Now that patient is shown in the fields next to the worklist.

2   If required, enter additional information in the fields in the window.

NOTE: *You cannot delete a document from the system that is in a queue to be sent to a DICOM device.*

Saving or Printing to a DICOM Network

Filenames of Documents Exported in DICOM Format

The filename of an exported document specifies the date and time the image was captured.

For example, 2D_20181022_135426_FV12345.dcm would be the label on an 2D image of patient FV12345 that was captured on October 22, 2018 at 1:54:26 P.M. (13:54:26).

Exporting to a PACS

If you have DICOM installed on your system, you can export images and clips to a PACS.

To archive all documents for a patient or examination or individual documents:

1 Tap to select the patient, the examination, or the individual documents you want to export.
2 Tap **Export**, and select the **PACS system you want to archive to**.

Reports

It is possible to export DICOM Structured Reports.

Queue

When you export to a (PACS), the information is copied and put into a queue to be transferred to the PACS. When the PACS is available, the information is transmitted.

NOTE: *If you have an accidental power failure while information is being transferred to the PACS, transfer may fail. Documents and information may not be stored in the PACS even though they appear to have been transferred successfully from the system.*

DICOM Status

A DICOM status indicator appears by the display values to the right of the image. It has a colored light next to it.

Status Indicator Color	Meaning
Green	No unsent documents. The LED disappears after 5 seconds.
Yellow	A document is being sent or waiting to be sent.
Red	A document was not sent successfully.

Table 11-1. DICOM status indicators.

If you tap the DICOM status indicator, the **DICOM Status** window appears.
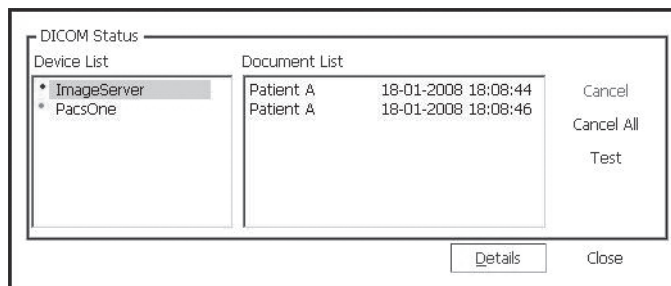
Figure 11-1. The DICOM status window.

The colors of the status indicator next to a device in the **Device List** are the same as described in Table 11-1. If a device has a red or yellow indicator, you can tap the device name to see a list of unsent documents displayed in the **Document List**.

You have the following options:

- **Cancel** – cancels the selected document.
- **Clear All** – clear all pending documents or jobs for the selected device.
- **Test** – tests the connection to the selected device (PING + C-ECHO).
- **Details** – see log of DICOM transactions - this is useful for a service technician.
- **Close** – closes the window and does nothing else.

To update the transaction log, tap **Update**.

NOTE: *You can also open the **DICOM Status** window from the **DICOM Setup** window. See "DICOM/PACS Tab" on page 145.*

Deleting a Document

NOTE: *You cannot delete a document from the system that is in a queue to be sent to a DICOM device.*

Appendix A
Glossary

This glossary contains explanations of terms and abbreviations that appear in the user guide or on the monitor. Measurements are listed in Appendix B, "Measurement and Calculation Abbreviations".

Term	Explanation
2D Filter	With 2D Filter, an automatic speckle suppression algorithm continuously analyzes the ultrasound image for irregularities and adjusts the smoothness to be applied. This reduces speckle and optimizes the ultrasound image. 2D Filter supports all array transducers (mechanical transducers are not supported).
A/B	Stuart index. PS/ED.
AIUM	American Institute of Ultrasound in Medicine.
ALARA	As Low As Reasonably Achievable. Refers to the principle of keeping ultrasound exposure as low as possible.
aliasing	Detection of a false flow in the opposite direction from the real flow. This can occur when the PRF used for the Doppler signal detection is not high enough compared to the flow speed. The problem only exists with pulsed wave Doppler detection.
Angular Compound Imaging	See ACI.
array transducer	A transducer that consists of a set of transducer elements, each capable of transmitting and receiving ultrasound.
Auto (Cardiac measurement)	PS, ED, RI, PS/ED
B/A	ED/PS
baseline	The baseline separates forward flow from reversed flow in Doppler imaging. Moving the axis can help overcome aliasing problems.
bodymark	A small drawing positioned on the image to help identify it in documentation.
catalog	A list of available items, as in a bodymark catalog or label catalog.
CFM	Color flow mapping. See Color mode.
cine	A function that lets you review a series of previously acquired images.
color box	When Color mode or Power mode imaging is turned on, the color box is superimposed on the 2D image. The color box outlines the area of the tissue in which flow information is available.
color Doppler	See Color mode.

Term	Explanation
Color mode (CFM)	Color-Flow Mapping (CFM). Real-time signal that represents the speed of flowing material in each sample volume within the Color mode image area. The Color mode signal is in principle independent of the amount of flowing material. The Color mode is normally superimposed on a 2D image that shows the anatomical surroundings. Flow directions towards and away from the transducer are represented as different colors in Color mode (e.g. towards = red, away = blue). The Color mode signal (flow speed) is represented by different values in the color mapping (relative measure) for each sample volume in Color mode. No color means either: • No flow in the sample volume (very low flow speed) or • Amount of reflection from flowing material (which might have a high flow speed) is below threshold set by the Color mode gain. The Color mode signal (flow speed) is dependent on the angle of the ultrasound beam relative to the flow direction.
color priority	When color information is superimposed on a 2D image, color can appear outside vessels, making it appear that the flow is not restricted to the vessel. To minimize this effect, you can adjust the color priority. Make the color priority lower to have less color outside the vessels. **NOTE:** High color priority gives color in more areas; low color priority reduces the number of areas that are colored.
combination mode	Simultaneous imaging in more than one mode, for example, 2D+Color or 2D+Color+Doppler.
Compounding	Compounding is a result of combining images made at up to 5 different angles into one compound image. This reduces speckle and optimizes the ultrasound image. **NOTE:** In certain cases compounding can remove or suppress some image artifacts such as shadowing (from e.g. kidney stones or cyst edges), which may be used to identify certain characteristics of the imaged anatomy.
DecT	Flow Deceleration Time.

Term	Explanation
depth	With a full 2D image, you adjust the depth to cut out parts below the part you are interested in. The image always includes the transducer surface, so changing depth changes the magnification of the image, stretching, or compressing it. **NOTE**: To adjust the depth of the image without changing the magnification, use Panning. When the image is panned, the top of the image does not necessarily still correspond to the transducer surface. Adjusting the depth of a zoomed image changes the magnification even though the transducer surface is not necessarily visible at the top of the image.
Doppler mode	(Spectral) Doppler mode. This mode displays information about the spectrum of flow velocities as a function of time. It is sometimes called FFT (Fast Fourier Transform) because the information is presented as a frequency spectrum indicating velocity components.
duplex	Simultaneous imaging in 2 modes. See combination mode.
dynamic range	The number of steps (gray scale change) between black and white.
EDC	Expected date of confinement.
EMC	Electromagnetic compatibility.
ESD	Electrostatic discharge.
Exam Type	An application package containing presets, measuring tools and calculation formulas.
F1, F2	Frequency at position of marker 1 or 2 (when you make a measurement).
FOI	Field of interest. The area within the 2D image where resolution and focus are maximal.
freeze	Stop updating the image so an unchanging image is displayed.
gain	The overall amplification that is applied to ultrasound echoes from all depths.
HIPAA	Health Insurance Portability and Accountability Act of 1996. American law that sets rules for how patient accounts, billing and medical records must be handled.
IEC	International Electrotechnical Commission.
image review	See cine.
label	Text positioned on the image to label it. See page 35.
LC	Length of cycle.

Term	Explanation
line density	Line density is a measure of how closely spaced the image lines are in the ultrasound image. Increasing the line density decreases the frame rate so that you get finer resolution but a slower refresh rate (frame rate).
MIP	Maximum Intensity Projection (3D imaging). See page 111.
NEMA	Association of Electrical and Medical Imaging Equipment Manufacturers (National Electrical Manufacturer's Association)
PACS	Picture Archiving and Communications System (DICOM).
PE	Previous examination.
persistence	Persistence is the amount of time over which 2D image frames are averaged on the monitor. High persistence increases the contrast in the image, but tissue movement will blur a high-persistence image.
PG	Pressure Gradient
phased array	A technique to control the image area by using time delays on an array transducer.
PI	Pulsatility index.
planimetry	Measuring the surface area and perimeter of an object by tracing its boundaries.
POI	Point of interest.
Power Doppler	See Power mode.
Power mode	Power mode (power Doppler) ultrasound displays information about the number of particles moving, rather than their velocity. The signal strength (related to the square of the velocity) increases as the number of flowing particles increases. Thus the amplitude of the signal indicates the amount of blood present and flowing within a sample volume.
power supply cord	The cord that connects the system to the wall outlet or power supply.
PRF	Pulse repetition frequency.
PSA	Prostate-specific antigen.
PSAD	PSA density: PSA divided by prostate volume.
pulse repetition frequency	The rate at which pulses of ultrasound waves are transmitted and received in PW (pulsed-wave) Doppler imaging.

Term	Explanation
PW Doppler	Pulsed wave Doppler. PW Doppler is the primary Doppler mode. In PW Doppler, short bursts (pulses) of ultrasound waves are transmitted at regular intervals and analyzed as they return. The received signals are detected and sent to amplifiers for audio output as well as displayed on the monitor for a visual presentation of the frequency components (spectrum).
Range (of velocities)	You can vary the PRF (pulse repetition frequency) to select the range of Doppler velocities (frequencies) that are color-coded and displayed. Restricting the range allows you to see velocity differences (within the range) in more detail.
Shots per estimate	One way to improve the accuracy of the color-coded velocity information is to increase the number of pulses transmitted in each waveform packet (shots per estimate) at the expense of decreasing the frame rate.
screen key	A control on the monitor that looks like a key or button.
spectral Doppler	See Doppler mode.
SS	Start systole.
steering	You can steer the Doppler beam of a linear transducer to vary the beam angle. This can be useful for examining flow in blood vessels parallel to the transducer surface.
ON/standby button	The switch on the back of the system used for turning the system on and off each day.
TAM	Time Average Mean.
TAMX	Time Average Max.
T-area	Transverse Area.
TEH	True echo harmonics. BK Medical's trademarked term for its pulse inversion tissue harmonic imaging system.
TGC	Time gain control. The TGC curve determines variable amplification applied to echoes from different depths in the tissue. The TGC function compensates for attenuation and scattering of the ultrasound beam in the tissue.
TI	Thermal index. The estimated rise in tissue temperature (in °C) caused by the power emitted by the transducer.
TIB	Thermal index in bone at focal point.
TIC	Thermal index, cranial – bone at surface.
TIS	Thermal index in soft tissue.
triplex	Simultaneous imaging in 3 modes. See combination mode.
voxel	A three-dimensional pixel. A **vo**lume pi**xel**.

Term	Explanation
wall filter	A wall filter is used to eliminate low-frequency artifacts (such as Doppler shifts arising from respiratory and cardiac motion or movement of blood vessel walls) in Color, Power and Doppler modes. The wall filter cuts off all frequencies below its cutoff frequency. You can adjust the cut-off frequency.
width	For some transducers, you can increase the width of the image area beyond normal full width. With linear transducer arrays, this is sometimes referred to as Trapezoidal View. You can also narrow the image width to increase frame rate.

Appendix B
Measurement and Calculation Abbreviations

Measurement/Calculation	Explanation
%Reduction	General % reduction tool (using distance tool)
%Reduction	General % reduction tool (using 2 ellipses) to measure stenosis.
2-Caliper Doppler	General 2 Caliper Velocity Tool
2D Trace	General Freehand Tool
A:B Ratio	General A:B Ratio Velocity Tool
Angle	General 1 Angle tool
Ao Dist	Aorta Distal
Ao Mid	Aorta Mid
Ao Prox	Aorta Proximal
Auto	Auto Doppler Calculations (PS, ED, RI, PS/ED)
Bladder	Bladder Outline
Curved Distance	General Open Freehand Tool
Dist LRA	Left Kidney Distance LRA
Dist RRA	Right Kidney Distance RRA
Distance	General Distance Tool
Dorsal Vn Dia	Dorsal Vein Diameter Flaccid/Post Injection
D Trace Freehand	Doppler Freehand Trace Tool
E/B Ratio	E/B Ratio
Ellipse	Ellipse (various organs)
Hip Tool	General 2 Angle Tool
HR	Heart Rate (Doppler/M-mode)
Lt CAV Auto	Left Cavernosal Artery Flaccid/Post Injection Auto
Lt CAV Manual	Left Cavernosal Artery Flaccid/Post Injection Manual
Lt Epid H	Left Epid Height
Lt Epid L	Left Epid Length
Lt Epid V	Left Epid Volume
Lt Epid W	Left Epid Width

Measurement/Calculation	Explanation
Lt Kidney H	Left Kidney Height
Lt Kidney L	Left Kidney Length
Lt Kidney V	Left Kidney Volume
Lt Kidney W	Left Kidney Width
Lt Skin Thickness	Left Testicle Skin Thickness
Lt Testicle H	Left Testicle Height
Lt Testicle L	Left Testicle Length
Lt Testicle V	Left Testicle Volume
Lt Testicle W	Left Testicle Width
M Distance	General M Distance Tool
Mid LRA	Left Kidney Mid LRA
Mid RRA	Right Kidney Mid RRA
Planimetry Freehand	Prostate Volume
Post Void Bl H	Post Void Bladder Height
Post Void Bl L	Post Void Bladder Length
Post Void Bl V Ellipse	Post Void Bladder Volume Ellipse
Post Void Bl V W*H*L	Post Void Bladder Volume Width*Height*Length
Post Void Bl W	Post Void Bladder Width
Pre Void Bl H	Pre Void Bladder Height
Pre Void Bl L	Pre Void Bladder Length
Pre Void Bl V Ellipse	Pre Void Bladder Volume Ellipse
Pre Void Bl V W*H*L	Pre Void Bladder Width*Height*Length
Pre Void Bl W	Pre Void Bladder Width
Prostate H	Prostate Height
Prostate L	Prostate Length
Prostate V Ellipse	Prostate Volume Ellipse
Prostate V W*H*L	Prostate Volume Width*Height*Length
Prostate W	Prostate Width
Prox LRA	Left Kidney Proximal LRA
Prox RRA	Right Kidney Proximal RRA
Rectum	Rectum Outline
Rt CAV Auto	Right Cavernosal Artery Flaccid/Post Injection Auto

Measurement/Calculation	Explanation
Rt CAV Manual	Right Cavernosal Artery Flaccid/Post Injection Manual
Rt Epid H	Right Epid Height
Rt Epid L	Right Epid Length
Rt Epid V	Right Epid Volume
Rt Epid W	Right Epid Width
Rt Kidney H	Right Kidney Height
Rt Kidney L	Right Kidney Length
Rt Kidney V	Right Kidney Volume
Rt Kidney W	Right Kidney Width
Rt Skin Thickness	Right Testicle Skin Thickness
Rt Testicle H	Right Testicle Height
Rt Testicle L	Right Testicle Length
Rt Testicle V	Right Testicle Volume
Rt Testicle W	Right Testicle Width
Seminal Vesicles	Seminal Vesicles Outline
Strain Ratio	General Strain Ratio Tool
Urethra	Urethra Outline
Volume	General Volume Tool using Ellipse/3 distances
Volume Flow	General Volume Flow Tool

Appendix C
Setting Up and Customizing Your System

The bkSpecto includes default setups that were created to optimize the ultrasound images and make it easy for you to use the different transducers, Exam Types, and presets. You can customize the system so that it is easy to enter and select exactly the information you need.

Figure C-1. The Settings screen.

In the Settings screen, you can select to customize the following:

- **System** for Header, Display, Patient Data and Miscellaneous settings like date format, video settings etc.
- **Presets** with a list of available presets, default presets and the possibility to manage them.
- **Measure & Calc** for general measurement settings, assignment of calculation packages to presets, results, and preferences.
- **Labeling** to assign new labels and bodymarks to presets, and to adjust the position of needle guides.
- **Configure Layout** to configure the button layout for exam type and imaging mode.
- **Store/Network** for storing and clip capture preferences, printer connections, DICOM/PACS connections and Wi-Fi connection.
- **Security** for system administrators only. Select password protection and login/logout preferences. User manager window.
- **3D - 4D**
- **Service** for import/export and restoring settings, system and transducer licenses, system information and third party licenses.

You can navigate the windows using a scroll bar and swiping. When you can swipe, dots will appear at the bottom center of the window to indicate this.

System Window

Header Tab
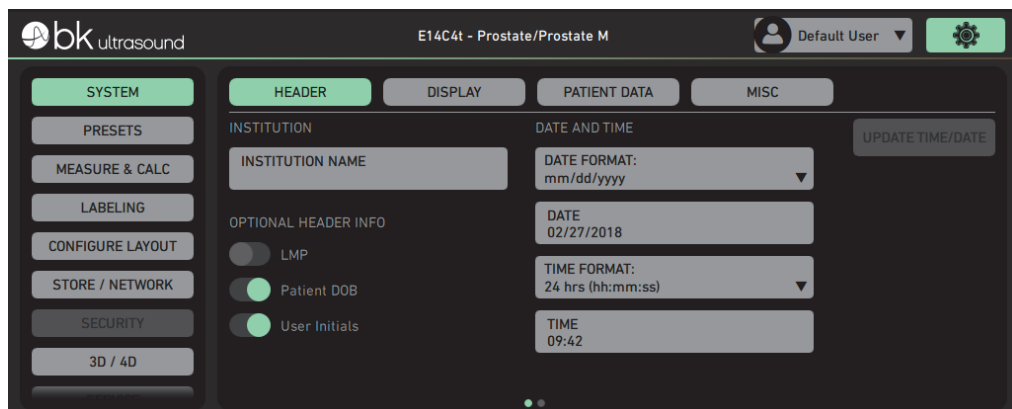
Figure C-2. System Header tab.

Institution information is displayed above the transducer name at the top of the monitor and included in documents archived to a DICOM system. On the **Header** tab, you can:

- Type in your institution name.
- Import a logo to be displayed with the hospital name.
- Select date format, date, and time format.
- Decide if you want to add **Optional Header Info**.
- Swipe forward to add a logo for your institution.

Display Tab
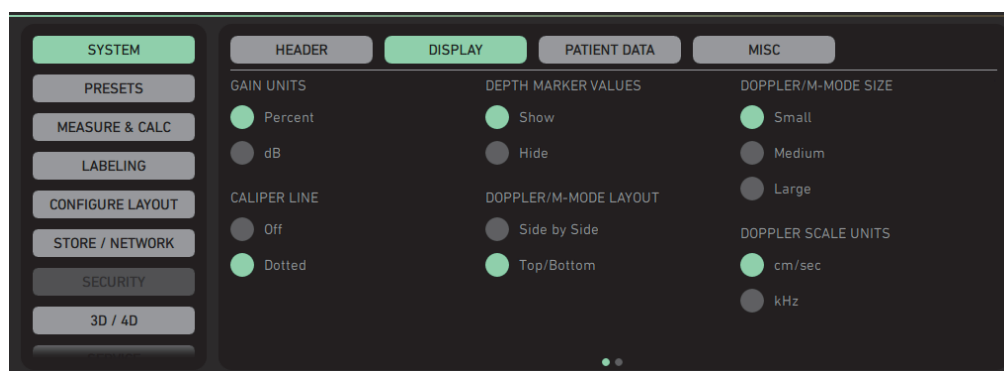
Figure C-3. System Display tab - first view.
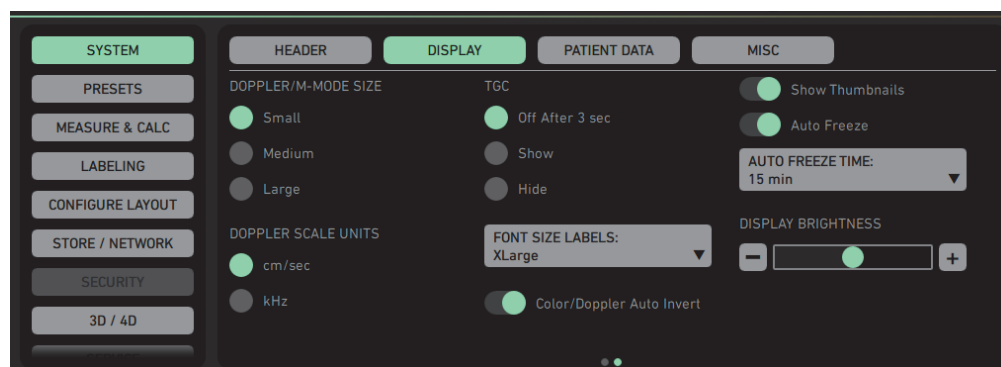
Figure C-4. System Display tab - swiped forward.

On the **Display** tab, there are several options for customizing your touchscreen and monitor. Use the radio buttons, slide buttons and drop-down menus to adjust the system to your preferences.

Patient Data Tab

Figure C-5. System Patient Data tab - swipe to display more empty fields.

On the **Patient Data** tab, you can add more fields to the **Patient Details** window.

1   Add a field from the input area by dragging it to the empty field marked with a + below **Prev Exam Date**.

2   You can swipe the bottom part of the tab to get to more empty fields marked with +.

The fields will be displayed next time you tap the **Patient Details** window.

Misc Tab
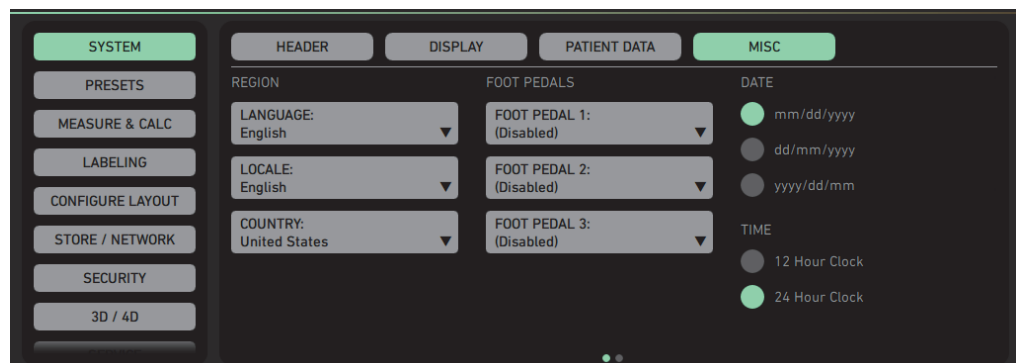
Figure C-6. System Misc tab

On the **Misc** tab, you can adjust language and location settings, including date and time. You can also set up your foot pedals. Swipe right to set up video output. Note that changes to these settings requires a restart of the system to take effect.

Preset Window

Available Tab
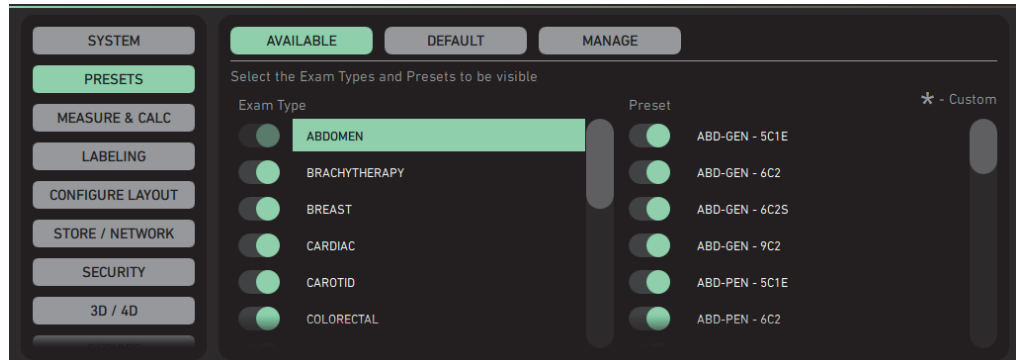
Figure C-7. Available presets.

The **Available** tab shows the presets available for the selected **Exam Type**. Use the toggle buttons to select which **Exam Types** and **Presets** should be visible.

Default Tab
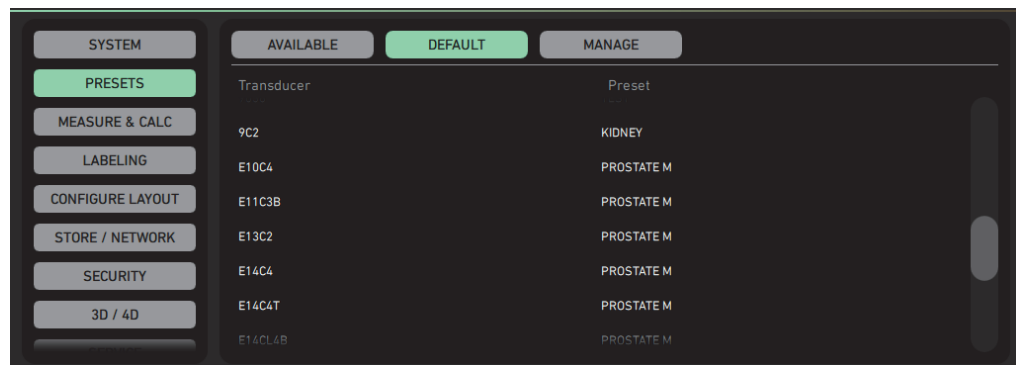
Figure C-8. Default presets.

The **Default** tab shows the default presets for the individual transducers.

Manage Tab
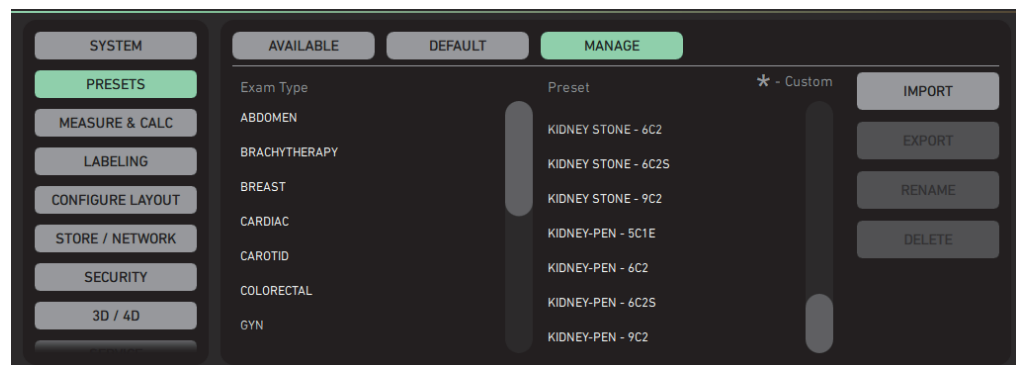
Figure C-9. Manage presets.

On this tab you can import and export, rename, and delete presets.

Measure & Calc Window

General Tab
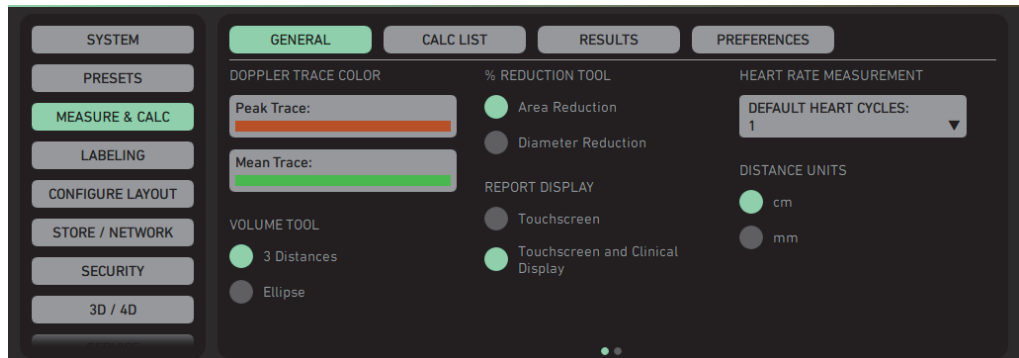
Figure C-10. Measure & Calc General tab.

On the **General** tab, you can,

- Select **Doppler Trace Color** scheme for Peak Trace and Mean Trace.
- Use the radio buttons to decide the behavior of the **Volume Tool**, the **%Reduction Tool** and how the **Report** should be displayed.
- Set **Default Heart Cycles** on the dropdown menu.
- Use the radio buttons to adjust **Distance Units** and (swipe) **Height/Weight Units**.

Calc List Tab

Figure C-11. Calc list tab.

On the **Calc List** tab, you can do the following,

- Assign a calculation to this **Exam Type** or remove an assignment:

  - Tap **Assign to Preset**.
  - Select **Exam Type.**
  - Use the **Add** and **Remove** buttons to move your choices from the **Available Presets** column to the **Assigned Presets** column. **Remove** will move the item back to the **Available Presets**, but will not delete the preset.
  - You can add presets and transducers individually, or you can tap **Select All** to move all available presets to the **Assigned Presets** column.
  - Tap **Save** to update the presets for this **Exam Type**.
  - Tap **Cancel** to close the window without saving.

- **Add** measurements from all categories, if you feel you need more than the default calculations in your **Calc. Package**.

- **Remove** measurements from the calc. package.

- To see all the preset and transducer calculations, tap **View All Assignments**.

- Tap **Restore Factory Defaults** to replace the presets for this Exam Type with the factory defaults.

Results Tab
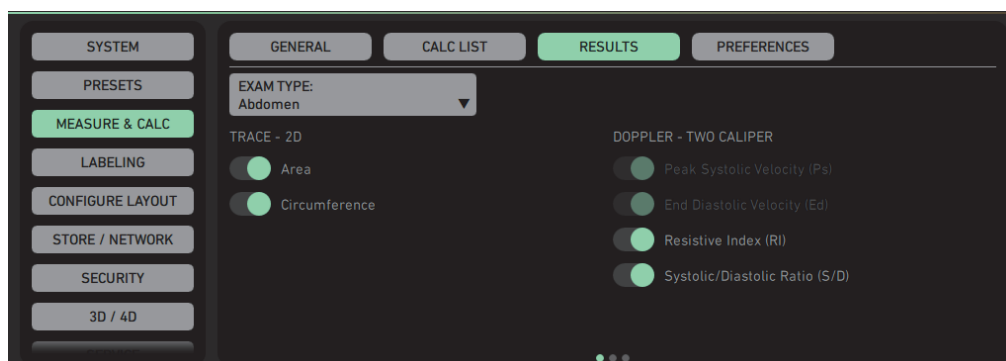
Figure C-12. Measure & Calc. Results tab.

On the **Results** tab, you can select which results will be displayed when you do the different measurements. Note that you can only change the results when the toggle buttons are highlighted. Use the dropdown to select **Exam Type** and swipe the tab to see all results.

Preferences Tab
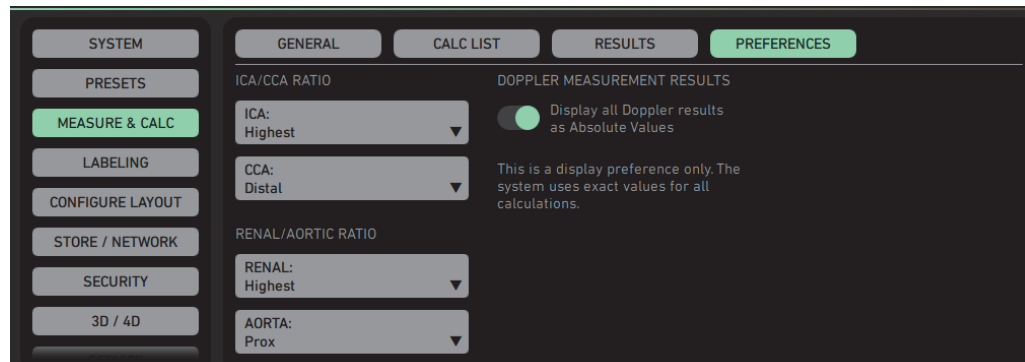
Figure C-13. The Measure & Calc Preferences tab.

On the **Preferences** tab, you can use the dropdowns to select the **ICA/CCA Ratio**, **Renal/Aortic Ratio** and decide if you want to see all Doppler results on the monitor in absolute values.

Labeling Window

Labels Tab
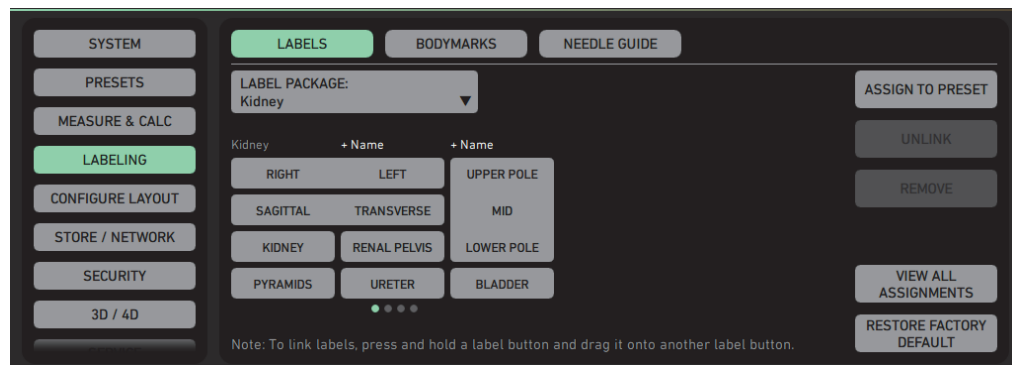
Figure C-14. The Labels tab.

On the **Labels** tab, you can do the following for each **Label Package**:

- Add names to the column headers. Tap **+Name** where you want a column header and type in the header using the keyboard.

- Add your own labels. Swipe to the end of the custom labels, tap **+Add** and type in the label using the keyboard.

- Link labels. Tap and drag a button to another button. To remove the link, tap **Unlink**.

- Assign a label to this **Exam Type** or remove an assignment:

  - Tap **Assign to Preset**
  - Select **Exam Type.**
  - Use the **Add** and **Remove** buttons to move your choices from the **Available Presets** column to the **Assigned Presets** column. **Remove** will move the item back to the **Available Presets**, but will not delete the preset.
  - You can add presets and transducers individually, or you can tap **Select All** to move all available presets to the **Assigned Presets** column.
  - Tap **Save** to update the presets for this **Exam Type**.
  - Tap **Cancel** to close the window without saving.

- Tap **View All Assignments** to see all the preset and transducer labels assigned to each Exam Type.

- Tap **Restore Factory Defaults** to replace the presets for this Exam Type with the factory defaults.

- **Remove** labels you don't need.

Bodymarks Tab
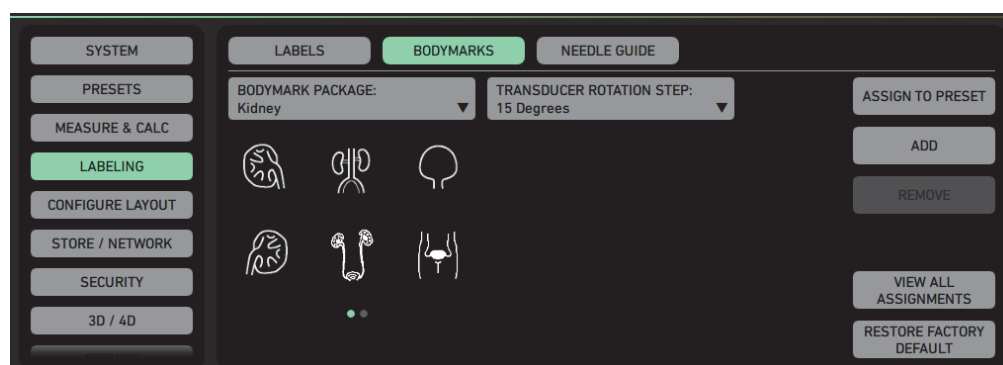
Figure C-15. Labeling Bodymarks tab.

On the **Bodymarks** tab, you can do the following for each **Bodymark Package**:

- Decide the degree of rotation of the imaging plane indicator (see "Bodymarks" on page 36) on the **Transducer Rotation Step** dropdown.

- Assign a bodymark to this **Exam Type** or remove an assignment:

  - Tap **Assign to Preset**
  - Select **Exam Type.**
  - Use the **Add** and **Remove** buttons to move your choices from the **Available Presets** column to the **Assigned Presets** column. **Remove** will move the item back to the **Available Presets**, but will not delete the preset.
  - You can add presets and transducers individually, or you can tap **Select All** to move all available presets to the **Assigned Presets** column.
  - Tap **Save** to update the presets for this **Exam Type**.
  - Tap **Cancel** to close the window without saving.

- **Add** bodymarks from all categories, if you feel you need more than the default calculations in your **Bodymark Package**.

- **Remove** bodymarks you don't need.

- Tap **View All Assignments** to see all the preset and transducer labels assigned to each Exam Type.

- Tap **Restore Factory Defaults** to replace the presets for this **Bodymark Package** with the factory defaults.

Needle Guide Tab

Tapping the **Open Needle Guide** button opens the **Needle Guide** window on the monitor.
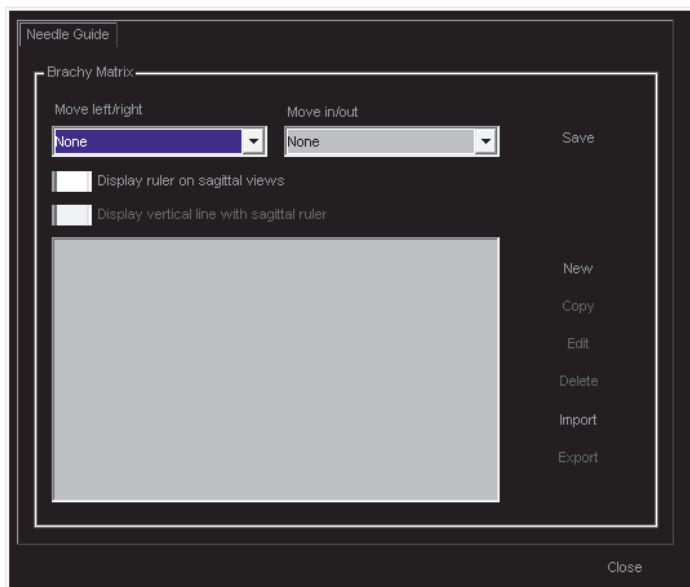
Figure C-16. Needle Guide window on monitor with Brachy Matrix setup.

In the **Brachy Matrix** setup window, you make setup changes to brachy matrices and needle guides. You can:

- Move a programmable brachy matrix or needle guide left, right, in or out.
- Specify that a brachy ruler is displayed on a sagittal view (E14CL4b transducer)
- Define your own brachy matrix and ruler.

To move the offset in either direction:

- Select the offset you want from the drop-down menu and tap **Save**.

Use the trackpad and pointer to navigate the Needle Guide window.

⚠ Offset changes	**WARNING P-w3** Changes you make to the offset of a programmable puncture guide or brachy matrix will affect ALL programmable puncture guides and brachy matrices. This could lead to incorrect puncture lines or matrix positions for a different guide than the one you wanted to change.

To have a vertical line displayed at the 0 of the brachy ruler:

- Check the **Display ruler on sagittal views** checkbox and tap **Save**.

User-Defined Matrices (including Brachy and Transperineal)

⚠ Verify user-defined guide	**WARNING B-w2** If you create a user-defined matrix, it is your responsibility to verify that the matrix that appears on the monitor corresponds to the physical matrix you are using.

User-defined matrices are listed in the lower part of the **Brachy Matrix Setup** window (Fig C-16).

You have the following options for user-defined matrices:

Option	What it does
New	Opens the User-Defined Matrix Wizard so you can define a new matrix.
Copy	Creates a new user-defined matrix as a copy of the currently selected matrix. The name of the new matrix is the name of the existing matrix plus an index number. You can then edit the copy to create a new user-defined matrix.
Edit	Opens the Measurement Definition Wizard so you can edit the selected user-defined brachy matrix.
Delete	Deletes the selected user-defined matrix. You are asked to confirm the deletion.
Import	Imports a matrix from an external storage device. If the system already has a matrix with the same name as the matrix you want to import, the imported matrix will be renamed to the matrix name plus an index number.
Export	Exports the selected matrices to an external storage device.

Table C-1. Options in the Brachy Matrix Setup window.

Using the User-Defined Matrix Wizard

To define a new matrix or edit an existing user-defined matrix:

1 In the **Brachy Matrix Setup** window, tap **New**, or select an existing measurement and tap **Edit**.

The following window appears:

2 Select the transducer that the matrix will be used with, and name the matrix. Tap **Next**.

┌─ Transverse Matrix - Dimensions ─────────────────────────┐
│   │
│ Width in mm   Horizontal holes/cm   Horizontal offset in mm │
│ [70]   [2]   [0]   │
│   │
│ Height in mm   Vertical holes/cm   Vertical offset in mm   │
│ [70]   [2]   [0]   │
│ ┌───┐ │
│ │ Columns: 15   │ │
│ │ Rows: 15   │ │
│ │ Column spacing: 5.00 mm   │ │
│ │ Row spacing: 5.00 mm   │ │
│ │   │ │
│ └───┘ │
└───┘

            < Back   Next >   Cancel

3   Enter the width and height of the matrix, the horizontal and vertical spacing between holes (holes per cm), and the horizontal and vertical offset of the matrix.

The system calculates the number of rows and columns and the hole spacing in each direction. Tap **OK** when cautions about this appear on the touchscreen. When the both offsets are 0, the matrix looks like this:
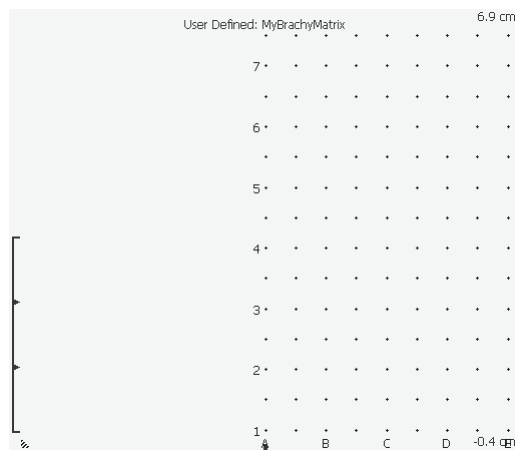
Assuming that the transducer is at the bottom of the image, positive offsets move the matrix to the right or up, negative offsets move it to the left or down.

4   Tap **Next**.
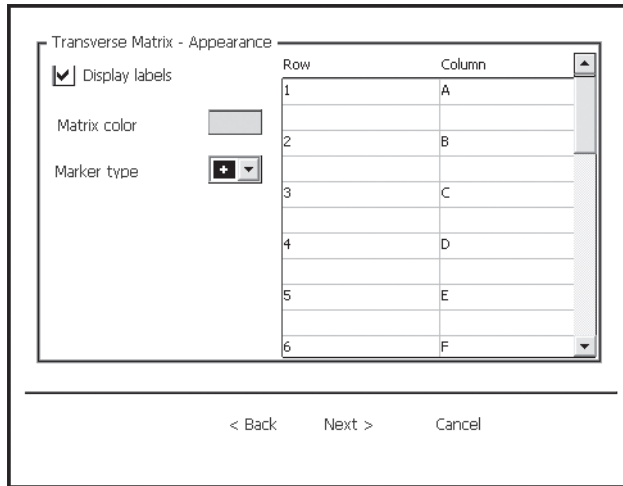
5 Select the symbols (**Marker type**) and color (tap the box) that will be used for the matrix. If you check **Display labels**, you can enter names for the rows and columns. Tap **Next**.
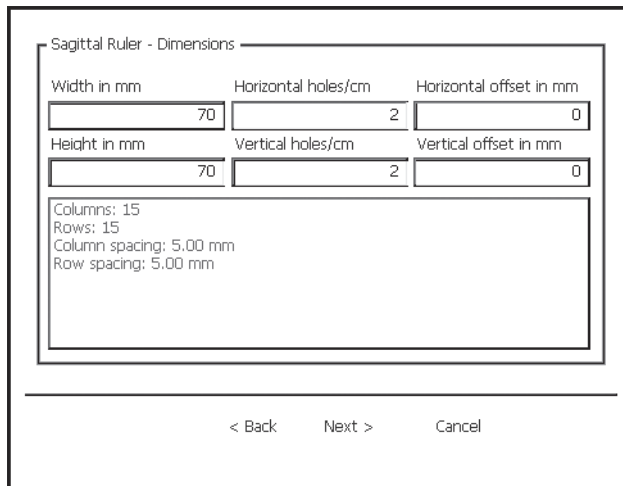
6 Enter the width and height of the ruler, the horizontal and vertical spacing between markers (holes/cm) and the horizontal and vertical offset of the ruler.

The system calculates the number of rows and columns and the hole spacing in each direction. When the both offsets are 0, the matrix looks like this:
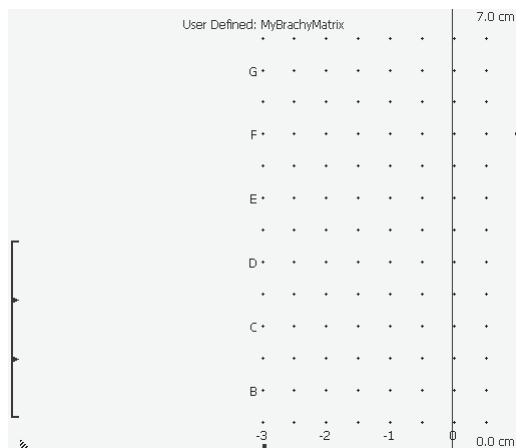
Assuming that the transducer is at the bottom of the image, positive offsets move the matrix to the right or up, negative offsets move it to the left or down.

Tap **Next**.
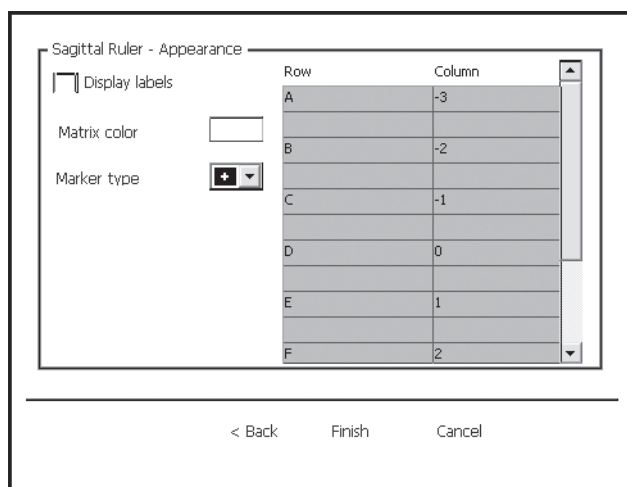
7   Select the symbols (**Marker type**) and color (tap the box) that will be used for the ruler. If you check **Display labels**, you can enter names for the rows and columns.

NOTE: *If you want to be able to have a vertical line displayed at the 0 of the brachy ruler (see page 137), you must name one of the columns "0".*

8   Tap **Finish**.

NOTE: *You must disconnect and reconnect the transducer for the changes to take effect.*

Matrix Alignment and Calibration

⚠	**WARNING** B-w4
	To avoid harming the patient, check the needle alignment (and recalibrate if necessary) before each use.

NOTE: The best accuracy that can be expected is a 3 mm deviation.

Check the alignment of a reusable needle guide or transperineal biopsy matrix if you have any reason to suspect that it has been damaged. BK recommends that you check them once a month, or more often in case of heavy use.

To check the alignment of puncture guides and matrices:

1   Fill a suitable tank with saline. The concentration of the saline depends on the room temperature. It should be 4% NaCl at 25 °C (77 °F) and 5 % NaCl at 20 °C (68 °F).

2   Assemble the needle guide (or brachy stepper and grid) and attach it to the transducer.

3   Turn on the system and connect the transducer.

4   Immerse the transducer tip in the saline.

5   Start imaging to produce an image on the monitor.

6 Tap **Biopsy** on the control panel to superimpose the puncture line or matrix on the monitor image.

7 Insert a needle through the puncture guide or grid.

8 Watch the image of the needle tip and measure its deviation from the puncture line or matrix point shown on the monitor.

9 Decide whether the accuracy is acceptable.

10 If the accuracy is not acceptable, contact your BK service representative.

To calibrate programmable matrices:

1 Fill a suitable tank with saline. The concentration of the saline depends on the room temperature. It should be 4% NaCl at 25°C (77°F) and 5% NaCl at 20°C (68°F).

2 Turn on the system and connect the transducer.

3 Make sure that the correct transducer type number is displayed the top of the monitor, followed by **T**, indicating that you are imaging in the transverse plane.

4 Press **Biopsy** on the control panel to superimpose the matrix on the monitor image.

5 Tap **Needle Guide** on the touch screen.

The list of needle guides appears.

6 Tap the matrix you want to calibrate.

7 Mount the transducer in the holder, by twisting the probe in, and put the transducer pin in the slot on the holder.

8 Then put the transducer (mounted in the holder, and with the grid attached) into the saline, making sure that the transducer arrays are fully immersed.

9 Verify that there is a image on the monitor, and that the image isn't frozen.

10 Insert a needle through hole D4 in the grid.

The needle echo appears on the monitor.

If the echo is superimposed on the dot in the matrix on the monitor, then insert a needle through B4 and F4. If the echo for the needles in these holes are also in the correct position, no further adjustment is required.

11 If the needle echo is not in the correct position relative to the matrix on the monitor, open the **Settings**. Tap **Labeling** and select **Needle Guide**.

12 Tap the **Needle Guide** button to open the **Needle Guide** window on the monitor.

13 Here you will be able to move the template to the right or to the left, and in and out. (In = closer to the transducer/down on the monitor; Out = farther from the transducer/up on the monitor.)

14 Whenever you make changes to the matrix, remember to save your settings. Then repeat the process from step 10 to verify that the needle echo is superimposed on the correct dot in the matrix.

15 It may be necessary to adjust the stepper as well. Consult the stepper user guide for instructions. After you adjust the stepper, use the earlier steps in this procedure to verify that the matrix is calibrated properly.

⚠️ Do not use damaged equipment	**WARNING** Check-w1
	To ensure safe operation, do not use the equipment if you find any signs of damage. Contact your BK Medical service representative.

Configure Layout Window

Figure C-17. Configure Layout window.

The **Configure Layout** window lets you configure the buttons for each **Exam Type** and mode according to your needs and preferences.

To add buttons in the parameter area, do as follows:

1   Select **Exam Type** on the dropdown, and mode on the bar next to it.

2   Select which screen you want the buttons to be displayed on (1 or 2) by swiping to that screen.

3   Drag the buttons you want from the input area to the empty buttons (marked with a +) in the parameter area. You can move the buttons you use most frequently to the fast button area just above the mode buttons.

4   You can also add a mode to the empty mode button above the Gain bar.

The fields will be displayed next time you tap the Exam Type/mode you have configured.

To remove buttons from the parameter area:

•   Drag the buttons to the input area.

Store/Network Window

Store/Clip Tab
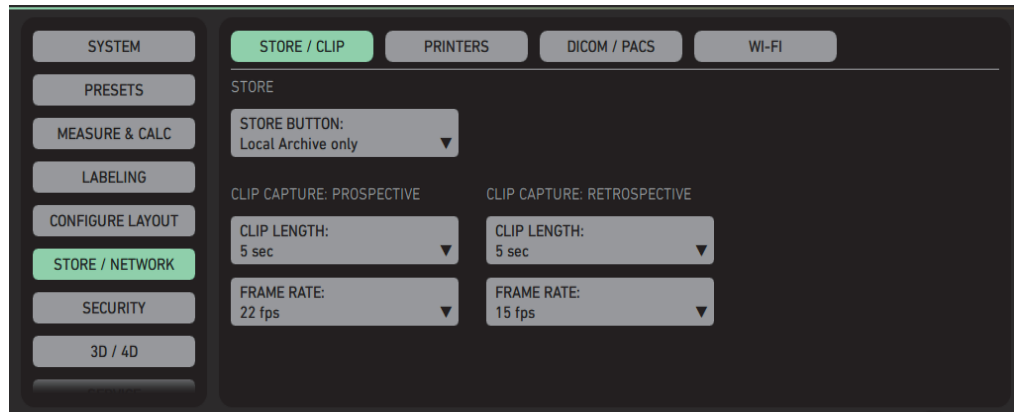
Figure C-18. Store/Clip tab.

On the **Store/Clip** tab, you can select where the images are stored and the clip length and frame rate of prospective and retrospective clips.

Use the **Store Button** dropdown to select where to store images. When storing to the **Local Archive**, you can see all data in the **Patient List**

Use the **Clip Length** and **Frame Rate** dropdowns to select these values for prospective captures (recording) or retrospective captures (capturing video clips based on the most recent cine loop).

Printers Tab
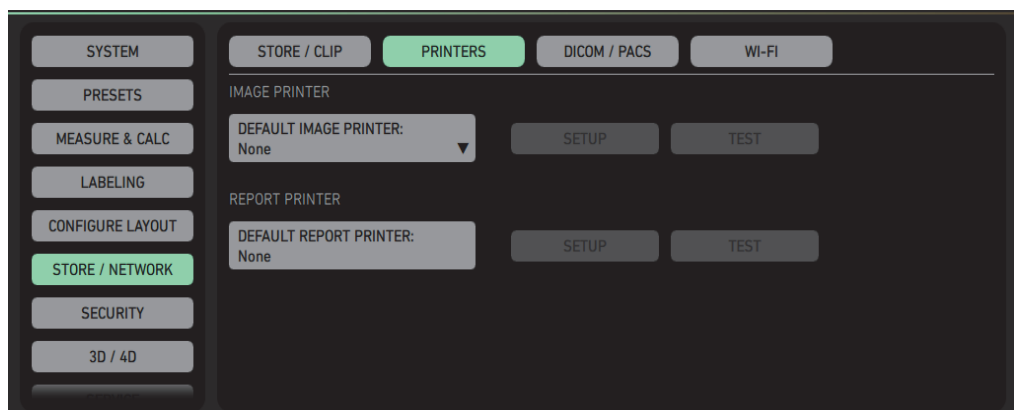
Figure C-19. Printers tab.

On the **Printers** tab, you can select and set up default printers. Use the dropdowns and the **Setup** and **Test** buttons to set up your printer.

DICOM/PACS Tab

DICOM is not installed on the bkSpecto as a default. You must purchase a DICOM license from BK before a qualified service technician can install DICOM on your system. The *bkSpecto Service Manual* contains instructions for service personnel to use when setting up your DICOM system.

If DICOM is enabled on your system, you access the **DICOM** setup window via the **DICOM/PACS** tab. Tap **Configure DICOM/PACS** to open the **DICOM** window on the monitor.

 NOTE: *Changing the DICOM setup can cause your system not to work properly. For example, you may be unable to print to a DICOM printer. All changes to the DICOM setup should be made by qualified service personnel only.*
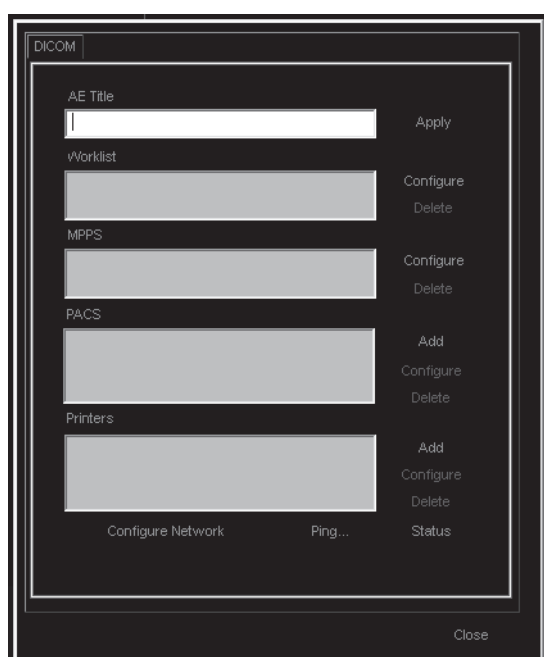
Figure C-20. DICOM window on monitor

You can open the **DICOM Status Window** by clicking **Status**.

Wi-Fi Tab

To connect to a wireless network, tap **Configure Wi-Fi** to open the Wi-Fi window on the monitor. Do as follows,

- Use the trackpad and pointer to navigate the Wi-Fi window.
- Choose the appropriate network and tap **Connect**.
- Type in the password and wait for the system to connect.
- Tap **Close**.
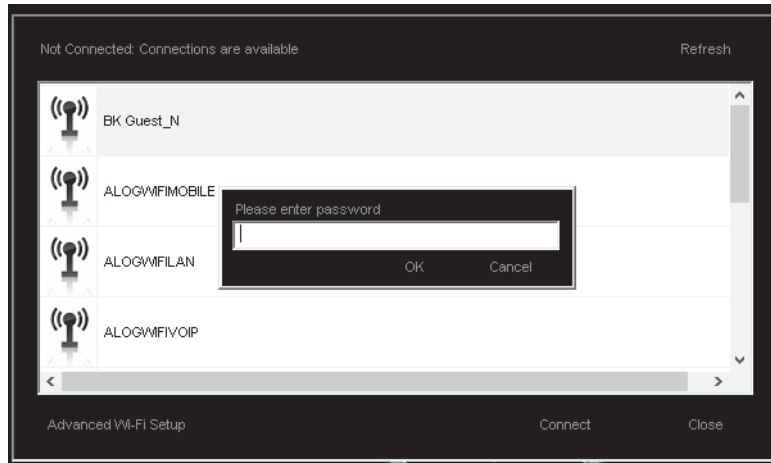
Figure C-21. Wi-Fi Connection window on monitor.

See also the section on **Wireless Networks** in the *bkSpecto User Guide.*

Security Window

This window is only available to system administrators.

General Tab
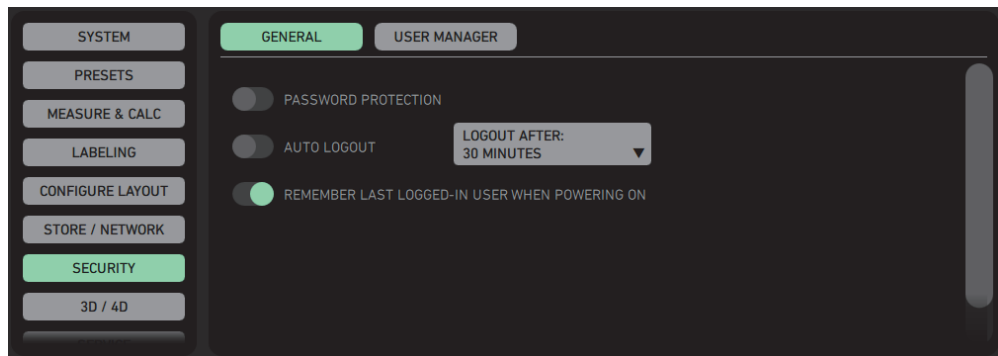
Figure C-22. Security - General tab.

On the **General** tab, you can select if the system must be password-protected, if the user should be logged out automatically after a specified period, and if the system should remember the last logged-in user when starting up.

User Manager Tab
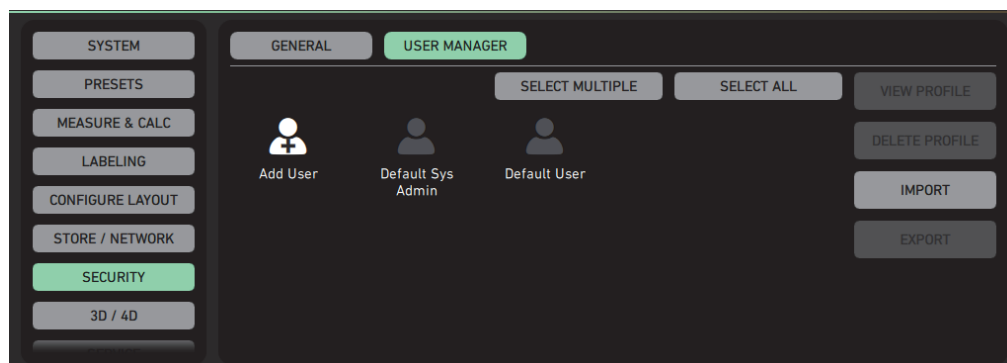
Figure C-23. Security - User Manager tab.

On the **User Manager** tab, you can create and administer users.

To create users:

1 Tap the **Add User** icon to add one or several users.

2 If relevant, apply the user profile settings of another user from the dropdown menu.

3 Fill in all of the columns to identify each user.

4 Use the toggle button to select if the users should be allowed to modify their own profiles.

5 Tap **Next**

6 Tap **Add** to create the users.

For each individual user, you must view and edit the profile in order to select specific settings for this user.

View Profile

To view and edit user profile:

1 Select user and tap **View Profile**.

2 In the **General** view, add or replace user photo.

3 Tap the toggle button to select if **Password required during login** should be activated.

4 If a password is required, type in the password according to the instructions on the screen.

5 Use the radio buttons to select if the user should have a **Regular Profile** or be a **System Administrator**.

6 Tap the toggle button to select if the user should be able to modify the profile. This does not allow the user to change a regular profile into a system administrator.

To edit User Preferences:

• In the **View Profile** window, tap **Preferences**.
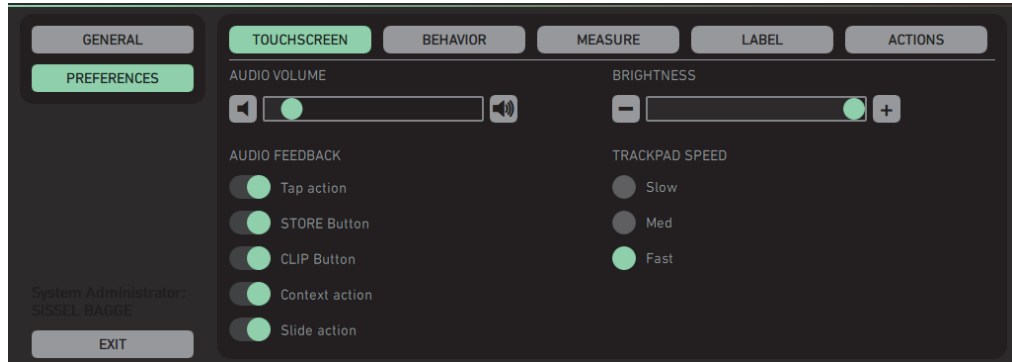
Figure C-24. User preferences, Touchscreen tab

On the **Touchscreen** tab, you can

- Set **Audio Volume**.

- Use the toggle buttons to select if you want to hear a sound when you
  - tap the touchscreen,
  - capture an image,
  - capture a clip,
  - use a context button, or
  - slide a bar.

- Set the touchscreen **Brightness**.

- Select **Trackpad Speed**.
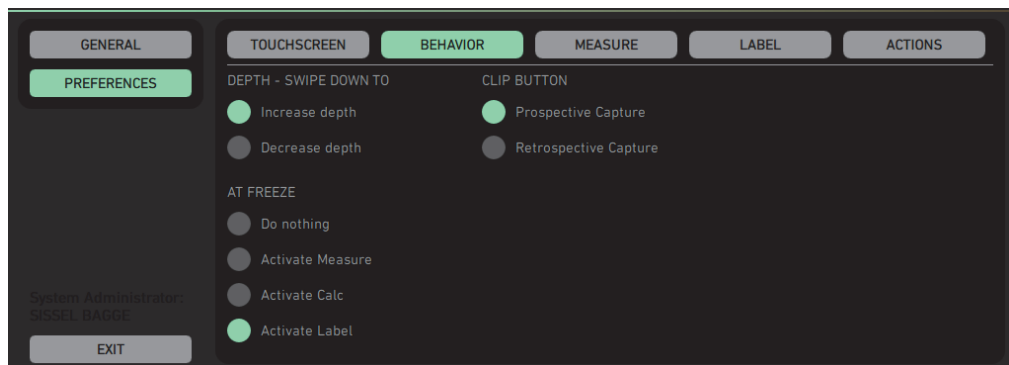
Figure C-25. User Preferences, Behavior tab

On the **Behavior** tab, you can:

- Select sliding direction on the **Depth** bar.

- Select system reaction **At Freeze**.

- Decide if the **Clip Button** should record a prospective or retrospective video clip.
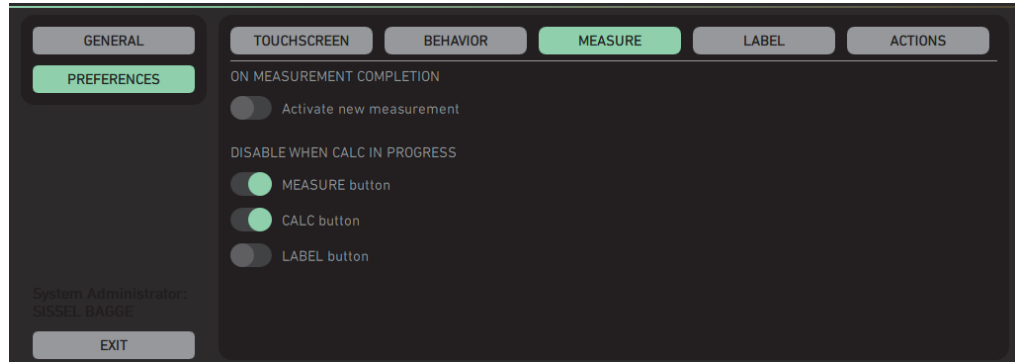
Figure C-26. User Preferences, Measure tab.

On the **Measure** tab, you can:

- Decide how the measurement calipers should behave when setting a measurement.

- Select which buttons to disable when **Calc** is in progress.
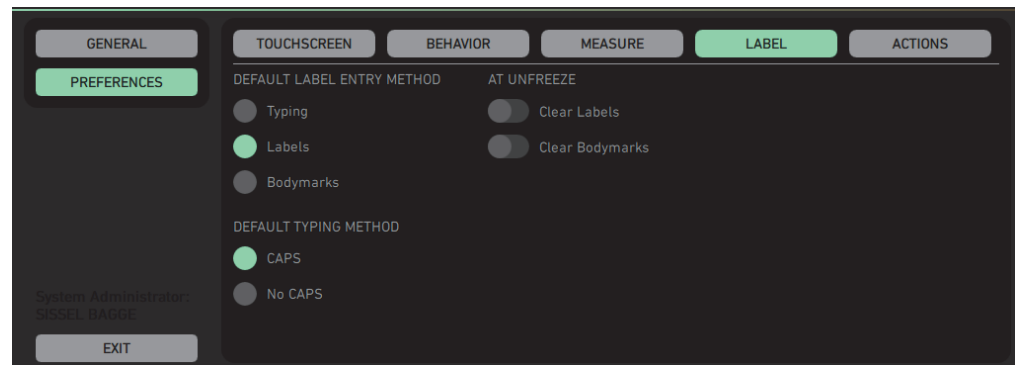
Figure C-27. User Preferences, Label tab.

On the **Label** tab, you can:

- Decide how you want to enter labels.

- Select if labels or bodymarks should be cleared at Unfreeze.
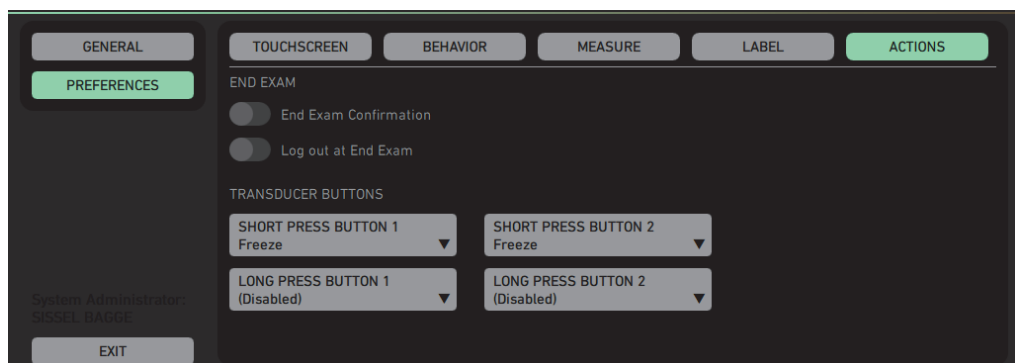
Figure C-28. User Preferences, Actions tab.

On the **Actions** tab, you can:

- Decide if you want to receive a confirmation or have the user logged out at the end of the exam.
- Select functions for the transducer buttons on the dropdown menus.

3D/4D

On the **3D/4D General** tab, you can decide whether the system will select the 3D region of interest marker automatically or not.

Service Window

General Tab
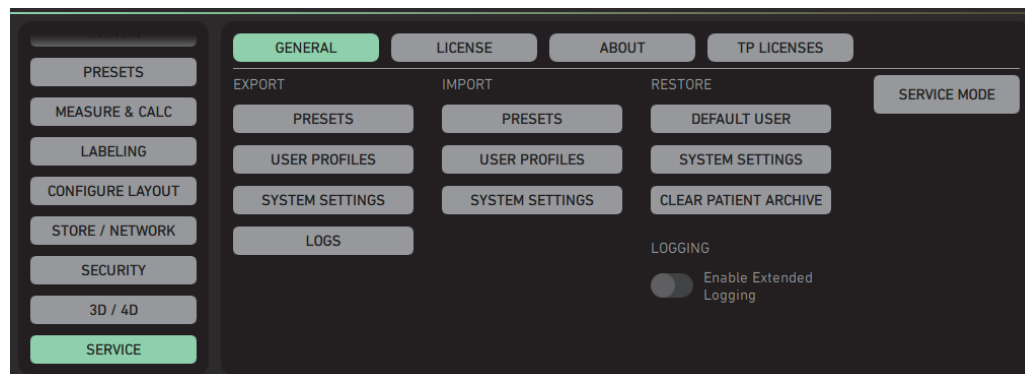
Figure C-29. Service General tab.

On the **General** tab, you can select **Enable Extended Logging**. You can also export and import **Presets**, **User Profiles** and **System Settings**, and export **Logs**. And you can restore the **Default User**, **System Settings** and **Clear** the **Patient Archive**.

License Tab
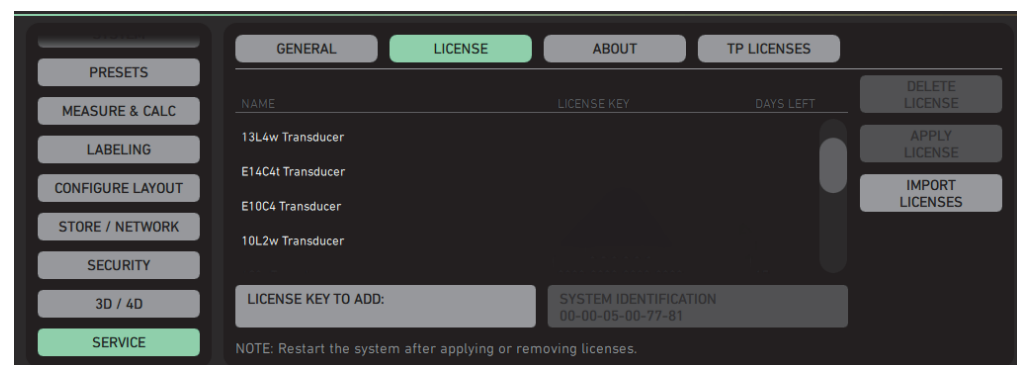
Figure C-30. The Service License tab.

On the **License** tab, you add, delete and import licenses.

To add a license:

1   Type in the license in the **License key to add** field.

2   Tap **Apply**.

3   Restart the system to activate the license.

To delete a license:

- Select the license you want to delete and tap **Delete**.

You must restart the system after any changes to the licenses in order for the changes to take effect.

About Tab
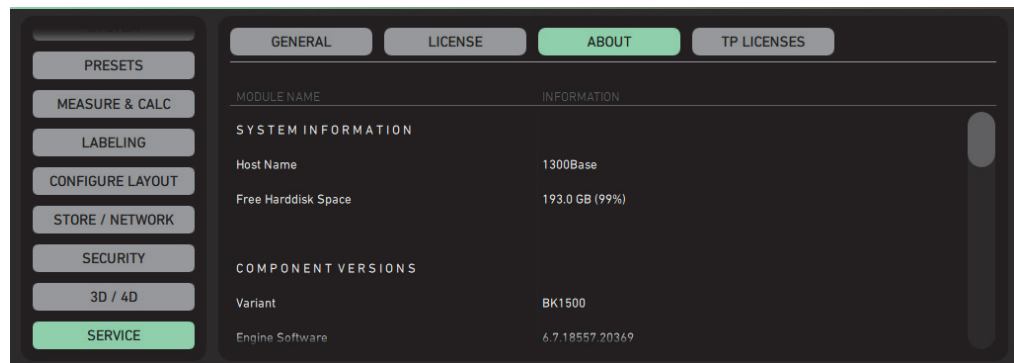
Figure C-31. Service About tab.

On the **About** tab, you will find information about e.g. the version of the installed software, which will be useful if you need service for the system.

TP Licenses Tab
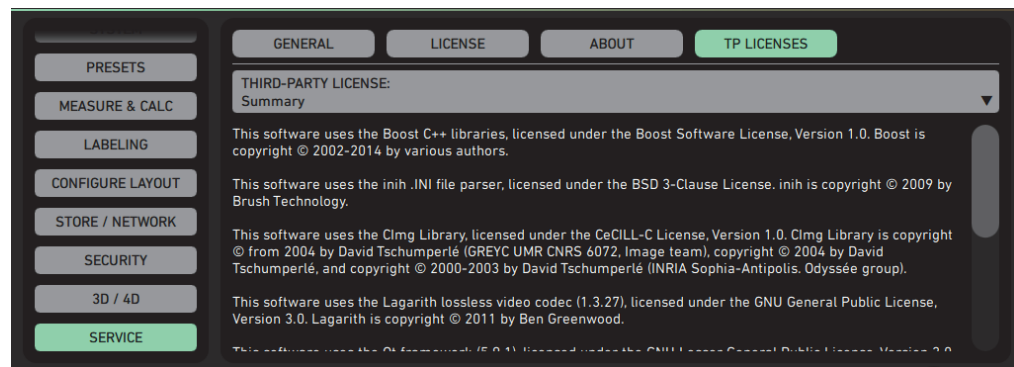
Figure C-32. Service - TP Licenses tab.

On the **TP Licenses** tab, you can see which third party licenses are used for the system installation.

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