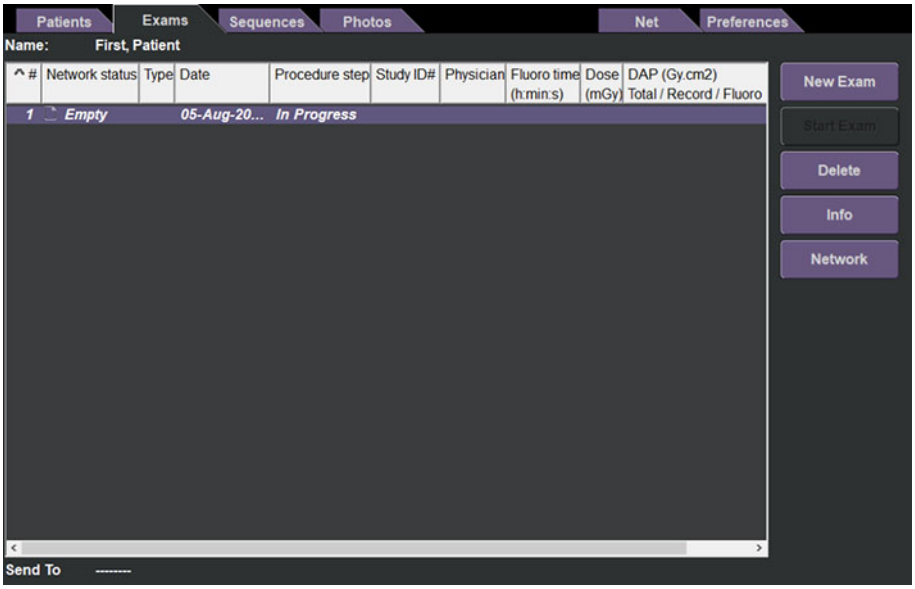
Figure 10-75 Exam Browser

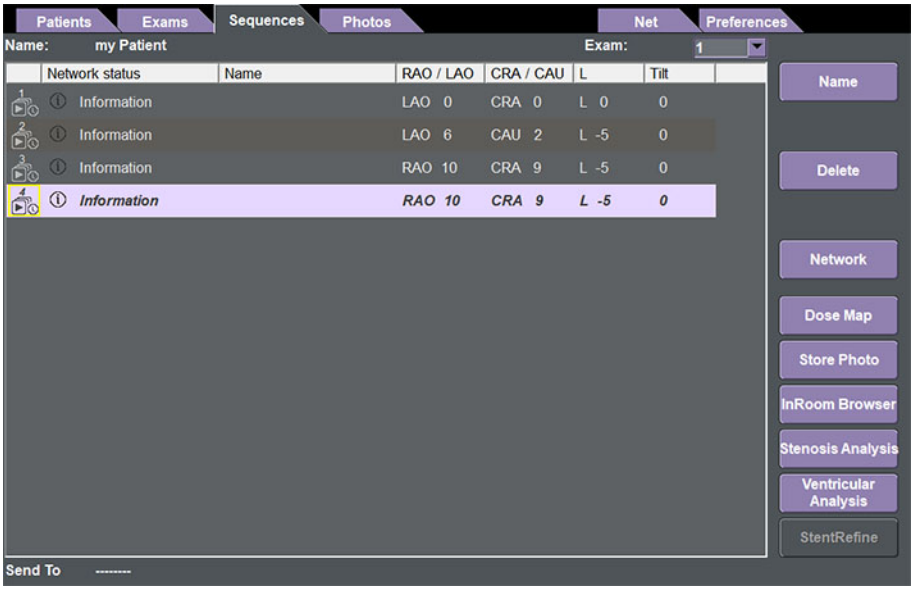


If there is more than one Exam available for the patient, both of them can be reviewed from the Sequence Browser. To activate this function, highlight the desired exams to review by holding down the Control key and clicking on them with the mouse.

Sequence Browser

Select the exam you want to review and double click on it. This brings up the SEQUENCE BROWSER window and automatically launches the review of the first sequence.

Figure 10-76 Sequence Browser



In the SEQUENCE/PHOTO BROWSER window, double click on any sequence/photo that you wish to review. A Sequence name is displayed on the image in the upper right corner during review.

The **Review** icon is displayed on the left side of the live display as soon as the review is launched to show that the displayed image in review was previously recorded.


are also displayed at the bottom right of the Live display to show that the displayed image is either a previously recorded or stored fluoroscopic image reviewed in Play or Paused mode (review in loop or frozen image)

If there are no Sequences acquired at this time, the Browser will be blank. As each Record Sequence is stored to the digital disk, a new icon will appear with the number of the sequence.

A single click on a Sequence icon only activates it for other processing. The icon will be highlighted to indicate that it has been selected. Selection can be for the following:

1. Name - each Sequence can be named with up to 8 characters. A menu window will open displaying a predefined list. Adding or deleting from this list is allowed.

   Sequence naming can be performed during Fluoro or Record acquisition.

2. Delete - this will delete the Sequence from the digital disk. It cannot be retrieved after the OK for deletion has been accepted. Multiple sequences can be deleted at a time by holding down the Control key and clicking on each icon with the mouse. If a Sequence is deleted from a list, the numbering of the other ones is not changed.

3. Network - this will start the transfer of the Sequence to the Network. Multiple sequences can be networked at a time by holding down the Control key and clicking on each icon with the mouse.

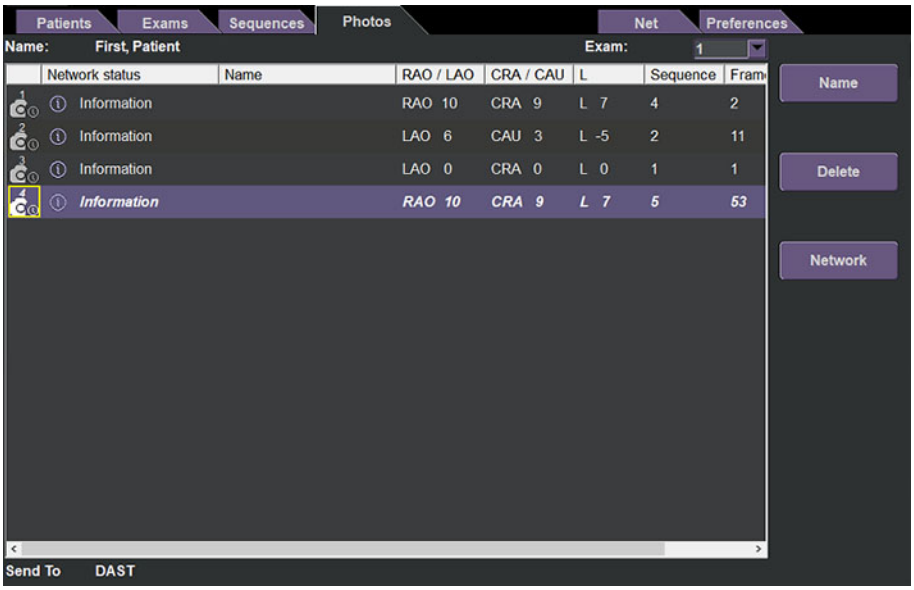
   Sequence network can be initiated during Fluoro or Record acquisition.

If the Sequence icon has a Yellow box around it, this indicates that this is the Sequence that is presently being reviewed.

NOTE
Reviewing images at frame rates higher than acquisition frame rates will cause some frames to be skipped during display.

Photo Browser

Figure 10-77 Photo Browser



In the PHOTO BROWSER window, double click on any photo that you wish to review.

A Photo name is displayed on the image in the upper right corner during review.

If there are no Photos stored at this time, the Browser will be blank. As each Photo is stored to the digital disk, a new icon will appear with the number of the sequence. During an exposure, a message will appear `Acquisition in Progress` on the DL screen. A single click on a Photo icon only activates it for other processing. The icon will be highlighted to indicate that it has been selected. Selection can be for the following:

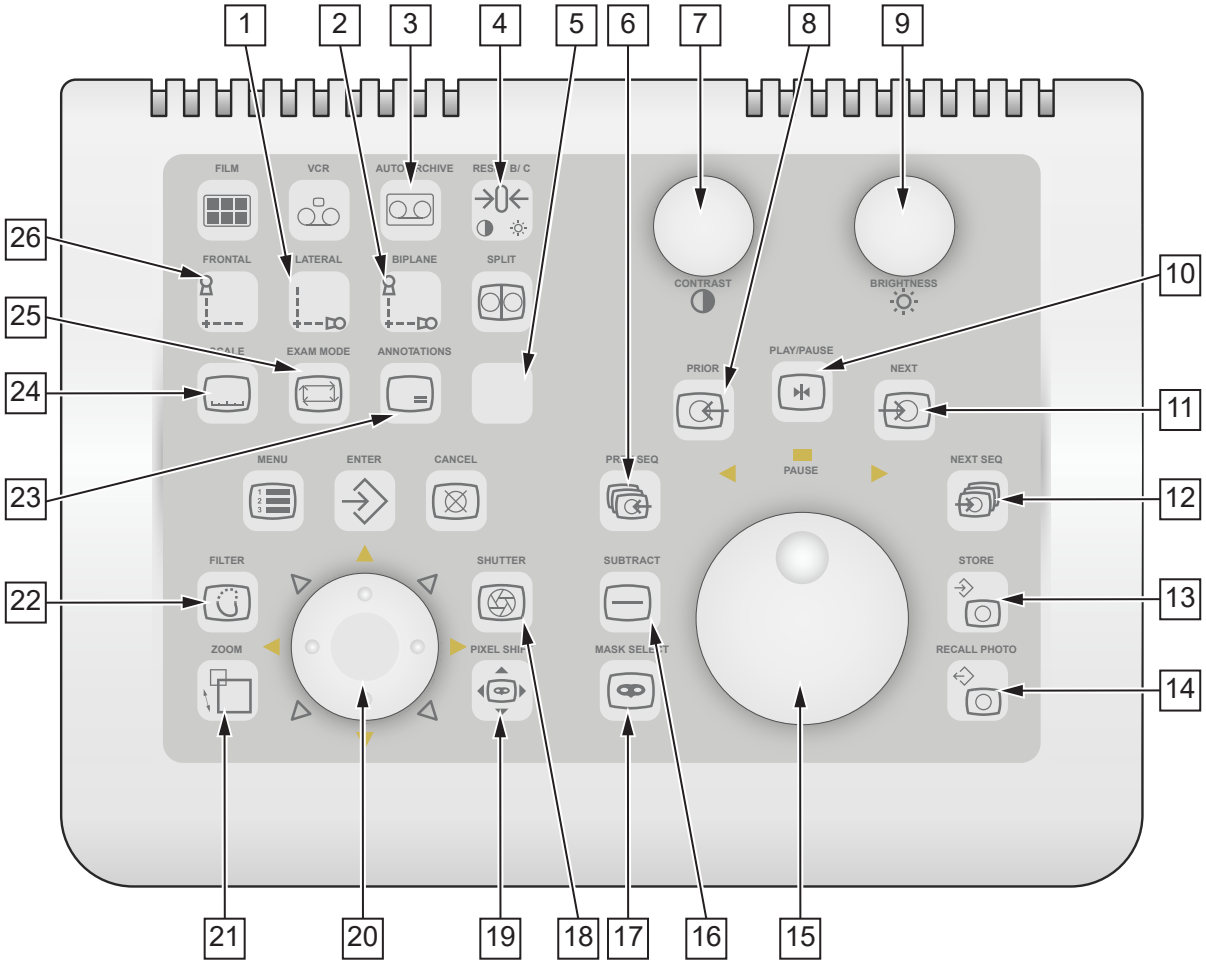
1. Name - each Photo can be named with up to 8 characters. A menu window will open displaying a predefined list. Adding or deleting from this list is allowed.
   Photo naming can be performed during Fluoro or Record acquisition.
2. Delete - this will delete the Photo from the digital disk. It cannot be retrieved after the OK for deletion has been accepted. Multiple Photos can be deleted at a time by holding down the Control key and clicking on each icon with the mouse. If a Photo is deleted from a list, the numbering of the other ones is not changed.
3. Network - this will start the transfer of the Photo to the Network. Multiple photos can be networked at a time by holding down the Control key and clicking on each icon with the mouse.
   Photo network can be initiated during Fluoro or Record acquisition.

If the Photo icon has a Yellow box around it, this indicates that this is the Photo that is presently being reviewed.

10.7.2 DL Keypad

DL keypad provides controls for the review and post processing of images. 9.1.2

Figure 10-78 DL Keypad



Item	Description
[1]	Not available on monoplane
[2]	Not available on monoplane
[3]	Auto Archive Mode Selection
[4]	Reset Brightness and Contrast to Default Values
[5]	Monitor Pattern
[6]	Review Previous Sequence
[7]	Contrast Adjustment 9.1.2
[8]	Review Previous Image
[9]	Brightness Adjustment 9.1.2
[10]	Start and Stop Review within a Sequence
[11]	Review Next Image
[12]	Review Next Sequence
[13]	Store Photo
[14]	Recall Photo
[15]	Shuttle Knob for Image Review
[16]	SUB/No Sub Selection
[17]	Mask Selection to select another mask if needed
[18]	Show/Hide the electronic shutter in review 9.1.2
[19]	Pixel Shift menu Selection
[20]	Edge Enhancement / Manual pixel shift or ROI change / Roam Adjustment
[21]	Zoom 9.1.2
[22]	Edge Enhancement Filter Selection
[23]	Show/Hide Image Infos
[24]	Time Scale ON/OFF Control
[25]	Exam Mode (Collage / In-room Browser)
[26]	Not available on monoplane

NOTE
The monitor pattern is not available while in review or under Ready for exam status (exam in progress).

- To display the pattern on both live and reference displays, press the blank **[5]** button.
- To remove the pattern:
  - Creating a new patient and starting the exam will blacken both screens.
  - Starting a review on any sequence will remove the pattern from the live display.
  - Recalling a photo will remove the pattern from the reference display.

10.7.3 Touch Panel

There are two ways to control the replay of sequences from the Touch Panel:

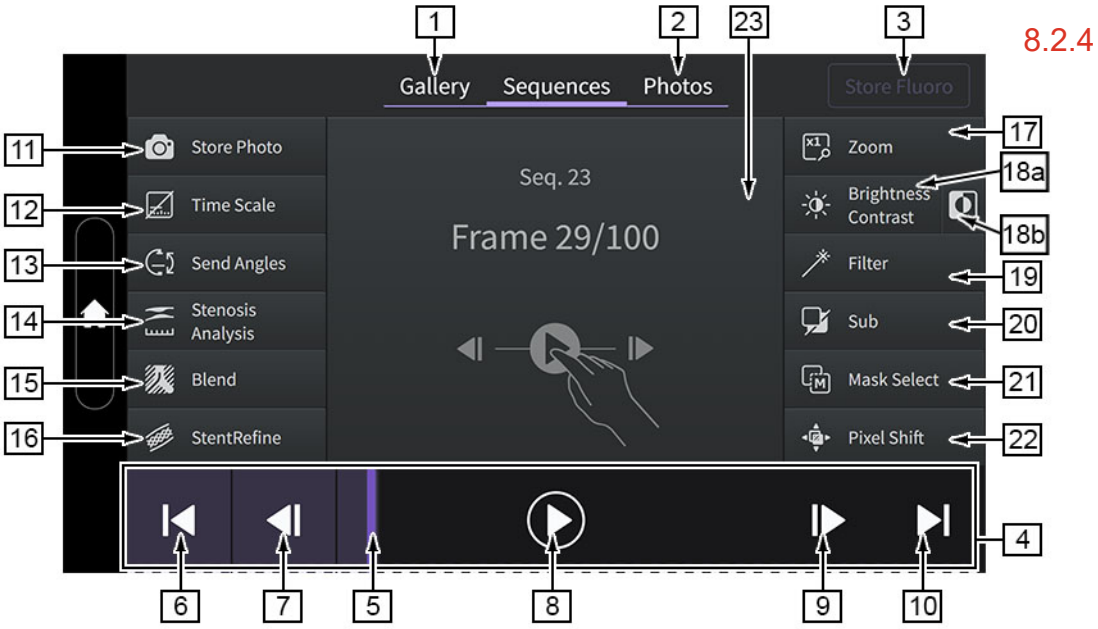
- The gallery application provides access to the gallery tab of the review page, and displays the thumbnails of all the sequences and photos available. Refer to 10.7.6 Gallery / In-room Browser on page 304.

- The review widget provides controls from home page to manipulate and edit the sequences of the current patient / exam. A tap on its header navigates to the sequence tab of the review page, providing all the functionalities to manipulate the sequence.

Photos can be accessed by selecting one in the gallery or by selecting the photo tab of the review page.

NOTE
Patient and exam selection is not possible on the Touch Panel. Select the patient on the console browser.

Sequence tab:



Item	Label	Description
[1]	Gallery	Display the **Gallery** tab content
[2]	Photos	Display the **Photos** tab content
[3]	Store Fluoro	Refer to 10.3.5 Fluorostore on page 237
[4]	Navigation bar	Slide anywhere in the bar area to navigate to the desired frame
[5]	Navigation bar Cursor	The cursor can be dragged directly to the targeted position to select the desired frame
[6]	Previous Sequence	Display the previous sequence
[7]	Previous Frame	Display the previous frame
[8]	Play / Pause	Play / Pause
[9]	Next Frame	Display the next frame
[10]	Next Sequence	Display the next sequence
[11]	Store Photo	Save on disk the image displayed on live display and displays this image on reference display
[12]	Time Scale	Display/Hide a timeline under the image in review on the live display
[13]	Send Angle	Activate the 2D send angles. See 12.7 2D Send Angles (Gantry, Table, Gantry+Table) on page 445
[14]	Stenosis Analysis (option)	Allow to launch the Stenosis Analysis application

Item	Label	Description
[15]	Blend (option)	Select the current frame as a mask for Blended Roadmap and select Blended Roadmap as the active fluoro acquisition mode. See 10.5.3 Blended Roadmap Fluoroscopy Acquisition (Option) on page 246
[16]	Stent Refine (option)	Activate the Stent visualization (StentViz or StentVesselViz) manual workflow. See Manual StentViz Workflow on page 368 and 11.4.3 Manual StentVesselViz Workflow on page 376
[17]	Zoom	Activate/Deactivate the Zoom function: When active, use the central gesture area to roam the image
[18a]	Brightness / Contrast Adjustment	Display the Brightness / Contrast adjustment menu
[18b]	Invert contrast button	Invert the contrast of the sequence
[19]	Filter Selection	Set the edge enhancement filter level
[20]	Sub / NoSub Selection	Toggle between subtracted and unsubtracted review
[21]	Mask Select	Display the Mask Selection menu
[22]	Pixel Shift	Display the Pixel Shift menu
[23]	Gesture central area	See below

Gesture central area:

- Tap to Play / Pause (except for single shot sequences)
- Double tap to enter or exit zoom
- When not zoomed, horizontal sliding navigates through the frames of the sequence and pauses the review (except for single shot sequences)
- When zoomed, sliding roams the visible area of the zoomed sequence: Roaming can also be achieved using the arrows.

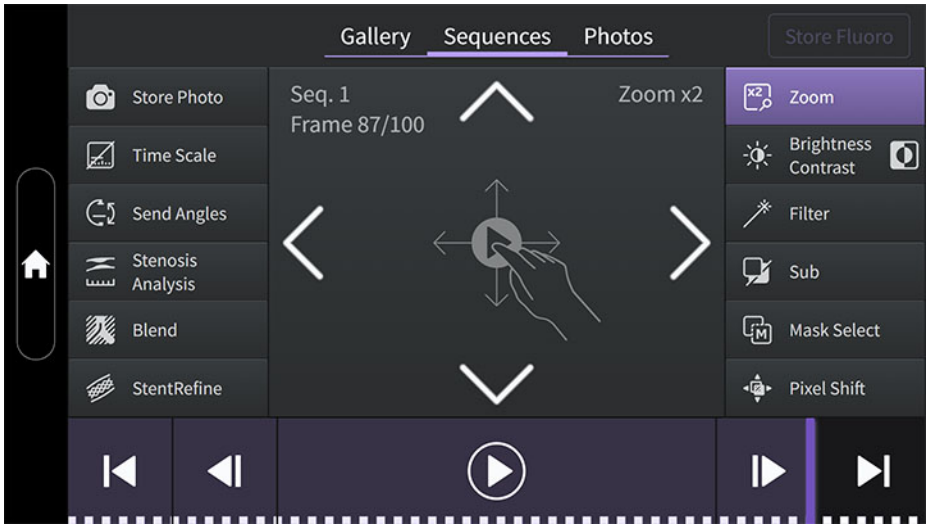
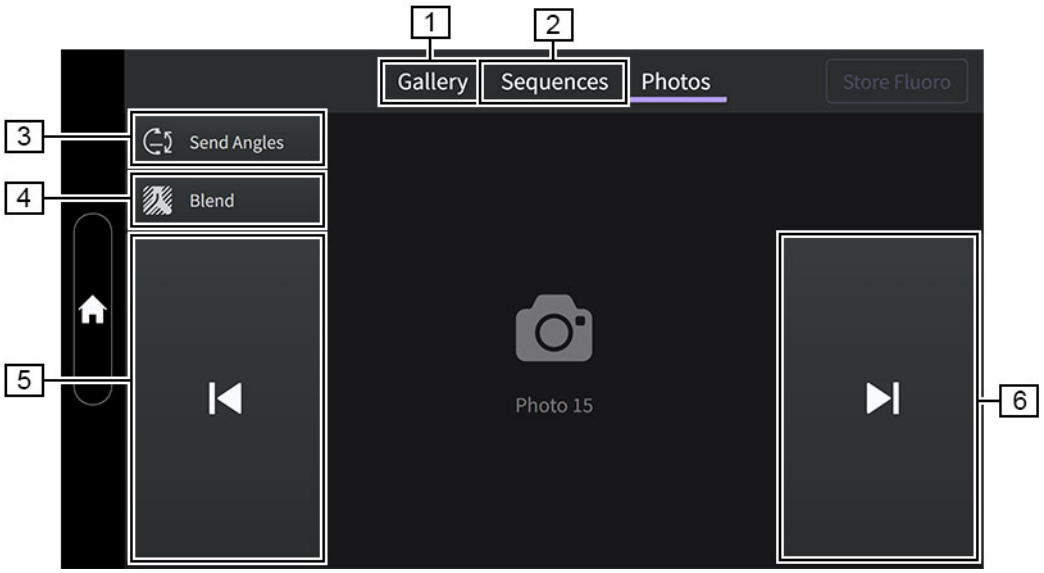


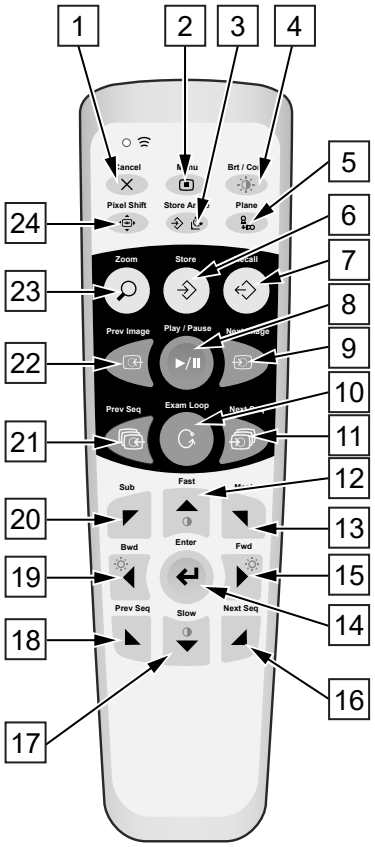
Photo tab:



Item	Label	Description
[1]	Gallery	Display the **Gallery** tab content
[2]	Sequences	Display the **Sequences** tab content
[3]	Send Angle	Activate the 2D send angles
[4]	Blend (option)	Select the current frame as a mask for Blended Roadmap and select Blended Roadmap as the active fluoro acquisition mode. See 10.5.3 Blended Roadmap Fluoroscopy Acquisition (Option) on page 246
[5]	Previous Photo	Display the previous photo
[6]	Next Photo	Display the next photo

10.7.4 DL Remote Control

Figure 10-79 DL Remote Control



Item	Description
[1]	Cancel
[2]	Menu
[3]	2D Send Angles
[4]	Brightness/Contrast Selection
[5]	Plane Selection on Biplane systems; not used on other systems
[6]	Store Photo
[7]	Recall Photo
[8]	Play / Pause
[9]	Next Image
[10]	Exam Loop (Collage / In-room Browser)
[11]	Next Sequence
[12]	Faster Review / Contrast + / Manual pixel shift or ROI change Up / Roam / IRB
[13]	Mask Selection to select another mask if needed / Manual pixel shift or ROI change Up- Right / Roam / IRB
[14]	Enter Key
[15]	Forward Review / Brightness + / Manual pixel shift or ROI change Right / Roam / IRB
[16]	Next Sequence / Manual pixel shift or ROI change Down-Right / Roam / IRB
[17]	Slower Review / Contrast - / Manual pixel shift or ROI change Down / Roam / IRB
[18]	Previous Sequence / Manual pixel shift or ROI change Down-Left / Roam / IRB
[19]	Backward Review / Brightness - / Manual pixel shift or ROI change Left / Roam / IRB
[20]	SUB/No Sub Selection / Manual pixel shift or ROI change Up-Left / Roam / IRB
[21]	Previous Sequence
[22]	Previous Image
[23]	Zoom
[24]	Pixel Shift menu Selection

10.7.5 Smart Nav

"Smart Nav" is a graphical interface providing an access to system functionalities (applications and actions to perform) from a menu displayed on user request, on the Reference display.

Smart Nav can be opened in-room by pressing the **Menu** button on the DL remote control, or on the DL keypad.

If Smart Nav is displayed, the user can hide this menu by pressing the **Menu** button, using the DL remote control or the DL keypad.

Figure 10-80 Function applicable on the Frontal plane

Functions and application accessible through Smart Nav

The Smart Nav contains the below applications / functions:

- StentRefine
- Filter
- In-room Browser
- Time Scale
- Dose Map
- Pixel Shift

Note that StentRefine is present if StentViz option is available on the system.

This logo indicates that the selected item is a sub menu.

This logo indicates that the selected item triggers an application or functionality.

Navigation and function selection through Smart Nav

In order to navigate, select an application or function, and control a functionality in Smart Nav, you can either use the DL remote control arrows or the DL keypad joystick.

- On the DL remote control:
  - Use the Left, Up or Down arrows to navigate in the menu.
  - Either use the right arrow or press **Enter** to access a sub menu.
  - Press **Enter** to select a function or application.

- On the DL keypad:
  - Perform a Left, Up or Down movement of the joystick to navigate in the menu.
  - Perform either a right movement of the joystick, or press **Enter** to access a sub menu.
  - Press **Enter** to select a function or application.

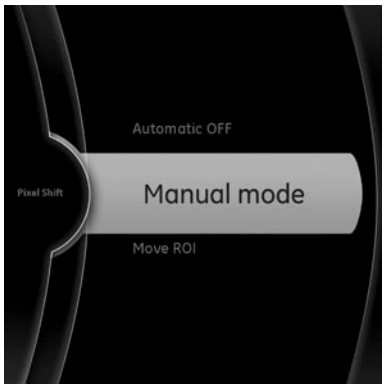
Smart Nav functions descriptions

- Select StentRefine to enable the StentViz and StentVesselViz functions (Smart Nav is hidden).
- Select Filter in order to choose a filter to apply. Use the DL remote control arrows or the DL keypad joystick to select the filter to apply on the sequence. Press **Enter** on either the DL remote control or the DL keypad to exit the function.

The state of the Smart Nav changes. Select Validate to keep the performed modification. Select Reset to reset the sequence to its initial state.

The number of the filter is displayed on the Live 1.

- Select InRooomBrowser to display the IRB (Smart Nav is hidden).
- Select Time Scale to display or erase the time scale. If time scale is displayed, a check is displayed on the time scale icon.
- Select Dose Map to display the active Dose Map (Smart Nav is hidden).
- Select Pixel Shift to display the Smart Nav Pixel Shift menu. Use the DL remote control arrows or the DL keypad joystick to select the desired sub-functions: Auto Pixel Shift ON or OFF, Move ROI function or Manual Pixel Shift.



- Manual Pixel Shift function and Move ROI function: Press **Enter** on either the DL remote control or the DL keypad to enter in the functions screen.

Use the DL remote control arrows or the DL keypad joystick to adjust the shift of the sequence or the ROI location. Press **Enter** on either the DL remote control or the DL keypad to exit the function.

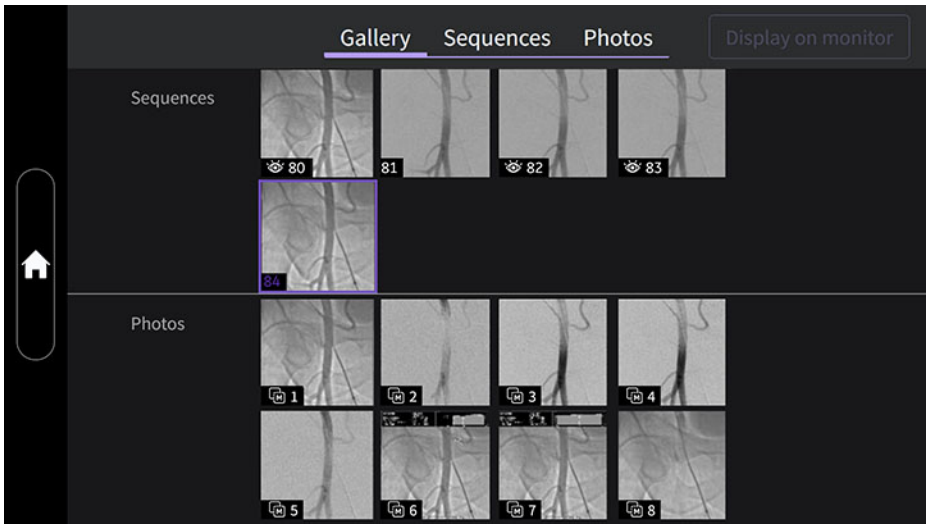
The state of the Smart Nav changes. Select **Validate** to keep the performed modification. Select **Reset** to reset the sequence to its initial state.

- Auto Pixel Shift ON or OFF function: Press **Enter** on either the DL remote control or the DL keypad to switch the value from ON to OFF or from OFF to ON.
  Note that Smart Nav is hidden in case of usage of the Reference display by another functionality.

10.7.6 Gallery / In-room Browser

From the Touch Panel:

Opening the **Gallery** application will display the review gallery on both Touch Panel and the reference display.

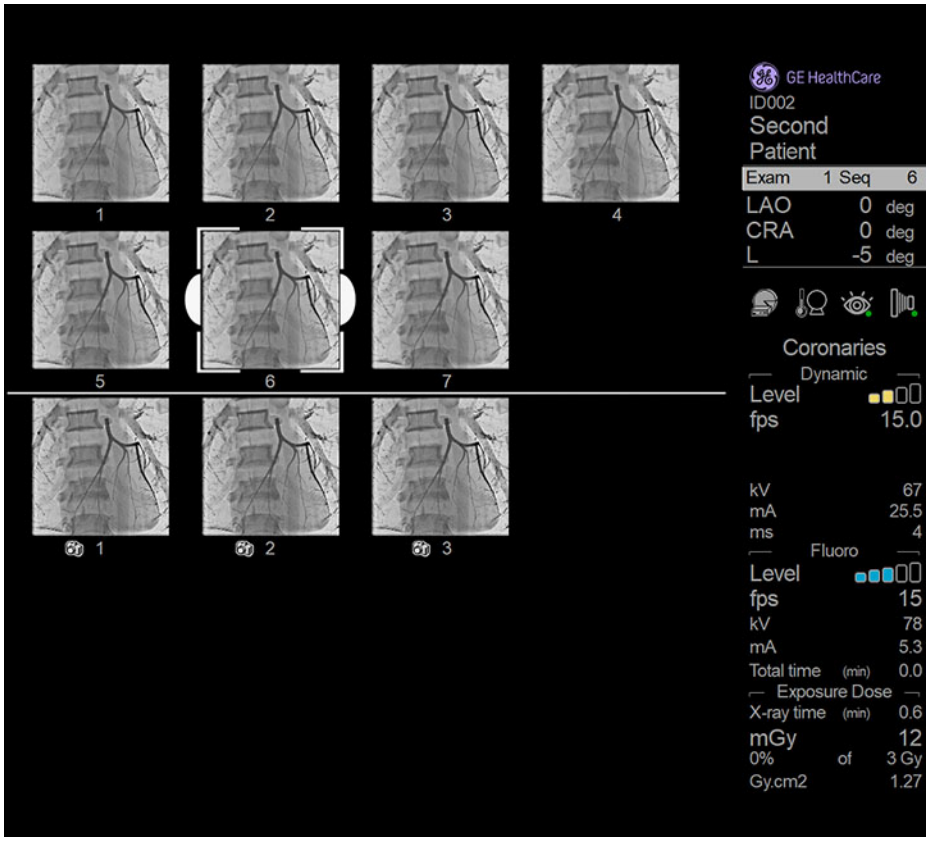


Both galleries are fully synchronized. The content and the list position are the same. Scroll vertically to navigate through the stored acquisitions.

NOTE
It may happen that the gallery disappears from the reference monitor. In that case, it can be redisplayed from the gallery page using the **Display on monitor** button.

From the DL Remote control or DL Keypad:

From the DL Remote Control, press the **Exam Loop** key (**[10]**, Figure 10-79 DL Remote Control on page 301) to activate and display the In-room Browser (IRB) on the reference display.



Sequence thumbnails are displayed first with their original sequence number; photo thumbnails are then displayed with a dedicated photo icon and their original photo number.

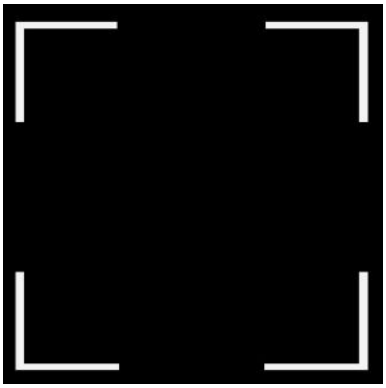
A thick horizontal line separates sequences and photos.

NOTE
In case of multiple exams performed on a Patient, sequences of each exam are displayed first (a thin horizontal line separates each exam), then, after the thick line, photos of each exam are displayed (a thin line also separates each exam).

NOTE
An image review must be started first to allow the IRB activation and display.

On the Touch Panel, the current sequence reviewed is highlighted.

On the reference display, a stroke shows the sequence in review:



The IRB can also be activated from the **Exam Loop** key of the Sequence Browser or the **Exam Mode** key of the DL keypad.

Once the IRB is displayed on the reference display, use the **Exam Loop** key to switch focus either on the IRB or on the live display. Refer to the highlighted label in side panel of both IRB or live displays to visualize where the focus is located.

Figure 10-81 Focus on live display

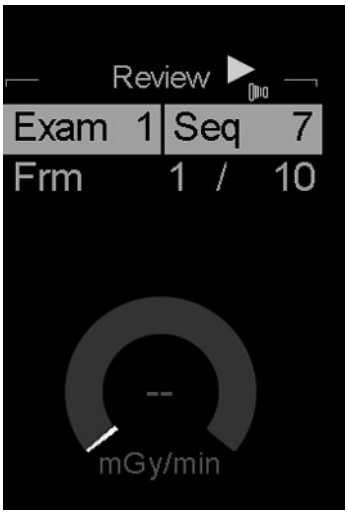
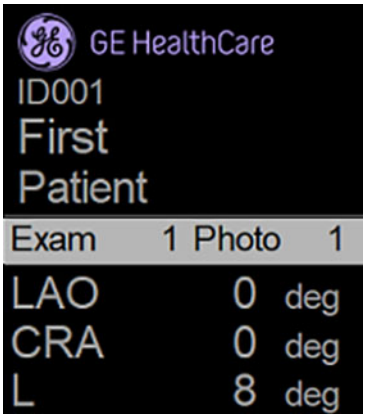


Figure 10-82 Focus on IRB



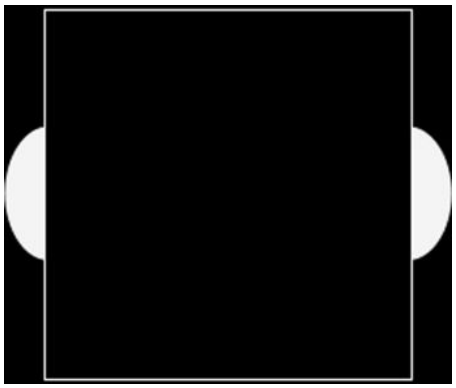
NOTE
The IRB will stay displayed on the reference display even when the focus is on the live display.

The IRB will be removed only in case of Start/End Exam or Store/Recall photo.

It will not be possible to activate or take focus on the IRB during a Stenosis quantification of acquisition.

When the focus is on the IRB, use one of the eight DL Remote Control arrows to select the sequence or photo to review.

A dedicated icon shows the selected thumbnail:

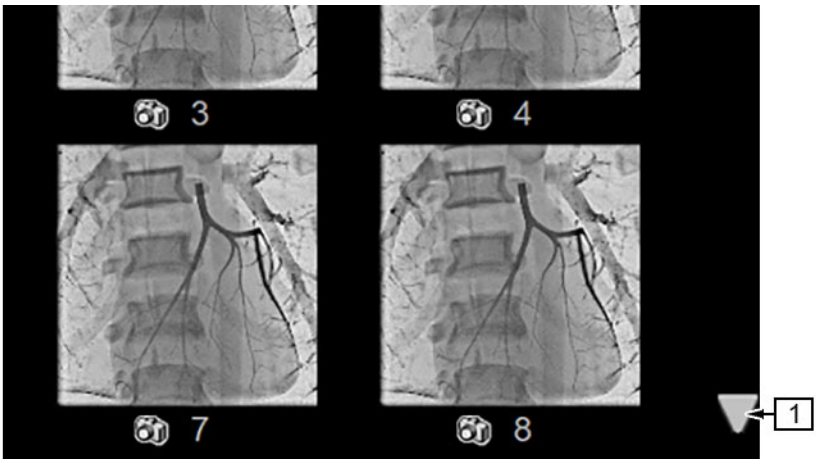


After selection, press on the DL Remote Control **Enter** key to launch the review.

NOTE
The thumbnail selection can also be performed using the DL keypad joystick. Press also on the DL keypad **Enter** key to launch the review.

A small arrow is displayed in the bottom right corner of the IRB to indicate that more than 16 thumbnails are available **[1]**.

Use the Remote arrow keys to scroll and see the other available thumbnails.



While focus is on the IRB, the 6 grey keys of the DL Remote Control (or equivalent functions on the DL keypad) can be used without exiting focus from the IRB.

Any other processing function activation (Zoom, Pixel Shift...) will automatically switch focus on the live display.

In case of photo thumbnail selection and **Enter** key pressed, the selected photo will replace the IRB on the reference display and the system will react as if a Recall photo was activated.

Press on Exam Loop again to re-display the IRB when the photo is not needed anymore.

10.7.7 Image enhancement and Post-processing

10.7.7.1 Brightness - Contrast

Brightness / contrast can be adjusted for the current sequence:

Brightness can be adjusted from 0 to 100, contrast from -100 to 100.

- Load the sequence to be reviewed.
- Press **Brightness/contrast** and changes the values.
- Exiting the function will apply the new settings.
- Cancel discards the changes and exits.
- Reset resets the parameters to the default values and exits.

Contrast value can be directly inverted using the Invert contrast button.

10.7.7.2 Edge Enhancement Filter Selection

Edge Enhancement can be used to sharpen or smooth the image content. A range of filter values is available and permits to obtain different image looks. By default, the edge filter used during acquisition is applied during DL review. This default edge enhancement value can be changed.

The following procedure should be followed to adjust the desired level of edge enhancement for Cardiac/DSA no Sub/Bolus/Chase/DSA/Single Shot/3D CT/3DStent acquisitions:

- Load the sequence to be reviewed.
- Press the **Edge Enhancement Filter Selection** and select the preferred filter setting for the type of acquisition reviewed.
- Apply the same number as the filter selected to the **Customer Sharpness Sensitivity** parameter in the acquisition protocol (ask Applications Specialist).

10.7.7.3 Mask Select

For DSA acquisitions, by default, the first frame of the sequence is used as a mask to subtract the sequence. Mask select can be used to change the mask image:

- Load the sequence to be reviewed.
- Press **Mask select** on the DL keypad or DL remote control, or Mask review on the Touch Panel and browse to review the mask images.
- Select the frame offering the best subtraction.

10.7.7.4 Mask Review

For Bolus and 3D CT acquisitions, each frame has its own mask image. It is possible to review only the masks of the subtracted sequence:

- Load the sequence to be reviewed.
- Press **Mask select** on the DL keypad or DL remote control, or Mask review on the Touch Panel and browse to review the mask images.

10.7.7.5 How to Use Pixel Shift

Refer to Pixel Shift in Smart Nav functions descriptions on page 303 for selection, navigation and interaction with Smart Nav.

Manual Pixel Shift function

The Manual Pixel Shift function is available in all subtracted Record modes. The Manual Pixel Shift is used to register the mask and one vessel image by shifting the mask in horizontal (X) and vertical (Y) directions.

You have to select one frame of the DSA sequence before activating the function.

NOTE

- If Auto Pixel Shift is set, the shift on a DSA sequence is applied to a unique frame of the sequence.
- If the Auto Pixel Shift is not set, the shift on a DSA sequence is applied to all the frames of the sequence.

Auto Pixel Shift ON/OFF function for DSA

Depending on the selected protocol, Automatic Pixel Shift correction is applied to the DSA Sequence in review.

NOTE

The correction is applied independently from one image to another.

The correction is computed for all DSA sequences. Switch the Correction ‘ON’ to display the result for the sequence in review or ‘OFF’ to remove it.

Move ROI function for DSA

The automatic pixel shift correction is based on a centered Region Of Interest (ROI). If the correction has to be optimized in another area of the frame, the Move ROI function will help move the ROI to this area.

Troubleshooting: bad correction/no correction (one frame or more).

Failure reasons	Workaround
There is not enough anatomical structure (like bones) in the ROI	Move ROI location to cover bone structure

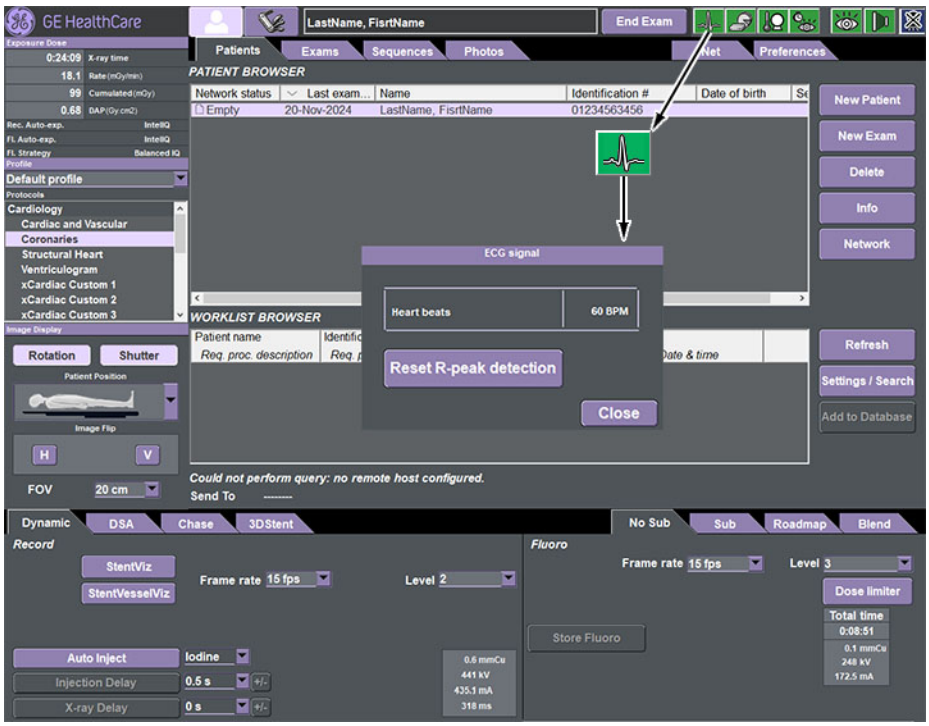
Failure reasons	Workaround
There are too many vessels in the ROI	Move ROI location to cover less vessels
The motion is too complex to be corrected by a translation (rotations, organ motions)	Use Manual Pixel Shift to correct registration
The ROI is over a collimated area	Move ROI location outside collimated area

10.8 How to Check or Reset the ECG, Disk Space, Heat Unit statuses

How to Check or Reset the ECG signal (Option)

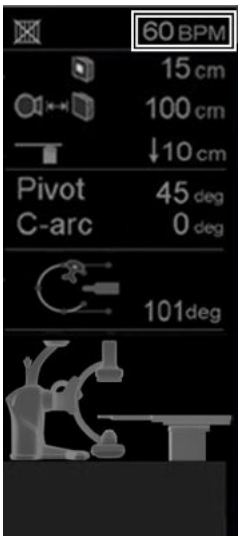
The icon is used as a visual update of the status of the ECG signal. Waveform and detected peaks are sent in real time during all kinds of acquisition modes to the AW. When the ECG is enabled and well received (i.e. status is Online), the ECG data will be automatically stored in the DICOM header of the corresponding sequence for the following record modes: DSA/Single Shot, Dynamic mode, unsubtracted 3D CT, 3DStent. T3

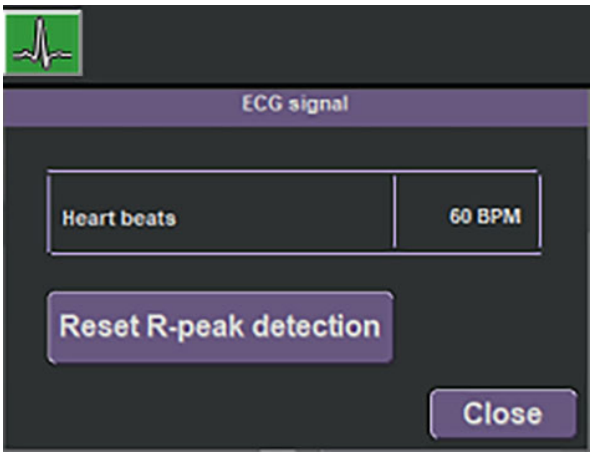
Click on the ECG icon on top of the DL Screen to display the beats per minute and to reset the R-wave peak to peak detection



Online (green):

A signal is received and the system is delivering triggers. The current BPM is displayed.



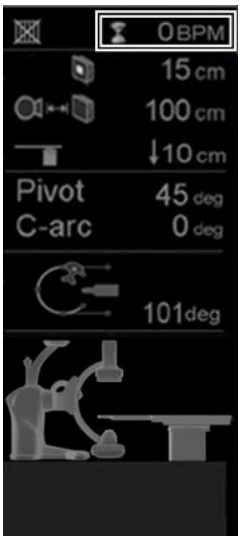


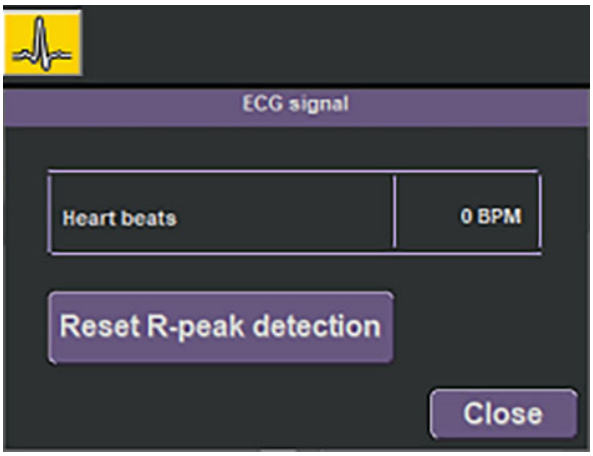
Stabilizing (yellow):

A signal is received, and the system is "learning" the ECG.

The algorithm detecting the peaks needs a period of 10 seconds to analyze the waveform (polarity, amplitude, etc.) before being able to trigger.

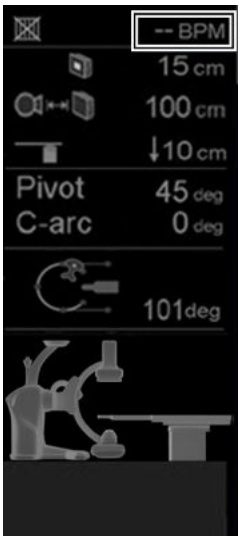
An hour glass will be displayed during the stabilization phase.

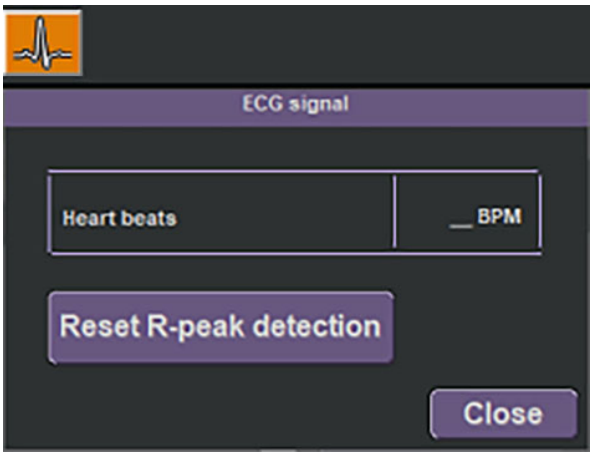




No Trigger (orange):

A signal is received but the system is not capable of delivering a trigger, there is no R - Peak detection or there is noise in the signal. "- -" is displayed.



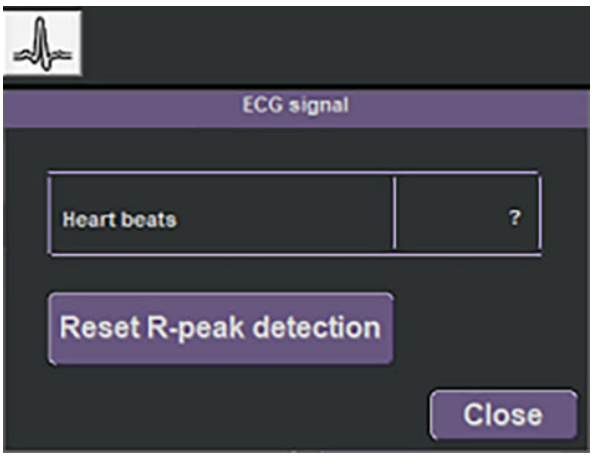


NOTE
Always refer to the hemodynamic or electrophysiology system as the prime reference for the status of the patient's ECG, not the IGS system.

Offline (White and grayed out):

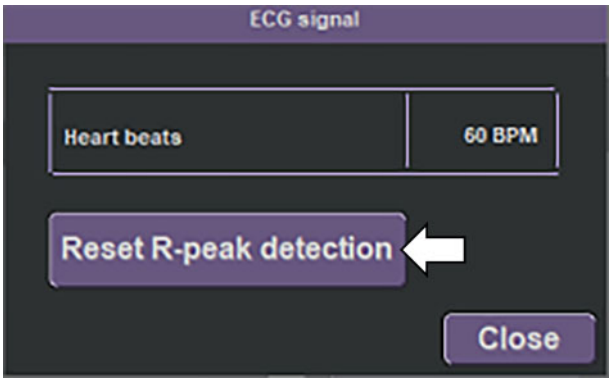
No ECG signal is received or there is no active exam.

The ECG line is black, there is no ECG indication



If the ECG signal is lost (ECG button is ORANGE or YELLOW):

In most situations, check the hemodynamic monitor verifying there is no electrode failure. Once that is confirmed, perform a reset of the R-peak detection to try to recover the signal.



The ECG waveform analyzer will be 'lost' in some situations:

- Noise cannot be differentiated from a regular signal and will try to detect peaks.
- When peaks are detected at a frequency greater than 300 BPM, the display of the BPM value will be ">300BPM" until the frequency is lower.
- If the polarity of the signal is changing, it is probable that no peak will be detected.
- If the signal is too noisy: false peaks may be detected.
- If the signal amplitude is increasing: false peaks may be detected.
- If the signal amplitude is decreasing: no peak may be detected.

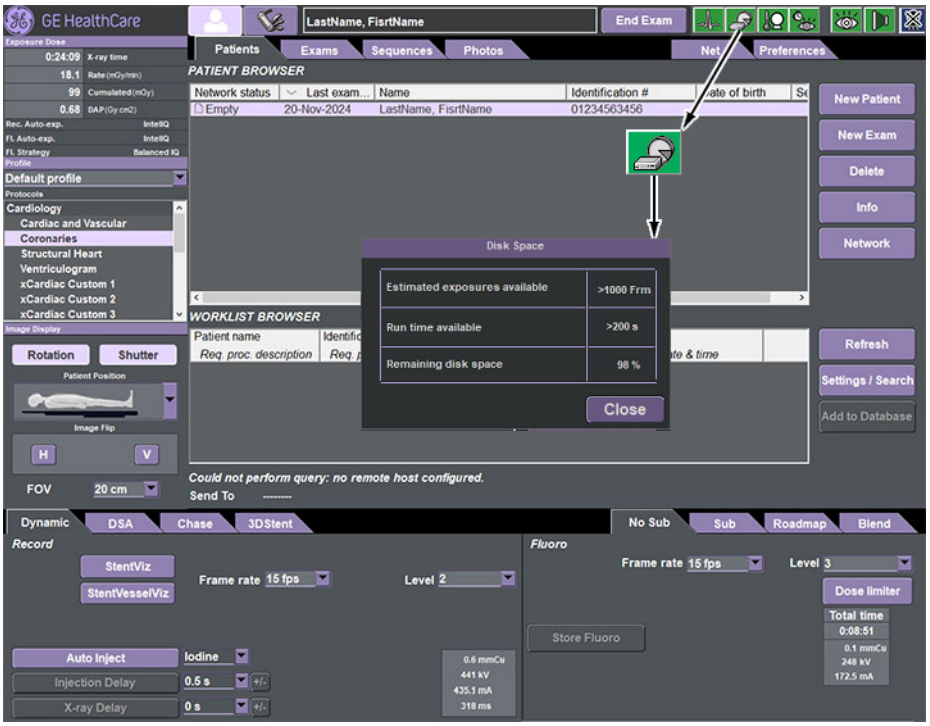
How to Check the Disk Space

Click on the Disk Space icon on top of the DL Screen to display:

- The estimated number of record frames available.
- The run time available.
- The Disk Space allocated.

Allia IGS 5

Allia IGS 7
Allia IGS 7 OR



The different thresholds for each warning levels:

- Higher than 10 sequences is GREEN.
- Between 3 and 10 sequences, warning level is YELLOW.
- Between 1 and 3 sequences, warning level is blinking YELLOW.
- Strictly below 1 sequence, warning level is ORANGE. Record Acquisition is not allowed anymore.

When it is not possible anymore to acquire images on one plane, the corresponding Record Ready icon switches to orange color.

NOTE
Always check that enough disk space is available before starting a procedure.

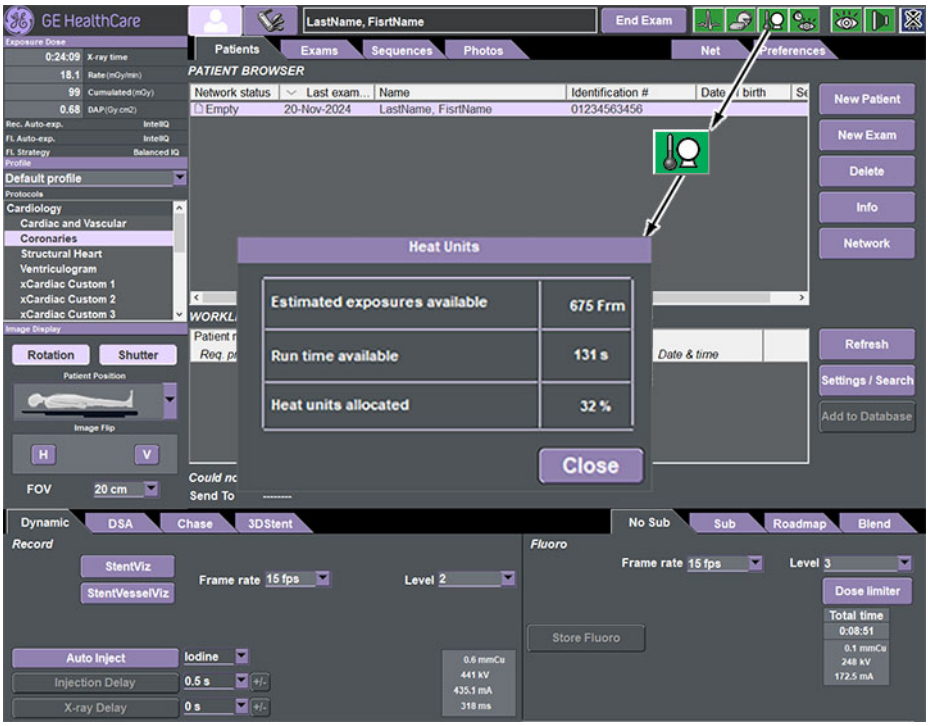
How to Check the Heat Unit Informations

The Heat Units Informations are available from the control DL Screen Heat Units window and from the reference display. These are only estimations made by the system depending on acquisition parameters computation.

Click on the Heat Units icon on top of the DL Screen to display the estimated exposures, run time available and heat units allocated.

Allia IGS 5

Allia IGS 7
Allia IGS 7 OR



The “Estimated exposure available” and “Run time available” values indicate the maximum possible run duration (respectively in terms of frames and of seconds) of the next acquisition that the user might perform. Depending on the acquisition mode, the system will check the possibility to perform the next run. If the entire run duration is not possible because of thermal limitation (tube too hot), these values will be displayed on the DL Screen Heat Units window and on the thermal icon in the reference display. For details about thermal behavior for the DSA mode, refer to 10.6.2 DSA Mode on page 265.

The “Heat units allocated” value indicates the current system availability based on an estimation of the tube thermal state.

There are 4 states:

- Higher or equal to 50%, warning level is GREEN.
- Between 30% - 50%, warning level is YELLOW.
- Between 0% - 30% , warning level is blinking YELLOW.
- Equal to 0%, warning level is ORANGE. X-Rays are not allowed anymore.

In addition to the different colors of the Heat Units Status button, the message `Heat Unit Remaining is equal or less than 20%` is displayed at the bottom of the live display when the remaining heat units reaches 20%.

A continuous audible signal is also activated when the remaining heat units reaches 20% and remain activated as long as the remaining heat units are lower than 20%. If X-Rays are ON (X-ray switch pressed) when the 20% threshold is reached, the audible signal is activated only after the X-Ray switch is released.

Before a Record acquisition is performed, it is the responsibility of the user to check the Heat Units information. Depending on acquisition parameters and available heat units, the next Record acquisition may or may not be completed.

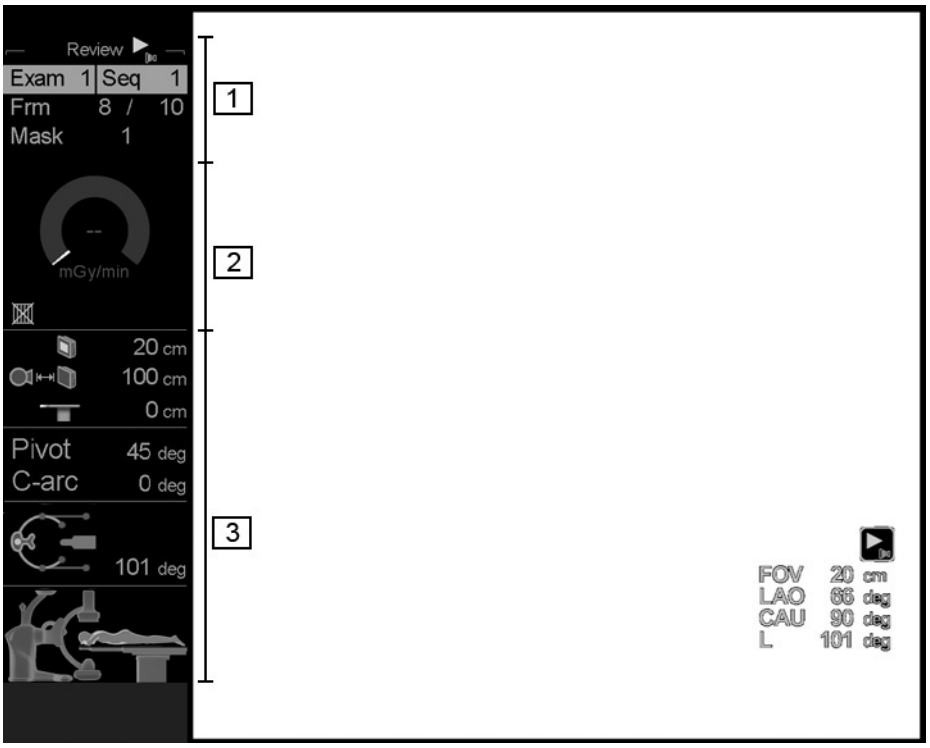
Reaching X-ray Tube thermal limit will interrupt the acquisition and require to wait for X-Ray Tube to cool down or to modify acquisition parameters. Fluoro is always available.

10.9 IGS Screens Image Display

Allia IGS 5

Allia IGS 7
Allia IGS 7 OR

Figure 10-83 Live display



Item	Description
[1]	Display state
[2]	Dose rate
[3]	Geometry area

10.9.1 Dose Display

Dose Rate Display

Error on dose estimation is within +/- 35 % interval in accordance with the international safety standard for Dose Rate which is valid down 6 mGy/min for dose rate.

The estimation value of the dose rate (mGy/min) delivered to the patient is continuously updated and displayed on the live display during acquisition. A white arrow positions this value between zero and the maximum dose rate value on a visual scale where the maximum dose rate is depending on acquisition mode, acquisition parameters, country regulation and system geometry.

On the Fluoroscopy dose rate meter, maximum of the dose rate meter and displayed limits correspond to fixed values for a plane representative of patient skin dose positioned at 30 cm from the entrance of the Image Receptor cover. As those limits on the dose rate meter is related to the SID, in some particular cases the numerical reference air kerma rate value can vary while its visual representation will stay at the same relative position

Outside of acquisition, the white arrow returns to zero value. The dose rate value of the last estimation remains displayed, as well as the visual colored representation remaining at the last value on the current scale.

Table 10-1 Different representations of live dose rate for fluoro acquisition with a blue color

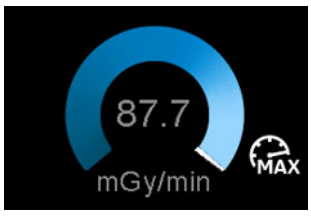
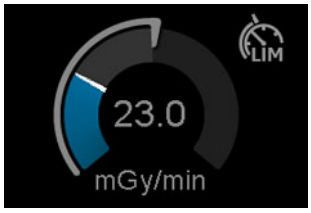
Live Display	Description
	Displayed on the left side of the live display to show the live dose rate during Fluoro acquisition.
	Displayed on the left side of the live display to show the last frame dose rate estimation after Fluoro acquisition.
	Status of the dose rate indicator when dose rate reached the highest reference dose at 30 cm from image receptor.
	Status of the dose rate indicator when the Dose Limiter is activated.

Table 10-1 Different representations of live dose rate for fluoro acquisition with a blue color (Table continued)

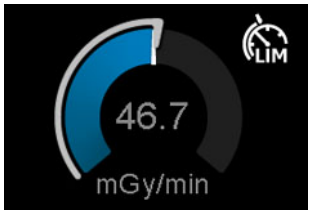
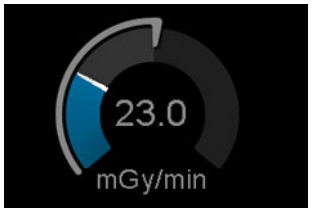
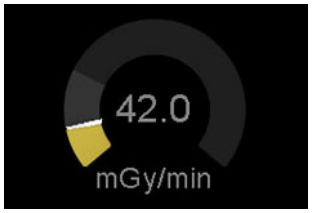
Live Display	Description
	Status of the dose rate indicator when dose rate reaches the Dose Limiter limit.
	Status of the dose rate indicator with an internal limit (in Maximum Dose Reduction Strategy)

Table 10-2 Different representations of live dose rate for record acquisition with a yellow color

Live Display	Description
	Displayed on the left side of the live display to show the live dose rate during Record acquisition.
	Displayed on the left side of the live display to show the last frame dose rate estimation after Record acquisition.
	Status of the dose rate indicator when dose rate reached the current record mode power limit.

Cumulated Dose and DAP Display

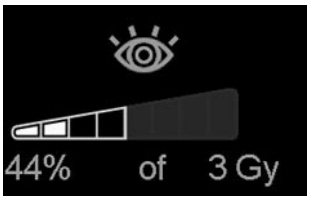
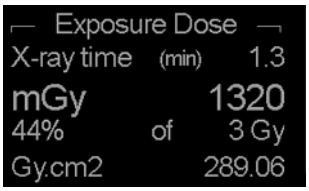
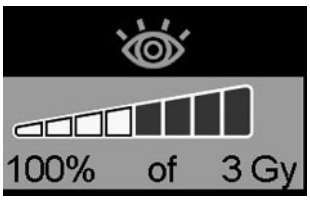
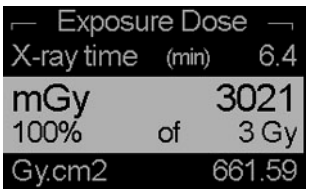
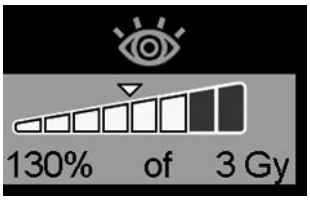
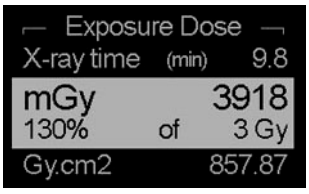
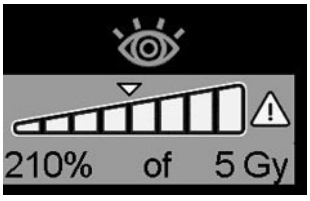
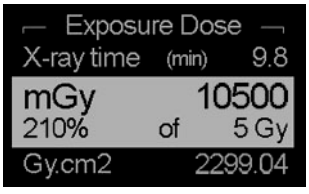
Error on dose estimation is within +/- 35 % interval in accordance with the international safety standard for Dose Rate and Total Dose and which is valid down to 100 mGy for dose.

Error on Dose Area Product (DAP) estimation is within +/- 35 % interval in accordance with the international safety standard and within +/- 30 % interval at 80 kVp in accordance with Switzerland legislation. This is valid down to 2.5 Gy.cm^2 DAP in accordance with the international safety standard.

Compliance is tested with acquisition or duration longer than 3 seconds.

The estimation of the total dose (cumulated Air Kerma) (mGy) delivered to the patient is continuously displayed and updated on the reference display. On the live display, the ratio (in percentage) of the current Total Dose value and the Dose Threshold value defined within the

protocol. The Dose Threshold value and a gauge icon visualizing the Dose percentage of the Threshold are displayed during acquisition. After the Dose Threshold value is reached, the value is displayed in reverse video. Once the Dose Threshold reaches twice the set Dose Threshold value, a warning icon is displayed on the corresponding live display next to gauge icon.

Description	Live display	Reference display
Display prior to the predefined Dose Threshold value being reached:		
Display after the predefined Dose Threshold value is reached:		
Display after the predefined Dose Threshold value has been exceeded (above 100%):		
Display on live display after double of the predefined Dose Threshold value has been reached:		

Possible states of the gauge icon depending on the actual Total Dose ratio to the Dose Threshold value.

	0% of Threshold		101-125% of Threshold
	1-25% of Threshold		126-150% of Threshold
	26-50% of Threshold		151-175% of Threshold
	51-75% of Threshold		176-200% of Threshold
	76-99% of Threshold		>200% of Threshold
	100% of Threshold		

Dose Threshold values are set in each protocol. The default Dose Threshold values are:

- 1 Gy Threshold for Pediatric protocols
- 2 Gy Threshold for protocols in **Interv Neuro** category
- 3 Gy Threshold for others

The Dose Threshold value of each protocol can be configured to any of the following values:

- 0.5 Gy
- 1 Gy
- 2 Gy
- 3 Gy
- 4 Gy
- 5 Gy

If you want to change Dose Threshold level for any of the protocols, contact your GE HealthCare Representative.

The DAP display unit is selectable:

- $Gy.cm^2$
- $cGy.cm^2$,
- $mGy.cm^2$.

10.9.2 Geometry Display

Innova^{IQ} and Magnus Maquet OR Tables

When the geometry angles are displayed using anatomical labels (CRA/CAU, LAO/RAO), the displayed angles take into account the position of the patient on the table, the rotation of the table and the tilt of the table.

Examples:

- If the table is tilted 5 deg Trendelenburg and the gantry is 10 deg towards head, the display will show CRA 5.
- If the gantry is in the lateral position and the table is rotated 5 deg clockwise, the display will show LAO 90, CRA 5.

When the geometry angles are displayed with mechanical labels, plain gantry angles are used.

A specific **Tilted Table** icon followed by the tilt angulation in degrees is displayed on the left side of the live display, in the Geometry area.

Example:

- In case of 8 degree Trendelenburg (head down) tilt, the tilt icon and 8 degrees will be displayed.
- In case of 8 degree Reverse Trendelenburg (head up) tilt, the tilt icon and 8 degrees will be displayed.
- In case of table horizontal icon will be displayed.

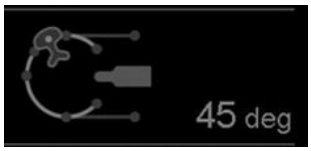
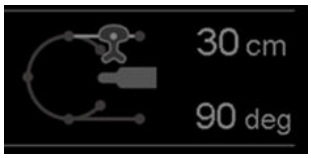
For Magnus Maquet OR Table system, the lateral tilt (cradle) of the table is possible:

- In case of right lateral tilt, icon will be displayed.
- In case of left lateral tilt, icon will be displayed.
- No cradle icon means no lateral tilt available.

Omega Table

When the geometry angles are displayed using anatomical labels (CRA/CAU, LAO/RAO), the displayed angles take into account the position of the patient on the table and the rotation of the table.

Swiveling and isocenter panning display on Allia IGS 7 and Allia IGS 7 OR system

	When on the swiveling trajectory (where gantry rotates around tits reference point), the geometry area will display the L (swivel) angle.
	When on the isocenter panning trajectory, the geometry area will display the distance between the gantry reference point and the isocenter.

Backout and parking display on Allia IGS 7 and Allia IGS 7 OR system

	When the gantry is on one of the backout trajectories and exits the imaging zone, this label will be displayed in the status area (bottom left area of the live display).
	When the gantry is on one of the parking trajectories, this label is displayed in the status area.

10.9.3 Status and Image Review

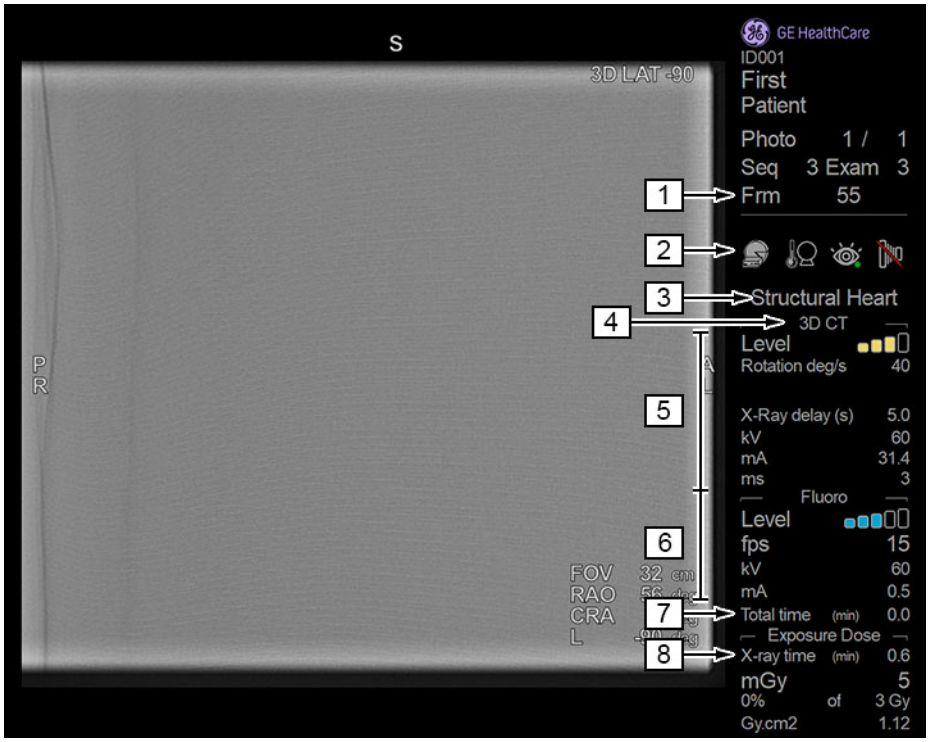
Symbol	Description
	Displayed on the left side of the live display to show that the displayed image is a live fluoroscopic image.

Symbol	Description
	Displayed on the left side of the live display to show that the displayed image is a live recorded image.
	Displayed on the left side of the live display during a Fluoro performed in Auto Fluorostore mode.
LIH	Displayed on the left side of the live display to show that the displayed image is the frozen last fluoroscopic image.
REVIEW	Displayed on the left side of the live display to show that the displayed image, previously recorded, is reviewed.
	Displayed on the left side of the live display to show that the Dose limiter is activated, this icon is lightened when the dose rate limit is reached.
	Displayed on the left side of the live display to show that the maximum limit of the dose rate is reached.
	Displayed on the left side of the live display to show that a mask is available for the Roadmap fluoro.
	Displayed on the left side of the live display to show the system is in Blended Roadmap and the selected percentage of vessel visibility
	Displayed on the left side of the live display to show the selected level of landscape for Subtracted, Blended Roadmap, or Roadmap fluoro.
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Play mode Forward nominal speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Play mode Forward half speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Play mode Forward high speed (review in loop)

Symbol	Description
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Play mode Backward nominal speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Play mode Backward half speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Play mode Backward high speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously recorded image reviewed in Pause mode (frozen image)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Play mode Forward nominal speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Play mode Forward half speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Play mode Forward high speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Play mode Backward nominal speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Play mode Backward half speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Play mode Backward high speed (review in loop)
	Displayed at the bottom right of the live display to show that the displayed image is a previously stored fluoroscopic image reviewed in Pause mode (frozen image)
	Displayed on the left side of the live display to show that an ECG signal is being detected

When reviewing a sequence or photo acquired when the table is tilted, a specific "Tilted Table" icon:  or  is displayed on the bottom right side of the live or reference display.

Figure 10-84 Reference display



Item	Description
[1]	Image in review
[2]	Monitoring bar
[3]	Selected protocol
[4]	Record mode
[5]	Record parameters
[6]	Fluoroscopy parameters
[7]	Total fluoro time
[8]	Total X-Ray time (Fluoro + Record)

Symbol	Description
	Displayed on the right side of the reference display to show that disk space is still available.
	Displayed on the right side of the reference display to show that disk is almost full.
	Blinking icon displayed on the right side of the reference display to show that the disk is nearly full.

Symbol	Description
	Displayed on the right side of the reference display to show that the disk is full.
	Displayed on the right side of the reference display to show that at least 50% of the heat units are still available in the X-Ray Tube.
	Displayed on the right side of the reference display to show that available heat units in the X-Ray Tube are between 30% and 50%.
	Blinking icon displayed on the right side of the reference display to show that available heat units in the X-Ray Tube are below 30%.
	Displayed on the right side of the reference display to show that the maximum heat units are reached in the X-Ray Tube.
	Displayed on the right side of the reference display to show that Fluoro is ready (enabled).
	Displayed on the right side of the reference display to show that Fluoro is not available (disabled).
	Displayed on the right side of the reference display to show that Record is ready (enabled).
	Displayed on the right side of the reference display to show that Record is not available (disabled).

Live and reference displays are managed independently, so, in some cases, it is possible to display images from two different Exams of the same patient.

There is a delay between Photo storage and Photo display. In case of X-Ray started before the Photo is displayed, use Recall Photo to display the last stored Photo.

10.9.4 Technique factors display resolution

The high voltage (in kV unit) is displayed with 1 kV resolution.

The tube current (in mA unit) is displayed with 0.1 mA resolution.

10.9.5 Display of SMPTE and QC test patterns

The SMPTE test pattern and 22 AAPM TG-18 test patterns are available for the quality control of the image display system. Use the AAPM TG-18 test patterns (OIQ, MP, UN10, UN80 and LN8-01 to LN8-18) to test compliance with the DIN 6868-157 standard.

To display the SMPTE pattern on both live and reference in-room/control-room displays, press the blank button **[1]**.

To display the test patterns on both live and reference in-room/control room monitors:

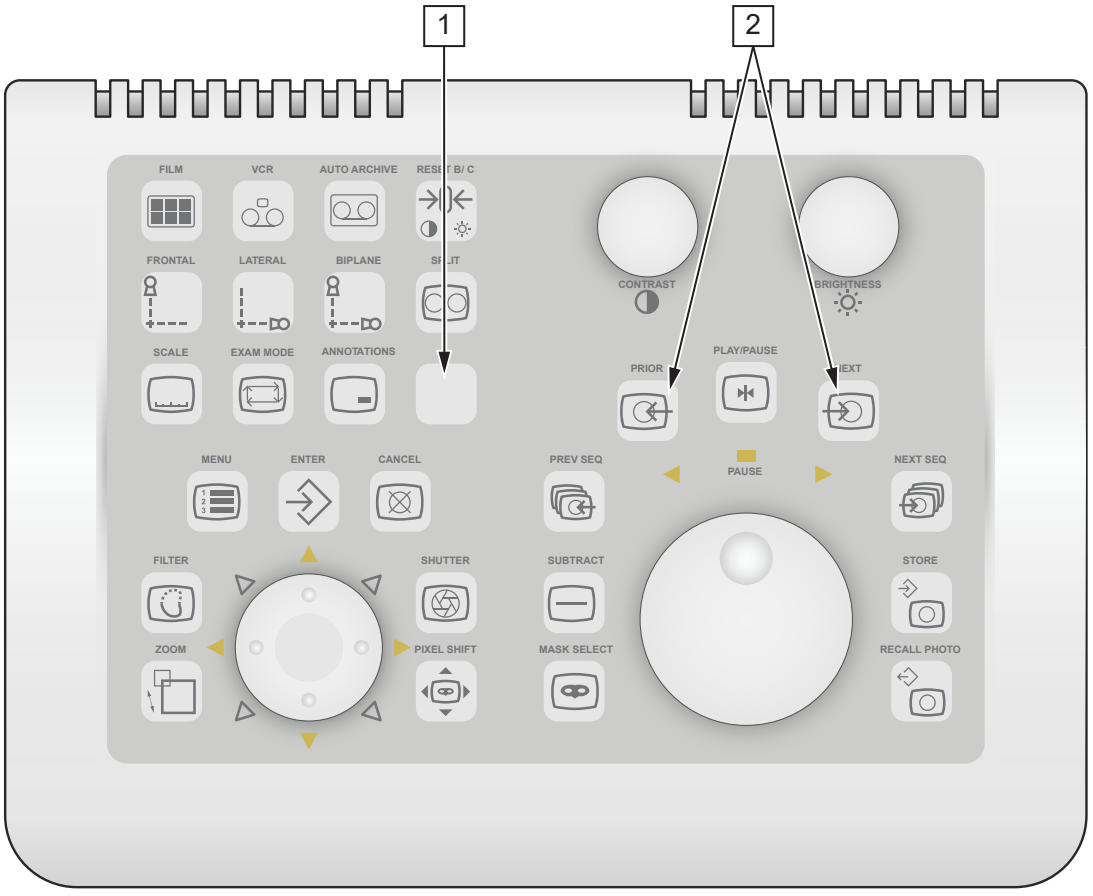
1. On the patient browser, if an exam is already started, click on **END EXAM**.
2. On the DL Keypad, click on the blank button **[1]** to visualize the SMPTE pattern.
3. On the DL Keypad, click on the Prev/Next button **[2]** to visualize the 22 test patterns.

NOTE
The monitor patterns are not available while in review or under Ready for exam status (exam in progress).

There are several ways to remove a displayed test pattern:

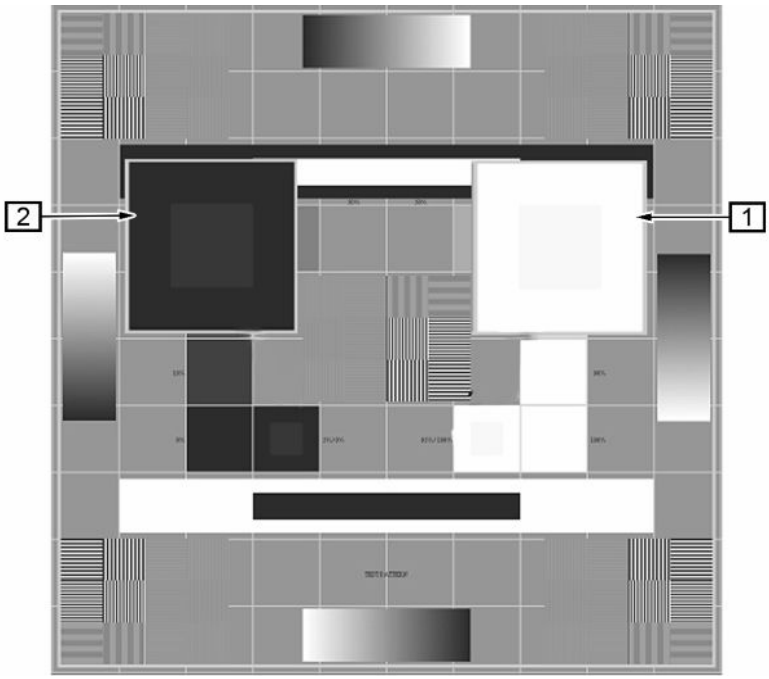
1. Re-press the blank button **[1]** to re-display the SMPTE pattern if another test pattern is displayed.
2. Create a new patient and start the exam to blacken both screens.
3. Start a review of any sequence to remove the pattern from the live display.
4. Recall a photo to remove the pattern from the reference display.

NOTE
Use the SMPTE test pattern to test compliance with the artifacts check of the DIN V 6868-57 standard.



10.9.6 Monitor Contrast Adjustment Check

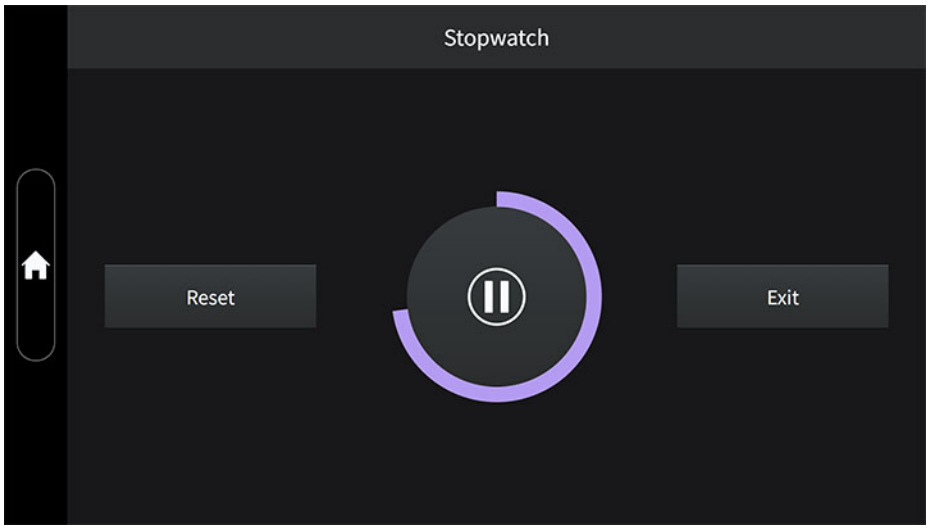
The Contrast Adjustment Tool is used to set monitor brightness and contrast levels. They are correctly adjusted when the 5% square inside of the black or white squares is visible. If this is not visible, brightness and contrast may need to be readjusted. Monitor changes are to be performed only by service.



Item	Description
[1]	Contrast Adjustment Tool 1
[2]	Contrast Adjustment Tool 2

10.9.7 Stopwatch

The Stopwatch gets displayed on the reference display in the bottom left corner by opening the application on the Touch Panel.



The application page provides the controls to Start, Pause, Restart the timer and Quit the function. Leaving this page keeps the Stopwatch displayed in the mode it was last used.

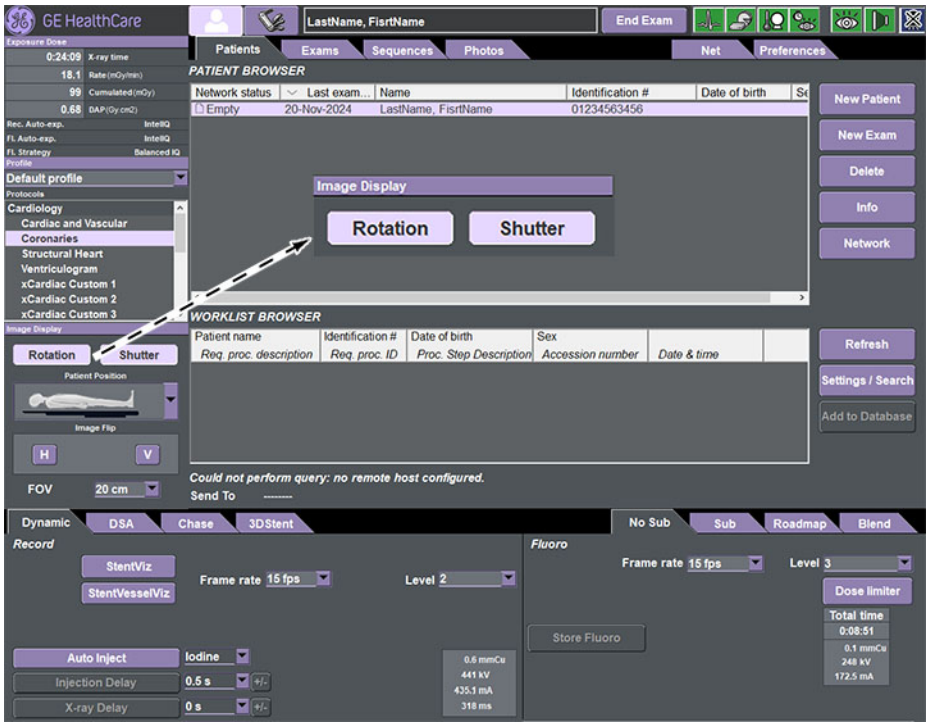
In the Stopwatch Application page:

- Press on **Play / Pause** to start or stop the counting.
- Press on **Reset** to restart the counting from 0.
- Press on **Exit** to stop the counting, reset and erase the display on the reference monitor.

10.9.8 Electronic Shutter

When collimated, an electronic shutter can be automatically applied around the image area to optimize its esthetic during Fluoro or Record acquisition, or during Review.

On the left side of the DL Screen, in the Image Display area, a Shutter button, activated by default, allows to display or not the electronic shutter during acquisition (Fluoro or Record).



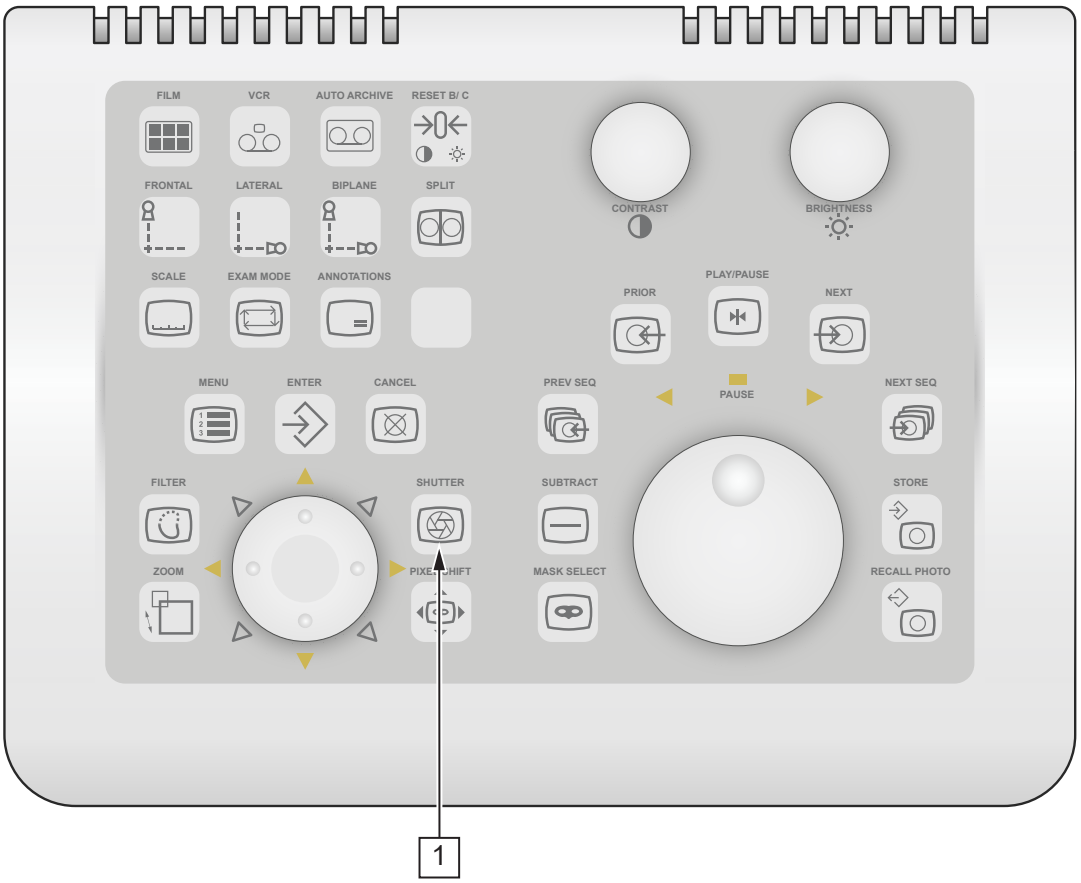
The electronic shutter is always displayed few millimeters larger than the image area to keep the collimator blades always visible during Fluoro or Record acquisition.

NOTE
In case collimator blades are moved during an acquisition, the electronic shutter displayed in review and pushed will correspond to the largest position of the blades.

Using the **Shutter** button located on the DL Keypad it is possible to activate or not the electronic shutter in review.

In review, the electronic shutter is applied as close as possible to the image area to hide the collimator blades completely.

NOTE
Only images acquired with electronic shutter can be reviewed with or without electronic shutter. For images acquired without electronic shutter the Keypad's **Shutter** button is inactive.



Item	Description
[1]	Show/Hide the electronic shutter in review

NOTE
The operator's attention is drawn to always check if the collimator blades edges are visible (not hidden by the electronic shutter) by checking for a sharp transition between the electronic shutter edge and the collimator blade edge. Failure to control may lead to not visualize exposed anatomy.

If a collimator blade edge is not visible, then the operator is recommended to:

- **For Record**: Review the last acquired sequence with electronic shutter disabled to check for collimator blades positions.
- **For Fluoro**: Stop the ongoing Fluoro then disable the electronic shutter for the next acquisitions to check for collimator blades positions.
- **For both cases**: If the blades are not in their place, disable the electronic shutter using the **Shutter** button located on the left side of the DL Screen, prior performing the next Fluoro or Record acquisition.

NOTE
When reviewing a stored Fluoro, it is not possible to remove the electronic shutter.
In case of electronic shutter failure during Fluoro, clinical data may be hidden by the electronic shutter and will be permanently lost.

NOTE
Always refer to recorded images on which electronic shutter can be disabled in review for diagnostic purpose.

11 Advanced Tools (Options)

11.1 Stenosis Analysis (Option)

The Stenosis Analysis (SA) application allows for an estimation of distances (for instance vessel size at the Stenosis position) and a Stenosis ratio by a trained user. It can be used to help an experienced physician assess lesion lengths.

NOTE
The Stenosis Analysis function is a reference tool only and is not intended as a means of making a diagnosis.

While the SA calculations take into account all available information, it should be kept in mind that these results are provided only as estimates to help the diagnosis, not as reliable measurements. In particular, the results are not robust to a number of factors including (but not restricted to) the followings:

- Mistake on the effective distance between the object to measure and the table top leading in the entry of an inaccurate value for the automatic calibration.
- Use of autocalibration on images acquired in full lateral view.
- Mistake on the effective size of the catheter (error in the entry, error on the catheter labeling) or other user inputs (points clicked).
- Significant error (more than +/- 4 cm) on the location of the artery above the table (in case of autocalibration on some systems).
- Catheter and vessel not in a same plane parallel to the detector plane.
- Measurement of objects in an axis not parallel to the detector plane.
- Bad positioning of catheter contours when using catheter calibration.
- Bad positioning of vessel edges.
- Conic deformation of X-Ray beam when calibrating on or measuring objects not centered in the image.
- Exceptional failures in gantry and table geometry measurement system.
- Patient motion during the sequence or between sequences.
- Vessel geometry affected by temporary changes (spasm, over-sizing due to medication…).

Therefore, special care should be taken when using the application in a diagnostic or interventional context - displayed results should be confronted to other sources of information - including (but not restricted to) personal assessment of practitioner and visual check - before taking a decision based on the data.

To get analysis results expressed in mm, Stenosis Analysis can be performed using either the autocalibration or the catheter calibration. In case of use of catheter calibration, the empty catheter and the vessel to analyse must be present in the same sequence.

The empty catheter must be in the vessel to analyse and at the same level as the lesion to quantify, else the measurement results displayed will be wrong. See 11.1.5 Calibrating on a Catheter Diameter on page 335.

NOTE
Before starting acquisition, exit the Stenosis Analysis (SA) application to have access to the display of the X-Ray technique factors on the DL Screen.

NOTE
For images acquired on system with universal table top or with headrest (adjustable), skull clamp or horseshoe, to get the distance in mm, Stenosis Analysis can be performed using catheter calibration only.

11.1.1 Analysis Limitations

The software will not allow analysis under the following conditions:

- Image type is not the original acquired image (i.e. photos cannot be used to perform an analysis).
- Some functionalities only work in the following conditions:
  Stenosis quantification can be used on Dynamic, subtracted DSA, Single Shot, subtracted Bolus and subtracted 3D CT images only (not available on InnovaChase™, unsubtracted 3D CT images and Dynamic images acquired using a Field of View larger than 20 cm).

Multi-segments and Distance Measurement functionalities are always available.

NOTE
Stenosis quantification and Distance measurement cannot be performed on Fluoro image: Fluoro LIH and Fluoro sequence created using the Fluorostore function. In such case, a pop up will be displayed and the application will fail.

11.1.2 Stenosis Analysis at a Glance

Using the Stenosis Analysis application to calculate stenosis size involves the activities summarized below.

- Select Study Image.
- In case of catheter calibration:
  Review patient loops and select two image-frame:
  - The one that most clearly shows the empty catheter
  - The one that most clearly shows the stenosis of interest.

  Calibrate System to Catheter Diameter.

  Indicate the size of catheter you are using, and then place 2 points within the catheter to define the section for diameter detection.

  The system uses the known catheter diameter to calculate screen pixels per millimeter. This metric is used later in calculating stenosis size.
- Stenosis Quantification; available for Dynamic, subtracted DSA, Single Shot, subtracted Bolus and subtracted 3D CT images only (not available on InnovaChase™, unsubtracted 3D CT images and Dynamic images acquired using a Field of View larger than 20 cm). T4
  Place 2 points or more within the vessel from the proximal to the distal part of the stenosis to define the section for automatic detection. The system determines the narrowest lesion width compared to the reference diameter, and then calculates stenosis percentages. 10.7
- In case of automatic calibration:
  Enter object to table top distance as requested or use default proposed value (15 cm for Cardiac image; 8 cm for Angio image).

- The system calculates stenosis and displays a report; available for Dynamic, DSA, Single Shot, Bolus and subtracted 3D CT modes only.
  You'll be given the option of saving the results electronically. When the report is saved electronically, it's added in the Photo Browser as a normal photo.

11.1.3 Performing Stenosis Analysis

- Once need for analysis has been established, select the desired sequence from the SEQUENCE BROWSER and begin playback.
- Review the images that most clearly show the stenosis of interest (and the catheter if needed).
- Click the **Stenosis Analysis** button **[1]** on the SEQUENCE BROWSER to start the analysis. The Stenosis Analysis button can be selected while in a review or paused mode.

If selected during a review, it will stop and then:

- The selected image and the Stenosis Analysis toolbar will appear on the flat panel.

NOTE
Any X-Ray acquisition will exit the Stenosis Analysis application.

Figure 11-1 Stenosis Analysis Button