

# QAngio XA 8.0

## Quick Start Manual



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<http://www.medisimaging.com>

On the Medis website, select “Products” and then the applicable product group. The user documentation can be found on that page.

A PDF reader is required to access the user documentation. If a PDF reader is not installed on the system, you can download the free Adobe reader. Visit the Adobe website at <https://get.adobe.com/reader/> and click “Download Adobe Reader” to download the PDF reader.

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# Legal Notices

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# Regulatory Information

## Intended Use

QAngio XA is software intended to be used for performing calculations in X-ray angiographic images of the chambers of the heart and of blood vessels. These calculations are based on contours that are either manually drawn by the clinician or trained medical technician who is operating the software, or automatically detected by the software and subsequently presented for review and manual editing. QAngio XA is also intended to be used for performing caliper measurements. The results obtained are displayed on top of the images and provided in reports.

The analysis results obtained with QAngio XA are intended for use by cardiologists and radiologists:

- to support clinical decisions concerning the heart and vessels
- to support the evaluation of interventions or drug therapy applied for conditions of the heart and vessels

## Indications for Use

QAngio XA is indicated for use in clinical settings where validated and reproducible quantified results are needed to support the calculations in X-ray angiographic images of the chambers of the heart and of blood vessels, for use on individual patients with cardiovascular disease.

When the quantified results provided by QAngio XA are used in a clinical setting on X-ray images of an individual patient, they can be used to support the clinical decisions making for the diagnosis of the patient or the evaluation of the treatment applied. In this case, the results are explicitly not to be regarded as the sole, irrefutable basis for clinical diagnosis, and they are only intended for use by the responsible clinicians.

## WARNINGS

-  QAngio XA must be used by cardiologists or trained technicians who are qualified to perform cardiac analysis. If the analysis results are used to reach a diagnosis, the results must be interpreted by a qualified medical professional. In clinical practice QAngio XA should not be used for purposes other than those indicated in the section Intended Use.
-  Users must have sufficient proficiency in the selected operating language, read this manual, and become familiar with the software before using QAngio XA in a clinical environment in order to obtain reliable analysis results.
-  Inherent to the angiographic method and the ventricular volume modeling, QAngio XA may severely overestimate the end-diastolic right ventricle volume in case of enlarged left ventricles.
-  QAngio XA may underestimate the volumes of large right ventricles with extensive trabeculae in case of bad contrast fillings.

## Note on Monitor Aspect Ratio and Resolution

-  The shapes of objects and calipers displayed may get slightly distorted when the resolution is set to an aspect ratio different than the monitor's physical aspect ratio. This distortion does **NOT** affect the accuracy of measurements or analyses. To avoid distortion, set the resolution of the monitor to an aspect ratio equal to the physical aspect ratio. LCD monitors typically operate best at their native resolution. Microsoft Windows recommends a resolution when it has sufficient information to do so.

## European Regulations

	QAngio XA is qualified as a class IIa medical device. It complies with the requirements of the Dutch Medical Devices Decree (Besluit Medische Hulpmiddelen, Stb. 243/1995) and the European Medical Device Directive 93/42/EEC.
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## North American Regulations

QAngio XA has been cleared for market in the United States by the FDA (Food and Drug Administration) under the provisions of Section 510(k) of the Food, Drug, and Cosmetic Act.

### Caution

Federal law restricts this device to sale by or on the order of a physician.

QAngio XA complies with the requirements of the Canadian Medical Devices Regulations and has been licensed as a Class II medical device.

## Asia-Pacific Regulations

QAngio XA complies with the requirements of the Australian Therapeutic Goods Administration and has been licensed as a Class IIa medical device.

QAngio XA complies with the requirements of the Japanese Pharmaceutical and Medical Device Law and has been licensed as a Class II medical device.

QAngio XA complies with the requirements of the South Korean Medical Device Act and has been licensed as a Class II medical device.

# Conventions Used

The following conventions are used throughout this manual to indicate mouse and keyboard actions and to refer to elements in the user interface.

## Mouse

Click	Press and release the primary mouse button. If you are left-handed, you may have set the right mouse button as your primary mouse button.
Click and drag	Press and hold the primary mouse button. Drag the mouse to perform a function. Release the primary mouse button. If you are left-handed, you may have set the right mouse button as your primary mouse button.
Right-click	Press and release the secondary mouse button. If you are left-handed, you may have set the left mouse button as your secondary mouse button.
Middle-click	Press and release the wheel button or the middle mouse button. If you have a two-button mouse, press and release the left and the right mouse button simultaneously.
Double-click	Press and release the primary mouse button twice.
Wheel	Rotate the mouse scroll wheel.

## Keyboard

SHIFT+click	Press and hold down the SHIFT key on your keyboard while you click a button or object.
CTRL+K	Press and hold down the CTRL key on your keyboard while you press K, then release both keys.

## Typographical Conventions

On the <b>Annotations</b> node of the <b>Procedures</b> pane...	Names of buttons, fields, menus, menu options, and tab names are capitalized and in bold.
<b>Procedures &gt; Text Annotation</b>	A sequence of menu options that you select to perform a specific task is indicated by angular brackets.
Label: <code>Aortic root</code>	Text that you type or that appears on the screen, such as annotation labels, is displayed in <code>Courier New</code> .

## Symbols Used



**Tip:** Provides helpful information or an alternative working method.



**Note:** Brings additional information to your attention.



**Caution:** Tells you to be careful when performing a task.



**Warning:** Warns you for a potentially dangerous situation in the image representation or analysis, which may lead to incorrect results. You are advised to follow the instructions to avoid this.

# Table of Contents

Introduction .....	11
<b>1</b> <b>About QAngio XA.....</b>	<b>11</b>
<b>2</b> <b>System Requirements.....</b>	<b>12</b>
2.1        Hardware .....	12
2.2        Operating System.....	12
<b>3</b> <b>Support .....</b>	<b>13</b>
Getting Started.....	14
<b>4</b> <b>Startup from Medis Suite .....</b>	<b>14</b>
<b>5</b> <b>QAngio XA Workspace .....</b>	<b>15</b>
5.1        Overview.....	15
5.2        Menu .....	16
5.3        Toolbar.....	16
Working with QAngio XA .....	17
<b>6</b> <b>Viewing .....</b>	<b>17</b>
6.1        Monoplane and biplane viewing .....	17
6.2        Image Viewports .....	17
6.3        ECG .....	19
<b>7</b> <b>Performing an analysis .....</b>	<b>21</b>
<b>8</b> <b>Single Vessel Analysis.....</b>	<b>22</b>
8.1        Wizard Step 1: Series selection.....	22
8.2        Wizard step 2: Frame selection .....	22
8.3        Wizard Step 3: Pathline .....	24
8.4        Wizard Step 4: Contours.....	24
8.5        Wizard Step 5: Reference .....	25
8.6        Wizard Step 6: Stent .....	26
8.7        Report.....	27
<b>9</b> <b>Monoplane Ventricle Analyses .....</b>	<b>28</b>

9.1	Wizard Step 1: Series selection.....	28
9.2	Wizard Step 2: ED Landmarks.....	28
9.3	Wizard step 3: ES Landmarks .....	29
9.4	Wizard Step 4: ED Contour .....	29
9.5	Wizard step 5: ES Contour .....	30
9.6	Wizard step 6: Results .....	31
9.7	Report.....	31
<b>10</b>	<b>Biplane Ventricle Analyses.....</b>	<b>32</b>
10.1	Wizard Step 1: Series selection.....	32
10.2	Wizard Step 2: ED Contours .....	32
10.3	Wizard step 3: ES Contours .....	33
10.4	Wizard step 4: Results .....	34
10.5	Report.....	34

## 1 About QAngio XA

QAngio XA is the Medis solution for the quantification of coronary vessels and ventricles of the heart in X-ray angiograms.

This software solution offers quantification results that enable interventional cardiologists and radiologists to review X-ray angiograms, and it provides a solid basis for the assessment of new therapies.

## 2 System Requirements

### 2.1 Hardware

#### QAngio XA:

- Intel or compatible quad-core processor
- 4 GB of RAM
- 250 GB of available hard disk space  
(if you want to store images locally, make sure you have enough disk space)
- 3-button mouse, scroll-wheel recommended
- CD-ROM player to install the software from CD-ROM
- Widescreen monitor supporting a minimum resolution of 1920x1080 pixels
- Video card supporting OpenGL and with 512 MB memory
- Network interface card of at least 100MBit/s to access, receive, and send images over the network

#### Sentinel license server:

- Intel or compatible processor with a minimum speed of 550 MHz
- 128 MB of RAM
- 1 GB of available hard disk space
- Network interface card

#### NOTES:

- All hardware must be compliant with the operating system
- For the license server, a PC with a fixed IP address or a reserved IP address in the DNS server is strongly recommended

### 2.2 Operating System

#### QAngio XA:

- Microsoft Windows 7, SP1, 64 bit version
- Microsoft Windows 8.1, 64 bit version
- Microsoft Windows 10, 64 bit version
- Microsoft Windows Server 2008 R2, SP1, 64 bit version
- Microsoft Windows Server 2012 R2, 64 bit version
- Microsoft Windows Server 2016, 64-bit version

#### Sentinel license server:

- Microsoft Windows 7, 32 and 64 bit version
- Microsoft Windows 8, 32 and 64 bit version
- Microsoft Windows 8.1, 32 and 64 bit version
- Microsoft Windows 10, 32 and 64 bit version
- Microsoft Windows Server 2008, 32 and 64 bit version
- Microsoft Windows Server 2008 R2, 64-bit version
- Microsoft Windows Server 2012, 64-bit version
- Microsoft Windows Server 2012 R2, 64-bit version
- Microsoft Windows Server 2016, 64-bit version

## 3 Support

Medis is committed to offering high-quality products and services. If you have questions about the software or if you would like to make suggestions for improvements in the software or in the documentation, please contact the Medis helpdesk.

If you contact the Medis helpdesk by e-mail, mention the name of the software and the version number in the subject field. To look up the version number of your software, select  > **Help** > **About** from the Medis Suite Main toolbar.

### North and South America

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## 4 Startup from Medis Suite

To enhance your image processing workflow, QAngio XA is launched from Medis Suite in different analysis modes. Each mode will provide you with different image analysis functionality with dedicated functionality and viewport layouts.

The following launch modes for QAngio XA are available in Medis Suite:



QCA Single Vessel: single vessel analysis on monoplane XA image acquisitions



QVA Single Vessel: peripheral single vessel analysis on monoplane XA image acquisitions



LV Monoplane: left ventricle analysis on monoplane XA image acquisitions



LV Biplane: left ventricle analysis on biplane XA image acquisitions



RV Biplane: right ventricle analysis on biplane XA image acquisitions



Availability of the different analyses is dependent on licenses. If you would like to purchase a license for one or more of the QAngio XA analysis modules, please contact Medis.



You can load the patient images before or after starting QAngio XA. In both cases the images will automatically be loaded into QAngio XA.

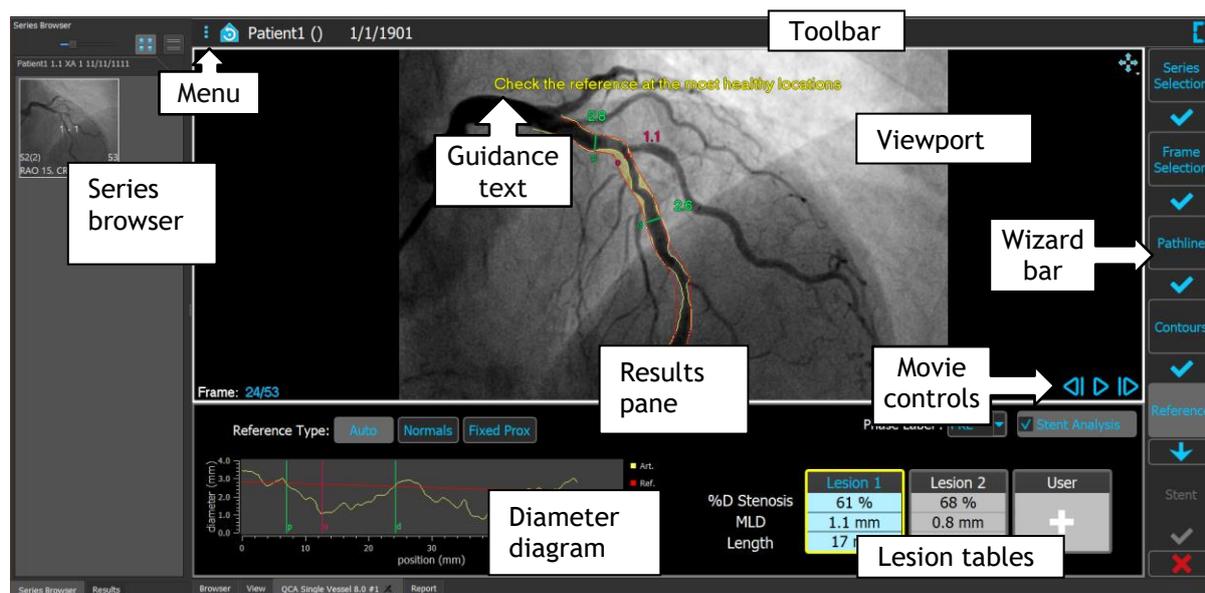
Detailed information on how to start the QAngio XA app and load images is described in the Medis Suite user manual.

## 5 QAngio XA Workspace

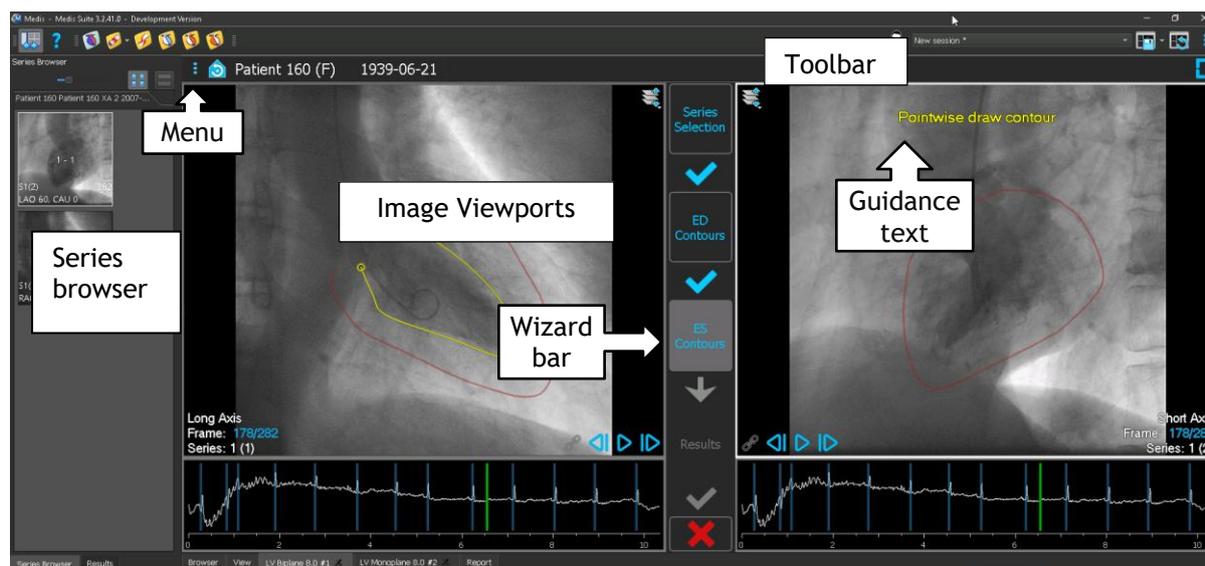
### 5.1 Overview

The main workspace window of QAngio XA consists of toolbars, workspace panes, and the central window area with the image viewport(s). The layout of the workspace window differs between the different QAngio XA launch modes; it is dependent on the type of acquisitions used as input for the analyses (monoplane or biplane), and the analysis module that was selected.

In this screenshot, you can see the layout for the QCA Single Vessel analysis:



In this screenshot, can see the layout for the Left Ventricle Biplane analysis:



## 5.2 Menu

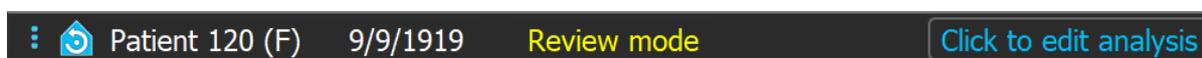
The menu contains commands to activate the application functionality.

To make the menu visible:

- Click on the menu icon  in the toolbar of the QAngio XA app.

## 5.3 Toolbar

The image below shows the toolbar that is available in QAngio XA.



The toolbar contains the button to show the menu, the patient name and birthdate and optional info and/or buttons.

## 6 Viewing

### 6.1 Monoplane and biplane viewing

QAngio XA can be started in different analyses modes. The **QCA Single Vessel** analysis and the **LV Monoplane** analysis require one single monoplane acquisition as input, and therefore provide a single viewport. The **LV** and **RV Biplane** analyses require a biplane acquisition (or two matching monoplane acquisitions) and therefore provide two viewports.

### 6.2 Image Viewports

#### 6.2.1 Biplane viewing

To maximize an image in the viewport:

- Double-click the image.

This maximizes the image, so that it takes up the entire viewport.

To return to the original viewport layout, double-click the image again.

#### 6.2.2 Mouse mode

The behavior of the left mouse button depends on the mouse mode: cine, zooming, panning, or window width and level. The active mouse mode is displayed in the mouse mode icon in the top corner of the image viewport.

To cycle through the different mouse modes:

- Select the mouse mode icon to activate the next mouse mode.

### 6.2.3 Frame Selection

You can move forward or backward through frames in the image in several ways. Moving through frames only applies to the selected viewport, unless synchronization is active. The active frame number is shown at the bottom of the viewport.

Action	Button in Viewport	Key on keyboard	Mouse scroll wheel	Left mouse button (cine mode)
Select next frame		→	Scroll down	Mouse drag right or down
Select previous frame		←	Scroll up	Mouse drag left or up
Select first frame		Home		
Select last frame		End		
Play the cine forward		Ctrl + →		
Play the cine backward		Ctrl + ←		
Stop playing the cine				
Toggle synchronization				
Select frame	Right click on the frame number in bottom corner of the viewport and enter the frame number. E.g. 			

If an ECG diagram is present, you can also select frames by dragging the ECG marker or by clicking in the ECG diagram.

### 6.2.4 Synchronization of corresponding biplane images

Frame synchronization helps you to simultaneously navigate through images in both viewports. This is only available in biplane acquisitions.

When synchronized, the  icon is shown at the lower part of the viewport, both viewports will always show the image with the same frame number.

When not synchronized, the  icon is shown at the lower part of the viewport or no icon is shown at all. Changing the frame selection in one viewport does not affect the other viewport.

In the LV biplane and RV biplane modes, synchronization cannot be switched on or off. It is always on for biplane acquisitions and always off for monoplane acquisitions.

## 6.2.5 Invert Image

To invert the image view, i.e. turn blacks to whites and whites to blacks:

- Select “Invert image” from the viewport context menu to toggle the image inversion.

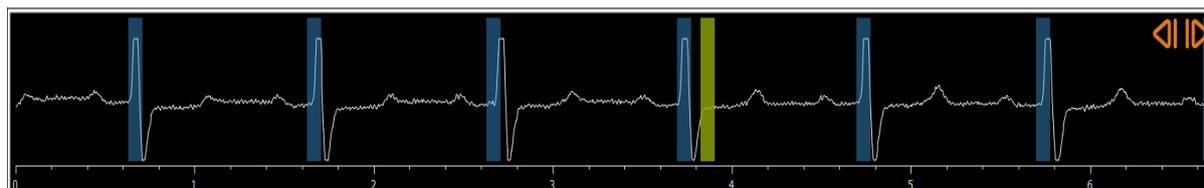
## 6.2.6 Initial View State

To reset the zooming, panning and window width and level settings to the initial view state:

- In the toolbar, click  to reset the zooming, panning and window width and level and image inversion.

## 6.3 ECG

In the frame selection step of the QCA Single Vessel wizard, the Landmarks and Contour steps of the LV Monoplane wizard and the Contours steps of the LV and RV Biplane wizards, the ECG diagram is shown below the image. If ECG data is included with the image data, the ECG curve is shown in the diagram.



On the x-axis, time is displayed in seconds. The yellow/green vertical bar indicates the selected frame, visible in the corresponding image viewport. The blue bars indicate the frames that correspond to the automatically detected ED phases.

To select a frame using the ECG diagram:

- Drag the green vertical bar to the desired location.

Or,

- Click in the ECG diagram to place the vertical bar (and thus select the related frame) directly at the desired location.

Or,

- Click on  to select the same phase in the previous cardiac cycle.

- Click on  to select the same phase in the next cardiac cycle.

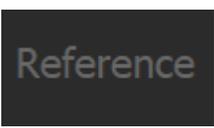
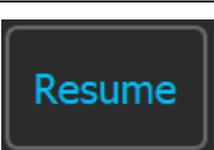


The buttons  and  are not available in the ES Landmarks and ES Contour(s) steps.

## 7 Performing an analysis

To start an analysis, select the corresponding launch mode in Medis Suite (see also Chapter 4). All XA images available in Medis Suite that are suitable for the analysis are loaded automatically in QAngio XA. The analysis starts in the Series Selection step, that shows the available calibrated XA images as thumbnails under the image viewport.

In all analyses, a wizard bar is displayed, showing the steps of the analysis. For example, the wizard bar of the QCA single vessel analysis is:

Wizard bar	
	Buttons with blue text on a dark background indicate completed steps. Any of these buttons can be pressed to jump to the corresponding wizard step.
	The button with blue text on a grey background indicates the active step.
	The button with the blue arrow can be pressed to proceed to the next step of the analysis. This button is only enabled when all required data for the active wizard step is available.
	The blue check icon indicates that the transition in the workflow from the step above the icon to the step below the icon has been completed.
	Buttons with grey text on a dark background are disabled. The wizard step has not been performed.
	Select the Cancel button to cancel the analysis and discard all changes. For a new analysis, cancelling the analysis will close the QAngio XA app and remove it from the Medis Suite session.
	Select the Finish button to complete the analysis. The wizard will be closed and QAngio XA will show the analysis in review mode. The analysis results will become available in the Medis Suite report.
	If in the current wizard step you cannot change the analysis frame, activating another frame will pause the wizard. The Resume button will be displayed at the bottom of the wizard bar. Select it to activate the analysis frames and resume the analysis.

If you reload a Medis Suite session that has QAngio XA analyses, they will be restored and activate QAngio XA in review mode.

## 8 Single Vessel Analysis

### 8.1 Wizard Step 1: Series selection

The analysis starts with the series selection step. The objective of this step is to select an appropriate image for the analysis.

QAngio XA only loads DICOM greyscale XA images with square pixels (pixel aspect ratio 1:1) that are either manual calibrated in Medis Suite or include isocenter calibration data.

To select the series for analysis:

- Click on a thumbnail under the viewport.

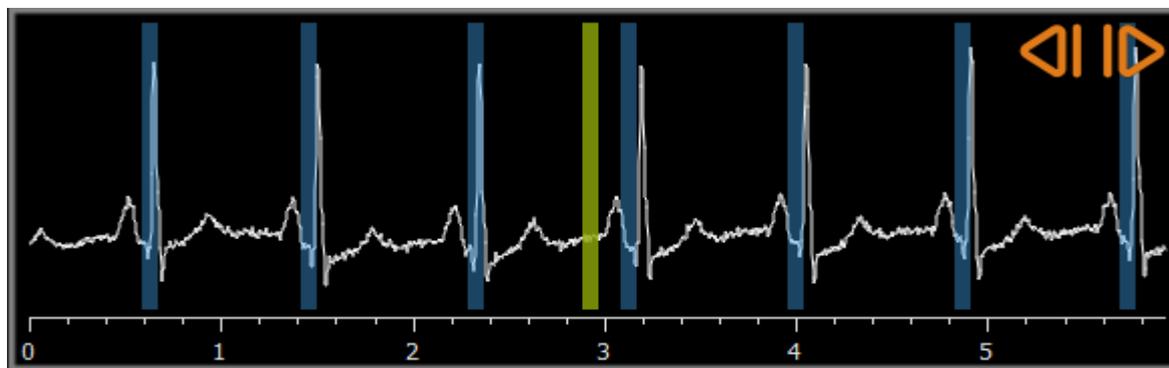
The image will be loaded in the viewport.

Press  to proceed to the next step.

### 8.2 Wizard step 2: Frame selection

The objective of the frame selection step is to select a frame to be analyzed. It is advised to select a frame that is on (or just before) the end diastolic (ED) phase of the heart cycle.

If an ECG signal is available with the image data, it will be displayed in a diagram underneath the image viewport.

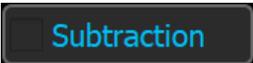


Select the frame to be analyzed and press  to proceed to the next step.

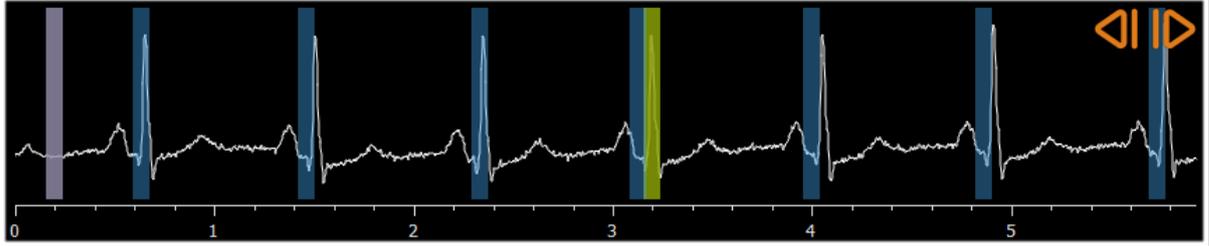
#### 8.2.1 Subtraction

In the QVA single vessel analysis, it is possible to perform subtraction on the analyzed image. Another image (the **mask image**) of the same series is subtracted from the analysis image, optionally with pixel shift.

To apply subtraction:

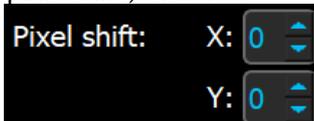
1. Click .

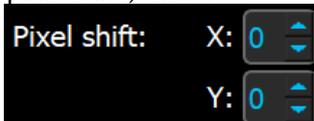
2. Select the proper mask frame, either by  or by dragging the purple mask frame bar in the ECG diagram:



- To make the currently selected frame the mask frame and select the original mask frame as analysis frame, click **Swap frames**.

3. If needed, change the pixel shift, either



- using the controls , or
- by CTRL+arrows, or
- by clicking in the image near a border. An arrow will appear when the mouse hovers over the image near a border:



- To go back to the situation where there is no pixel shift, click **Reset pixel shift**.

- To switch off subtraction, click  again.

## 8.3 Wizard Step 3: Pathline

The objective of the pathline step is to create a pathline in the vessel segment of interest.

### To create a pathline:

1. Click in the viewport to mark the proximal point of the vessel segment.
2. Click in the viewport to mark the distal point of the vessel segment.

QAngio XA will automatically detect the pathline and contours.

3. If needed, drag the proximal or distal point of the vessel segment to correct their location.

### To edit a pathline:

- Click a point on the pathline and drag it to the correct position.  
This creates a pathline support point and redetects the pathline and the contours.
- If needed add more support points or drag existing support points to better locations.

### To delete a pathline support point:

- Right-click on the support point to delete it.  
The pathline between the proximal and distal points and the contours are redetected automatically.

Press  to proceed to the next step.

## 8.4 Wizard Step 4: Contours

The objective of the contour step is to assert that the vessel contours are correct. You can verify and optionally correct the automatically detected contours. On entering the contour step for the first time, the image will be zoomed for a better look at the contours.

### To edit a contour:

- Click a point on the contour and drag it to the correct position.  
This will create a contour support point and redetect the corresponding contour.
- If needed add more support points or drag them to better locations.

### To delete a contour support point:

- Right-click on the support point.  
The point is deleted, and the corresponding contour is redetected.

Press  to proceed to the next step.

## 8.5 Wizard Step 5: Reference

The objective of the reference step is to obtain a correct reference diameter function and lesions markers.

QAngio XA will determine and display the following:

- The reference contours, indicating the vessel contours had the vessel been healthy.
- One or more lesions, each having a table displaying the following lesion parameters: percentage diameter stenosis, minimal lumen diameter (MLD), and the lesion length.

### 8.5.1 Correcting Reference Contours

There are two ways for correcting the reference contour:

- You can mark two healthy parts of the vessel segment as “normal areas”.

Or:

- You can set a fixed reference diameter for the proximal part of the vessel in combination with a ‘normal area’ for the distal part.

**To correct the reference contours by normal areas:**

- Click the button **Normals** (above the diagram) to put the reference contours in normal area mode. Two normal areas will appear in the image and in the diagram.
- Click and drag the areas to the required positions, either in the image or in the diagram. You can resize the areas by dragging an edge. The reference contours will be recalculated automatically.

**To correct the reference contours by a fixed proximal reference diameter:**

- Click the button **Fixed prox** (above the diagram) to put the reference contours in fixed proximal reference mode. A marker (proximal) and a normal area (distal) will appear in the image and the diagram.
- Adjust the normal area either in the image or in the diagram by:
  - Dragging the area to the desired position and/or
  - Resizing the area by dragging an edge.The reference contours will be recalculated automatically.

### 8.5.2 Correcting Lesion Markers

Multiple lesions can be detected in a single vessel segment. The maximum number of automatically detected lesions can be set in the options.

**To correct the lesion markers:**

- If needed, select the desired lesion by clicking on its lesion table.
- Click and drag the obstruction (O) marker to the required position.
- Click and drag the proximal (P) and distal (D) markers to the required positions.

To reset the lesion markers to the automatically detected position:

- Select **Reset lesion** from the lesion table's context menu.

To reset all lesion markers to the automatically detected position:

- Select **Reset all lesions** from the lesion table's context menu.

### 8.5.3 Deleting and Adding Lesions

To delete a lesion:

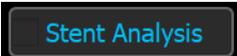
- Select **Delete lesion** from the lesion table's context menu.

To create a user defined (custom) lesion:

- Click on the **User (+)** table.
- Drag the obstruction marker (O) to the required position
- Optionally correct the proximal (P) and distal (D) markers.

### 8.5.4 Accept Analysis Results or Continue with Stent Analysis

In a single vessel analysis without stent this is the last wizard step. Press  to end the wizard. The analysis results will now become available in the Medis Suite report and will be stored if the Medis Suite session is saved. QAngio XA will enter the review state of this analysis.

If you also want to perform a stent analysis, press . This will add the Stent analysis workflow step to the wizard bar, and you must complete the stent analysis step before you can close the analysis.

If you press  again, the Stent analysis workflow step will be removed from the wizard bar.

Press  to proceed to the next step.

## 8.6 Wizard Step 6: Stent

The objective of the stent step is to add stent parameters to your analysis.

QAngio XA will automatically place the stent markers at the proximal and distal end of the vessel segment, they need to be placed on the correct locations manually.

To place the stent markers or the correct locations:

- Click and drag the stent markers (S) to the required positions.
- Click and drag the stent edge regions to the required position.

After completing the stent step in the analysis wizard, press  to end the wizard. The analysis results will now become available in the Medis Suite report and will be stored if the Medis Suite session is saved. QAngio XA will enter the review state of this analysis.

## 8.7 Report

The report in Medis Suite is extended with a single vessel analysis section as soon as the analysis is finished. During editing of an analysis, the section is removed from the report and re-added after completion.

Details on the reporting functionality can be found in the Medis Suite user manual.

## 9 Monoplane Ventricle Analyses

QAngio XA supports the analysis of left ventricles in monoplane acquisitions.

### 9.1 Wizard Step 1: Series selection

The analysis starts with the series selection step. The objective of this step is to select an appropriate image for the analysis.

QAngio XA only loads DICOM greyscale XA images with square pixels (pixel aspect ratio 1:1) that are either manually calibrated in Medis Suite or include isocenter calibration data, and are acquired at RAO 30 ( $\pm 10$ ).

To select the series for analysis:

- Click on a thumbnail under the viewport.

The image will be loaded in the viewport.

Press  to proceed to the next step.

### 9.2 Wizard Step 2: ED Landmarks

The objective of the ED Landmarks step is to select the End Diastolic frame and set landmarks for automatic contour detection.

#### 9.2.1 Manual contours

The Landmarks steps can be skipped to draw manual contours. In that case just press  in the ED Landmarks step and the wizard will automatically proceed to the ED Contour step.

#### 9.2.2 ED frame selection using ECG

If an ECG signal is available with the image data, it will be displayed in a diagram underneath the image viewport. If ED phases have been detected, the middle ED phase is automatically selected.

#### 9.2.3 Setting landmarks

Once the End Diastolic frame is selected, place the landmark points of the two valve points and the apex point by clicking in the image.

To change the end diastolic frame

- In the context menu in the image viewport, select 'Delete landmarks',

- Navigate to the desired End Diastolic frame,
- Place new landmarks.

Press  to proceed to the next step.

## 9.3 Wizard step 3: ES Landmarks

The objective of the ES Landmarks step is to select the End Systolic frame and set landmarks for automatic contour detection. If ED landmarks are set, ES landmarks must also be set to generate automatic contours.

### 9.3.1 ES frame selection

If an ECG signal is available with the image data, it will be displayed in a diagram underneath the image viewport, similar to the ED Landmarks step. There are no buttons to go to the next or previous cardiac phase.

It is advised to select the ES frame in the same cardiac cycle as the ED frame. If ED frames were automatically detected, and in the ES Landmarks step a frame outside this cardiac cycle is selected, a warning text is displayed on the image.

It is not possible to select the ES frame the same as the ED frame.

### 9.3.2 Setting landmarks

Once the End Systolic frame is selected, place the landmark points of the two valve points and the apex point by clicking in the image.

#### To change the End Systolic frame

- In the context menu in the image viewport, select 'Delete landmarks',
- Navigate to the desired End Systolic frame,
- Place new landmarks.

Press  to proceed to the next step.

## 9.4 Wizard Step 4: ED Contour

The objective of the ED Contour step is to draw or correct the ED contour. If ED and ES landmarks have been set in the ED and ES Landmarks steps, automatic contours are calculated and displayed in this step.

### 9.4.1 Manual contours

If no ED and ES landmarks have been set, select the ED frame (see 9.2.2) and pointwise draw the contour: click on multiple locations on the image and accept by a double click at the last point. A smooth contour through the clicked locations will be generated.

### 9.4.2 Editing contours

Contours that were automatically generated or manually drawn can be corrected in the following ways:

- Near the existing contour click and drag an altered contour. The alteration will be combined with the original.

Or,

- Right-click on the contour and drag it, using the rubber-band tool .

When the contour is correct, press  to proceed to the next step.

## 9.5 Wizard step 5: ES Contour

The objective of the ES Contour step is to draw or correct the ES contour. If ED and ES landmarks have been set in the ED and ES Landmarks steps, automatic contours are calculated and displayed in this step.

### 9.5.1 Manual contours

If no ED and ES landmarks have been set, select the End Systolic frame (see 9.3.1) and pointwise draw the contour: click on multiple locations on the image and accept by a double click at the last point. A smooth contour through the clicked locations will be generated.

### 9.5.2 Editing contours

Contours that were automatically generated or manually drawn can be corrected in the following ways:

- Near the existing contour click and drag an altered contour. The alteration will be combined with the original.

Or,

- Right-click on the contour and drag it, using the rubber-band tool .

When the contour is correct, press  to proceed to the next step.

## 9.6 Wizard step 6: Results

The objective of the Results step is to view the calculated results and enter additional patient data. The calculated Ejection Fraction, ED Volume and ES Volume are displayed to the right of the image. Additional patient data can be entered below the table with results.

**To calculate indexed values:**

- Enter the Height of the patient and press Enter,
- Enter the Weight of the patient and press Enter.

**To calculate cardiac output:**

- Enter the Heart Rate and press Enter

**To hide the centerline information on the image:**

- Select 'Hide Centerline graphics' from the image context menu.

Press  to end the wizard. The analysis results will now become available in the Medis Suite report and will be stored if the Medis Suite session is saved. QAngio XA will enter the review state of this analysis.

## 9.7 Report

The report in Medis Suite is extended with a Ventricle analysis section as soon as the analysis is finished. Details on the reporting functionality can be found in the Medis Suite user manual.

During editing of an analysis, the section is removed from the report and re-added after completion.

## 10 Biplane Ventricle Analyses

QAngio XA supports the analysis of left- and right ventricles in biplane image acquisitions (or two matching monoplane acquisitions).

### 10.1 Wizard Step 1: Series selection

The analysis starts with the series selection step. The objective of this step is to select an appropriate image for the analysis.

A biplane analysis can only be performed on calibrated images. Also, the images must have been acquired with the following acquisition angles for left ventricle analyses:

- RAO 30, LAO 60 ( $\pm 10$ )

And the following acquisition angles for right ventricle analysis:

- RAO 30, LAO 60 ( $\pm 10$ )
- RAO 0, LAO 90 ( $\pm 10$ )

To select the two series for analysis:

- Click on a thumbnail under the left viewport.
  - The image will be loaded in the left viewport.
  - Thumbnails of matching images appear under the right viewport.
- Click on a thumbnail under the right viewport (not needed if already loaded)
  - The image will be loaded in the right viewport

Press  to proceed to the next step.

### 10.2 Wizard Step 2: ED Contours

The objective of the ED Contours step is to select the End Diastolic frame and draw the ED contours in both the Long Axis image and the Short Axis image.

#### 10.2.1 ED frame selection using ECG

If an ECG signal is available with the image data, it will be displayed in a diagram underneath the image viewport. If ED phases have been detected, the middle ED phase is automatically selected.

#### 10.2.2 Draw contours

When the End Diastolic frame has been selected, pointwise draw the contours in both the Long Axis and the Short Axis images: click on multiple locations on the image and accept by a double click at the last point. A smooth contour through the clicked locations will be generated.

### 10.2.3 Editing contours

Contours can be corrected in the following ways:

- Near the existing contour click and drag an altered contour. The alteration will be combined with the original.

Or,

- Right-click on the contour and drag it, using the rubber-band tool .

When the contours are correct, press  to proceed to the next step.

## 10.3 Wizard step 3: ES Contours

The objective of the ES Contours step is to select the End Systolic frame and draw the ES contours in both the Long Axis image and the Short Axis image.

### 10.3.1 ES frame selection

If an ECG signal is available with the image data, it will be displayed in a diagram underneath the image viewport, similar to the ED Contours step. There are no buttons to go to the next or previous cardiac phase.

It is advised to select the ES frame in the same cardiac cycle as the ED frame. If ED frames were automatically detected, and in the ES Contours step a frame outside this cardiac cycle is selected, a warning text is displayed on the image.

It is not possible to select the ES frame the same as the ED frame.

### 10.3.2 Draw contours

When the End Diastolic frame has been selected, pointwise draw the contours in both the Long Axis and the Short Axis images: click on multiple locations on the image and accept by a double click at the last point. A smooth contour through the clicked locations will be generated.

### 10.3.3 Editing contours

Contours can be corrected in the following ways:

- Near the existing contour click and drag an altered contour. The alteration will be combined with the original.

Or,

- Right-click on the contour and drag it, using the rubber-band tool .

When the contour is correct, press  to proceed to the next step.

## 10.4 Wizard step 4: Results

The objective of the Results step is to view the calculated results and enter additional patient data. Select the Patient Type: Pediatric or Adult.

The calculated Ejection Fraction, ED Volume and ES Volume are displayed below the images. Additional patient data can be entered there.

**To calculate indexed values:**

- Enter the Height of the patient and press Enter,
- Enter the Weight of the patient and press Enter.

**To calculate cardiac output:**

- Enter the Heart Rate and press Enter

Press  to end the wizard. The analysis results will now become available in the Medis Suite report and will be stored if the Medis Suite session is saved. QAngio XA will enter the review state of this analysis.

## 10.5 Report

The report in Medis Suite is extended with a Ventricle analysis section as soon as the analysis is finished. Details on the reporting functionality can be found in the Medis Suite user manual.

During editing of an analysis, the section is removed from the report and re-added after completion.