



GE Healthcare

Vivid™ Tutorial Series: Auto LVQ Tool

Please also view the short videos which accompany this guide

Automated LV Quantification tool enables estimation of the LV volumes and EF in 4D data sets from both TOE and TTE

- Requires Full Volume LV dataset >12 FPS and >20% of HR, >25FPS for 4D Strain analysis TTE only
- Ensure no significant reverberation or stitching artefacts are present
- Ensure all of LV wall is inside the sector (Multislice Acquisition can help)

Part 1: 4D LV Volumes, EF & End Diastolic Mass

1. Click on **Measure** tab
2. Click on **Volume** from the drop-down list
3. Click on **4D Auto LVQ** from the drop-down list
4. Start at **Align Views**.
5. Notice the positions of the crop lines and their colours corresponding to the images displayed.
6. Use the short axis, bottom right, to adjust the green and white cut lines to ensure you have true 2-ch and APLAX views in the 2D images along with the 4-ch view top left.
7. Align the views so the vertical dotted line is going through the centre of the MV and the apex and the blue horizontal line is at the annulus of the MV.
8. To auto align press the **Auto Align** button on the ultrasound system touch screen. On EchoPAC™ the views will auto align when opening the tool.
9. To adjust the rotation of the image hover outside of the image to see a horseshoe shape, click drag and drop into position. Notice how it changes the other images.
10. To adjust the position of the crop line by hovering on the middle of the line until a straight line with arrows icon appears, click, drag and drop into position.
11. Adjust where the image lies beneath the lines by hovering over the image until a cross arrow is displayed, click, drag and drop the image into position.
12. Once you are satisfied with the alignment of all views click on **EDV** from the list on the right side
13. The first views displayed are end diastole, if you wish to change the frame use the arrows next to **Move ED** in the control panel
14. Press the **Auto** button on your ultrasound system console or select the **Auto Init** button on the left side of your EchoPAC™ screen and a contour will automatically be drawn.
15. OR for a more manual positioning of the contour line, in one of the apical views, place two points, one at the centre of the base and one at the apex and a contour will then be automatically drawn
16. The contour detection needs to be checked in all slices by hovering over an image with the cursor and moving through the ventricle from base to apex
17. If you wish to make an adjustment you can right click to keep the image still and then click on **Lock Views** and deselect once completed
18. To make an adjustment to the contour click to where you want the line to move to and the images will automatically update.
19. To remove an adjusted point, double click on the point and the images will automatically update
20. Once EDV contour check has been completed and approved click on **ESV** from the right-hand list
21. Repeat the process for ESV
22. Once both EDV and ESV have been completed and approved, select **Volume Waveform** and the segmentation will be processed
23. 4D Volumes and EF will now be displayed
24. Select LV Mass tab to display the LV End Diastolic Mass value
25. Click **Store** at any point to save a screen shot
26. For 4D LV strain quantification (available on 4D TTE images only), pause here and refer to Part 2 of this Vivid™ Tutorial alternatively select **Approve & Exit** to record the results or **Cancel** to discard.



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Part 2: 4D LV End Systolic Mass & Strain

1. Select **4D Strain ROI** from the touch screen tab or from the righthand list on the main screen
2. End systolic frame is displayed. Check the tracking of the Epicardial contour border by moving the cursor through the LV cavity from base to apex and observing the short axis view
3. Adjust the position of the contour line by clicking on the image where you would like the green line to move to
4. Double click on a point to remove any adjustments
5. Toggle between Endo, Epi and Endo & Epi by using the touch screen tab. The contour is highlighted green when it can be adjusted
6. Once the contour tracking is satisfactory note the updated **End Systolic Mass** value is shown in the measurements list.
7. Select **4D Strain Results** to move onto the next stage of the tool
8. Observe the segment tracking and note any areas which are highlighted grey and have a **X** on the Bulls Eye display. These segments are rejected from the analysis. If more than 3 segments are rejected a global strain value will not be calculated. Areas highlighted green are approved and will be included in the analysis.
9. To further adjust any grey tracking areas, return to the **4D Strain ROI** stage by pressing the tab on the touch screen. Adjust the contour line as described previously then go back to the **4D Strain Results** stage
10. You can also change the status of approved or rejected segments by highlighting the segment and selecting either **Approve** or **Reject** on the touch panel, without having to return to the 4D Strain ROI stage
11. Once all adjustments have been completed the Bull's Eye model will show the strain values per segment and a global longitudinal strain value (GLPS) will be display in the measurements list
12. Note the Bull's Eye is showing the 17-segment model, this can be adjusted to ASE 17-segment model in the configuration pages (Config/Meas-Text/Advanced/AutoLVQ Segment Model)
13. You can highlight a segment on the Bull's Eye and the corresponding strain curve on the graph above and on the 2D display images will also be highlighted
14. You can change the strain parameter results being displayed by using the touch screen tabs (Longitudinal Strain, Circumferential Strain, Area Strain, Radial Strain, Rotation/Twist, Torsion)
15. Click **Store** at any point to save a screen shot
16. Select **Approve & Exit** to store the measurements shown to the worklist, alternatively select **Cancel** to discard the results

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