Spectralis

Spectralis HRA+OCT

Spectralis HRA

Spectralis OCT

QuickGuide

Software Version 3.1

HEIDELBERG ENGINEERING

Spectralis QuickGuide - Introduction

⚠ CE 0482

This QuickGuide is not intended as a replacement for the SPECTRALIS Manuals. Do not use the Spectralis without reading the full Operating Instructions. Please read the Cautions and Warnings in the Hardware Operating Instructions and always follow their contents.

The **Spectralis HRA** is a confocal scanning laser ophthalmoscope (cSLO) for retinal angiography and reflectance imaging. Available imaging modes are fluorescein and ICG angiography, infrared and red-free reflectance, and fundus auto-fluorescence. The imaging modes can be used separately or simultaneously.

The **Spectralis OCT**, is a dual beam spectral domain optical coherence tomograph (SD-OCT) and cSLO system that acquires transectional images or volume scans of the retina and an infrared reference image simultaneously. A real time eye tracker couples cSLO and SD-OCT scanners to position and stabilize the OCT scan on the retina.
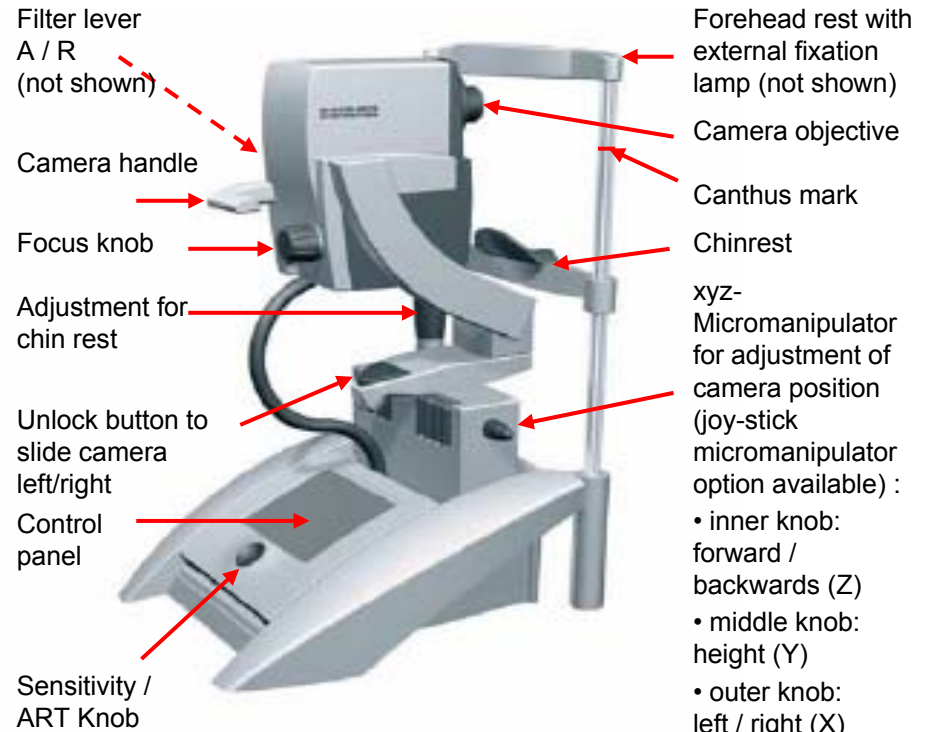
The **Spectralis HRA+OCT** combines the features of the Spectralis HRA and the Spectralis OCT. All six acquisition modes are available, separately or simultaneously.

Spectralis HRA	Spectralis OCT	Spectralis HRA+OCT
5 modes	2 modes	6 modes
-	SD-OCT	SD-OCT
Infrared	Infrared	Infrared
Autofluorescence	-	Autofluorescence
Fluorescein Angiography	-	Fluorescein Angiography
ICG Angiography	-	ICG Angiography
Red Free Photography	-	Red Free Photography
HEYEX Database		

The following imaging modalities and options are supported:

- High Resolution Images
- High Speed Images
- ART Mean Images[1,2]
- ART Composite Images[2,3]
- ART Volume Scans[2]
- External and Internal fixation targets
- Offline Mean Images[3]
- Offline Composite Images[3]
- Automatic Brightness Control
- High Myopia Compensation[3]
- Movies[3]
- Wide Field Images (55°/120°)[2,3]
- Advanced Sensitivity Control[3]
- Tomography[3]
- Stereo Images[3]

1 ART – Automatic Real Time
2 Optional
3 Laser Scanning acquisition modes only

Filter lever A / R (not shown)

Camera handle

Focus knob

Adjustment for chin rest

Unlock button to slide camera left/right

Control panel

Sensitivity / ART Knob

Forehead rest with external fixation lamp (not shown)

Camera objective

Canthus mark

Chinrest

xyz-Micromanipulator for adjustment of camera position (joy-stick micromanipulator option available) :
• inner knob: forward / backwards (Z)
• middle knob: height (Y)
• outer knob: left / right (X)

As the viewing conditions may change during an examination, these settings can be readjusted continuously if necessary:

- • Focus   Focus knob at camera
- • Illumination   Laser intensity and detector sensitivity (control panel)
- • Working distance Z adjustment knob / joystick
- • Lateral alignment X, Y adjustment knobs / joystick
- • Area of interest   Horizontal rotation, vertical tilt of camera head

General Workflow - Overview

1. Prepare the device (headrest and camera).
   - o Make sure camera head is pulled all the way back.
   - o Clean camera chinrest and forehead rest.
   - o Check that lens is clean.
   - o Adjust table height and chinrest for the patient.
2. Prepare the patient.
3. Start the software and Acquisition Window.
   - o Create or open the patient file, start a new acquisition.
   - o Pre-set the default **Acquisition Parameters**.
   - o Select an Acquisition mode using the filter lever and the control panel.
4. Choose a fixation target (internal or **e**xternal, via control panel).
5. Ask patient to put head on headrest.
6. Make sure canthus mark is at eye / canthus level.
7. Bring camera forward, align the camera for optimum image quality.
8. Activate desired image modes using the control panel.
9. Acquire images.
10. Move camera backwards and then over to fellow eye to acquire images for fellow eye.
11. Save images.
12. Review images for content and quality, select inferior/redundant images to be deleted.
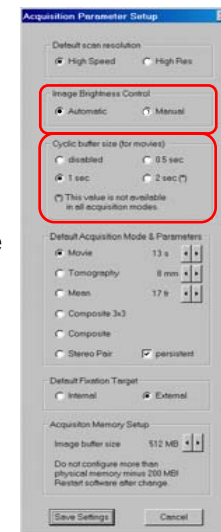
Preparations

Pull the camera in the most backward position, ensure head support and camera objective are clean. Adjust the height of table and chair for each patient. Pupil dilation is recommended to increase the image quality. It is recommended to perform the Spectralis scan before other diagnostic measures are taken that irritate or dry the cornea.

Explain the procedure and the fixation targets to the patient. Adjust the focal plane to the refraction (spherical equivalent) of the examined eye using the focus knob at the back of the camera. For the examination of highly myopic patients, an internal myopic lens is available for scanning laser imaging. Start the software (see page 4).

After creating a patient file or opening a new examination session for an existing patient file, the **Acquisition Window** will open.

It is recommended to pre-set the default **Acquisition Parameters**. In the Acquisition Window, open the menu **Setup** and choose the option **Acquisition Parameters**. The window shown on the right will open.

Set the resolution / speed parameters. The **Cyclic Buffer Size** is important for movie acquisition available for all scanning laser imaging modes. After the "**Series**" button on the control panel has been pressed to start the acquisition, the system will additionally save the last images before the button was pressed. The **Automatic Brightness Control** is recommended. It automatically increases/decreases detector sensitivity so that the image is not too dark or overexposed. This feature can also be enabled/disabled from the control panel (menu "**More**").

For Angiography, it is recommended to enable the **Show Timer Window** option to display the duration since the last injection.
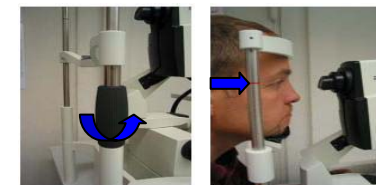
Start the laser by pressing the button at the bottom right corner of the control panel screen. The main menu will open. The following default settings are typically used (see image on the right):

- Infrared reflection mode (**IR** button on the control panel, see image), turn the filter lever to "**R**" for the reflection mode.
- Scan angle of 30 degrees.

Use the central internal fixation target if needed. Ask the patient to place his/her chin on the chinrest and to place the forehead against the headrest. Adjust the chinrest height so that the patient's eyes are at the same level as the red canthus marks on the headrest posts.

Camera alignment for IR or other Scanning Laser Imaging Modes

Aim for even illumination, minimal artifacts and centering of the macula, unless otherwise indicated.

Slowly bring the camera towards the patient's eye, move the camera (up, down, right or left) to the center of the pupil and adjust the distance between the objective and the examined eye to approx. 14 mm between the front edge of the objective and the cornea. As soon as the laser beam enters the pupil, you will see the image of the fundus in the IR image on the screen (*Acquisition window,* page 7 and 8).

Turn the camera so that the structure of interest is visible on the screen. Move the camera slightly up/down and sideways until the image appears brightest and most evenly illuminated. Then move the focal plane (using the focus knob) until the image is brightest.

Then, increase sensitivity to the point just before 'saturation / blooming' occurs, which can be identified as white areas of dots with colored specs begin to appear. Alternatively, use the *Automatic Brightness Control*.

The optimum camera position is reached when no dark corners and white (overexposed) areas are visible in the live image (right image).

Image with dark corners and overexposed area	Overexposed image	Evenly illuminated image

A set of infrared and red-free images should be taken as a control prior to angiography.
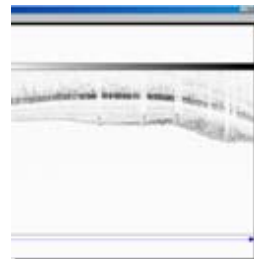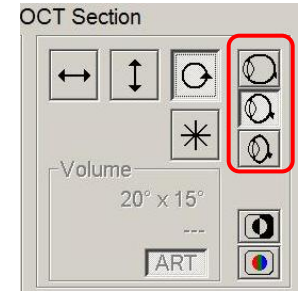
Camera Alignment for OCT Imaging

Move the camera towards the patient until a cross sectional image of the retina appears in the OCT image window. If no OCT image becomes visible, adjust the scan depth by selecting a different eye length using the buttons in the *Acquisition window* shown on the right.

The OCT image may appear mirrored at the upper image boundary or at the lower image boundary (in the second case, the signal is much weaker).

If the OCT image shows mirrored (upside down), move the camera further away from the patient. If the OCT image is tilted in a horizontal direction, move the camera slightly left/right (if you do a horizontal scan) or up/down (if you do a vertical scan). To achieve optimum image quality, position the OCT image in the upper half of the acquisition window.
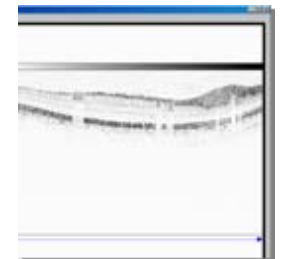
Move the camera slightly up/down and sideways until the images appear brightest and most evenly illuminated. Move the focal plane (using the focus knob) until the simultaneous infrared image is brightest and sharpest.

Mirrored OCT image	Partially mirrored OCT image at upper border	OCT image in correct orientation

To acquire images with the settings highlighted in blue, press the *Acquire* button on the control panel or press the foot switch.

The *Heidelberg Eye Explorer (HEYEX)* is a common software platform for all Heidelberg Engineering imaging devices. Each device features image acquisition and *Analysis* modules, called 'plugins' for the HEYEX.

Starting the HEYEX

Start the device (power button is located on the front panel of the power supply) and the computer.
Start the application by left double-clicking on the *HEYEX icon* on the desktop:
or by using the windows start menu:
Start → Programs → Heidelberg Eye Explorer → Heidelberg Eye Explorer. The *Patient Database* window will appear.

On the left side, all patients in the patient database are listed. The right part of the window serves to select patients for new examinations and review or for batch processing (e.g. export).
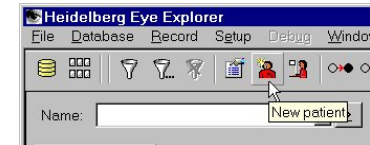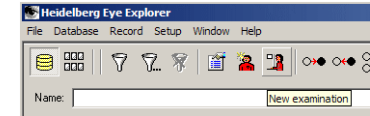Closing the window of the HEYEX will shut down the program.

Starting an Acquisition

Create or Open a Patient File

- To open an existing patient file, select the patient name and click on the *New Examination* button to start the new examination. Confirm that you wish to re-examine the patient with *Yes*.

- To create a new patient record, click on the *New Patient* button.

  Enter last name, first name, date of birth and gender (sex). All other data are optional.
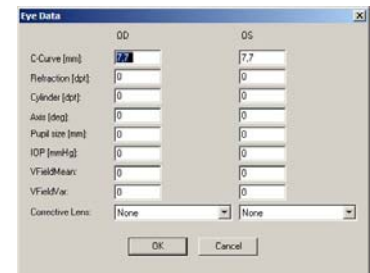
Examination Data Window
The *Examination Data* dialog opens before each exam, but can also be opened at any later stage using the *Examination* button in the patient file.
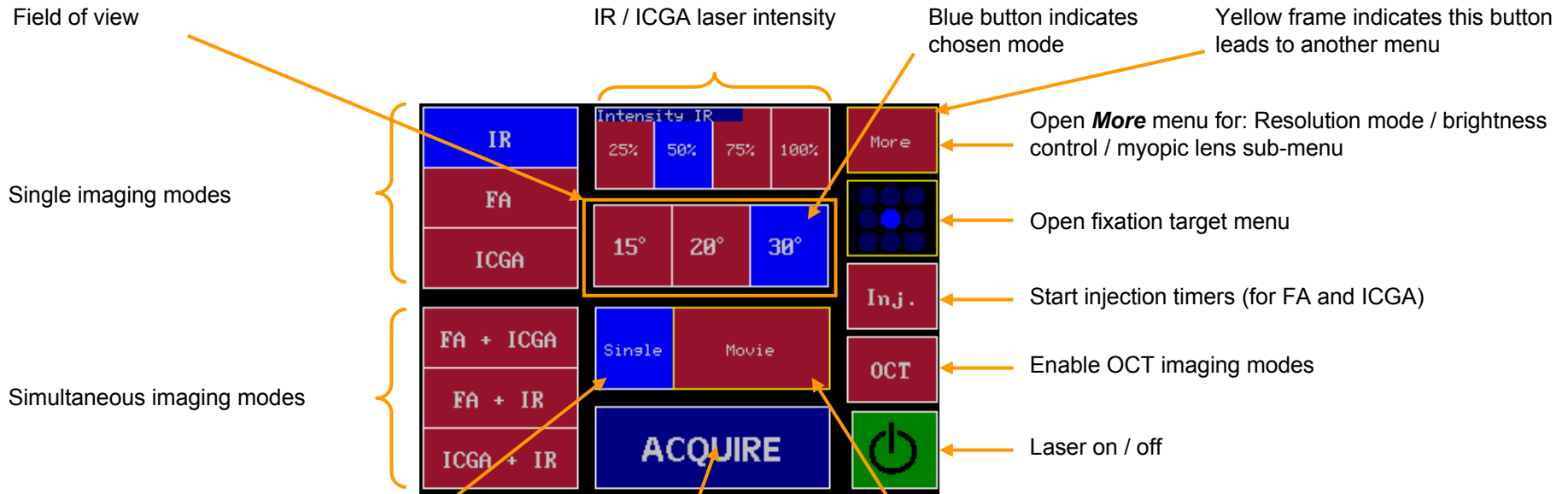The respective *Device Type* for the examination must be selected; all other data are optional.

Eye Data Window
This window enables to enter the eye parameters for both eyes. For the Spectralis, only the cornea curvature is important; it will affect the measurement of distances and areas.
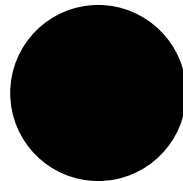
Control Panel Guide - Overview

Field of view

IR / ICGA laser intensity

Blue button indicates chosen mode

Yellow frame indicates this button leads to another menu

Single imaging modes

Simultaneous imaging modes

Control panel buttons: IR, FA, ICGA, FA + ICGA, FA + IR, ICGA + IR, Intensity IR (25% 50% 75% 100%), 15° 20° 30°, Single Movie, ACQUIRE, More, Inj., OCT

Open *More* menu for: Resolution mode / brightness control / myopic lens sub-menu

Open fixation target menu

Start injection timers (for FA and ICGA)

Enable OCT imaging modes

Laser on / off

Start / Stop Acquisition

Spectralis HRA and Spectralis HRA+OCT*: Activate primary acquisition mode: single image

Spectralis OCT and Spectralis HRA+OCT**: Activate section scan (click) and select scan pattern using the buttons in the acquisition window (see page 8)

Sensitivity / ART Button:
Sensitivity (turn)
ART function on / off (push)

Spectralis HRA and Spectralis HRA+OCT*: Activate indicated secondary acquisition mode (click) or open *Acquire Mode* menu (double click) to choose other mode

Spectralis OCT and Spectralis HRA+OCT**: Start volume scan (click)

*OCT button deselected / ** OCT button selected

Click on button to select secondary acquisition mode with settings specified on button to the right
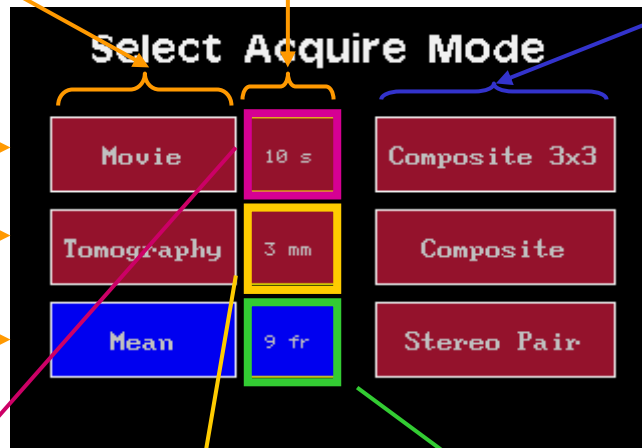
Double click on these square buttons to open sub-menus in order to select *other* settings than specified on the button

Click on buttons to select secondary acquisition mode

Movie
(Image sequence)

Tomography (Layered 3D image sequence)
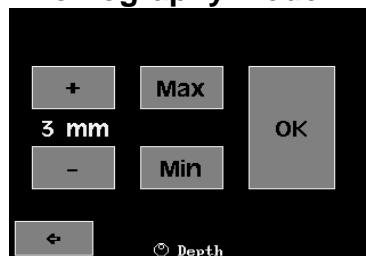
Mean
(Averaged image)

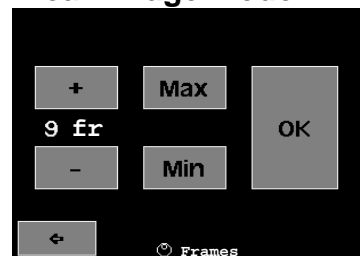Composite 3x3

Composite

Stereo image pair

Movie mode

Tomography mode

Mean image mode

*OCT button deselected (see previous page)

OCT Acquisition Window

Patient name, birth date

Blue pattern indicates location of OCT section image (right window). Click in the image with the mouse to move the scan line.

Blue arrow indicates scan direction

Menu bar
Save images
Setup
    Acquisition Parameters
    Reset Injection Timer
    Calibration Touch Panel
Exit

Minimize / maximize window

Close window to end acquisition

Grey scale or color scale

Timers (for fluorescein / ICG angiography only)

Laser off in (remaining laser on time)

Tracking time left (for OCT only)

Memory

Images taken

Free memory available

Settings

Eye (OD-right, OS-left eye)
Angle (field of view)
Focus
Sensitivity:
Power: Laser power (IR & ICGA)
Mode of acquisition
Rate: images per second
Resolution: high speed or high resolution

System Status Line
Green: Information
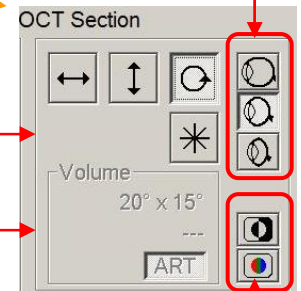Yellow: Warning
Red: Error message

Follow-Up

Select baseline image if the current examination is a follow-up examination - see page 11

Preselect eye length (long, normal, short eye)

Select star-shaped scan pattern (see next page)
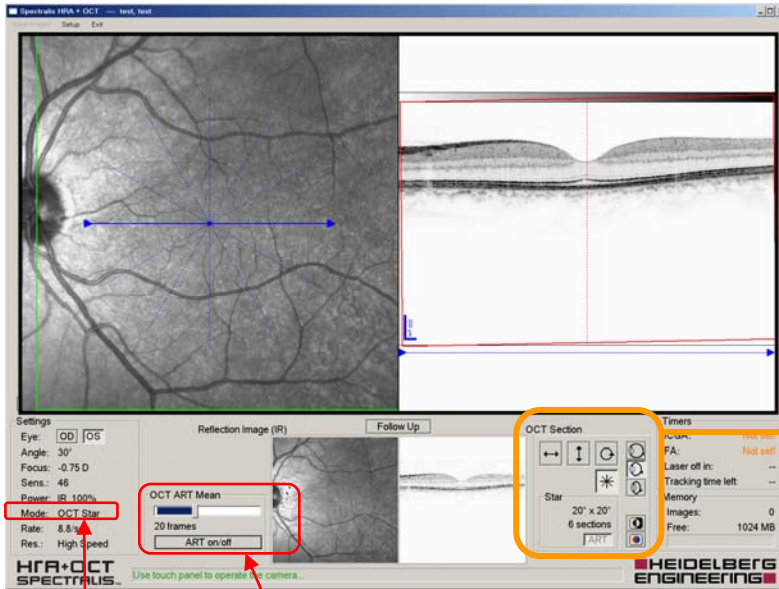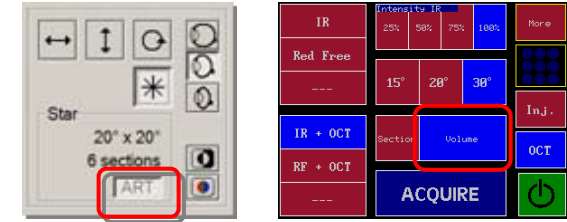
Details for volume scans

False color or black/white image

*For Spectralis OCT and Spectralis HRA+OCT; for the latter, the OCT button must be selected (see page 5)

Activate the scan patterns by selecting *Section* or *Volume* in the control panel and by clicking on the desired scan pattern on the acquisition window.

Activate the *ART* (Automatic Real Time) mode by clicking on the *ART* button in the acquisition window (only available for volume scans). At each position, the selected number of B-scans is averaged. Acquire images by pressing the *Acquire* button on the control panel or by using the foot switch. If eye movements are too strong, the acquisition is repeated at the respective scan position. To switch the *ART* mode off, press the *ART* button again.

OCT - Scan Patterns

Select scan pattern

Volume scan or star-shaped scan pattern:

The size of a volume or star- pattern scan can be changed using the *right/left* cursor keys (← / →) of the keyboard. For volume scans, the *up/down* (↑ / ↓) cursor keys may be used to set the vertical extension of the scan. The number of scan lines can be selected via the scroll-wheel of the mouse, or by pressing the *Shift* and *up/down* cursor keys at the same time (⇧ + ↑ or ⇧ + ↓)

Details on volume and star pattern scans:
Size and number of sections in the selected pattern

Select *ART* mode for volume and star pattern scan

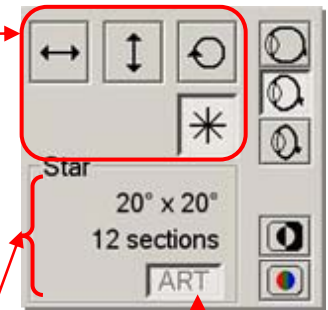**Mode** of acquisition and scan pattern are indicated

OCT ART Mean

Set maximum number of B-scans (*frames*) that are averaged to generate displayed OCT image (maximum 100; here: 9 frames). The blue part of the bar represents the current number of frames averaged*

*For Spectralis OCT and Spectralis HRA+OCT; for the latter, the OCT button must be selected (see page 5)

Patient name, birth date

Menu bar
Save images
Setup
    Acquisition Parameters
    Reset Injection Timer
    Calibration Touch Panel
Exit

Minimize / maximize window

Timer Log Window

Shows the injection timers of all patients imaged using angiography modes on the same day (unless the HEYEX was closed)

Settings

Eye (OD-right, OS-left eye)
Angle (field of view)
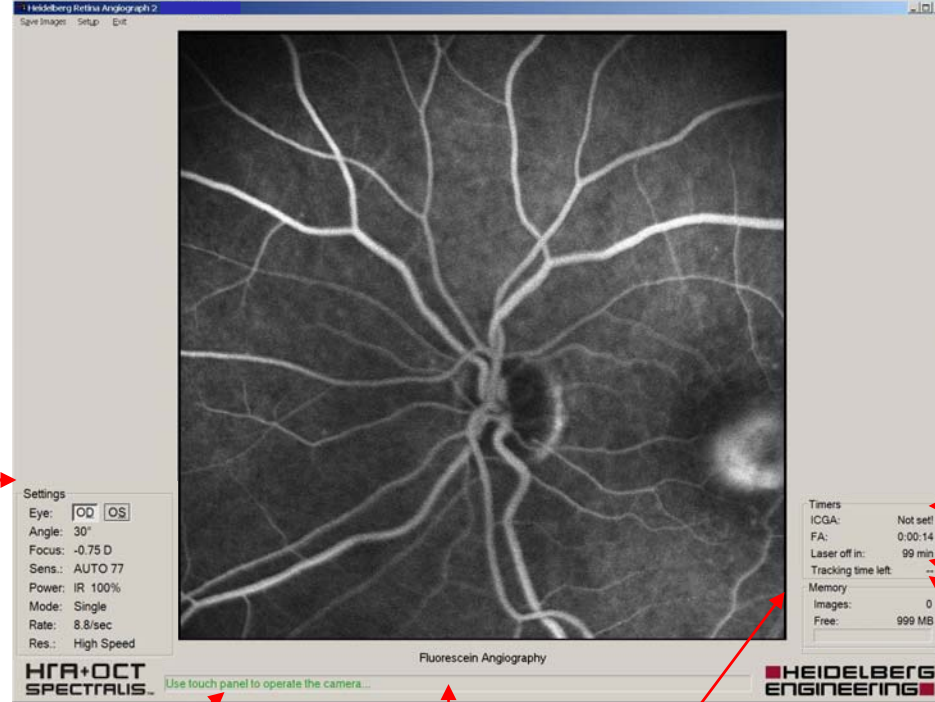*Focus*
Sensitivity:
AUTO - automatic brightness control is enabled
Power: Laser power (IR & ICGA)
Mode of acquisition
Rate: images per second
Resolution: high speed or high resolution

Timers (for fluorescein / ICG angiography only)

Laser off in (remaining laser on time)

Tracking time left (for OCT only)

System Status Line
Green: information
Yellow: warning
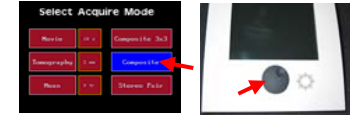Red: error message

Acquisition mode

Memory

Images taken

Free memory available

*For Spectralis HRA and Spectralis HRA+OCT; for the latter, the OCT button must be deselected (see page 5)

■HEIDELBERG
ENGINEERING

Activate ART Composite mode by selecting **Composite** in the control panel menu and pressing the sensitivity button of the control panel. Acquire images by pressing the **Acquire** button on the control panel or by using the foot switch. The ART mode remains switched on after an image or image series has been acquired. To switch the **ART COMPOSITE** mode off, press the sensitivity button again.

Central area of live image in higher magnification to enable focusing

Live image to evaluate brightness and even illumination of image enables optimum camera adjustment

Set number of images (frames) that are used for averaging (maximum 100) with the slider. The chosen value is indicated below the slider (here: 9 frames).

The blue part of the bar represents the current number of averaged frames processed*

Close window to end acquisition

Red frame shows position of current live image in the composite image

Timers (for ICG / fluorescein angiography only)

Laser off in (remaining laser on time)

Tracking time left (for OCT only) Tracking time is limited to meet light exposure safety standards

Memory

Images taken

Free memory available

System Status Line   Acquisition mode   Composite image

*If the live image cannot be matched, the last image stays on the screen and the position of the last live image is shown by a dotted frame. It is possible to acquire multiple images during the same ART Composite session by pressing the footswitch or the **Acquire** button on the control panel.

*For Spectralis HRA and Spectralis HRA+OCT; for the latter, the OCT button must be deselected (see page 5)

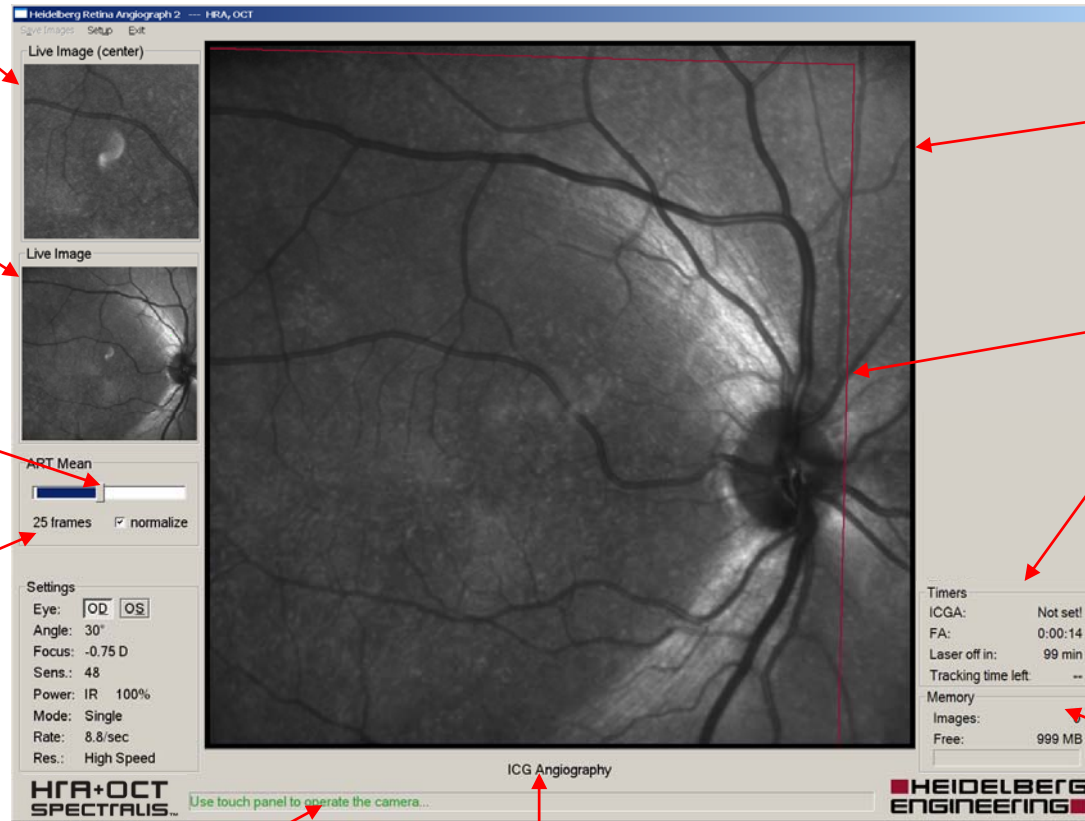Activate ART Mean mode by pressing the sensitivity button of the control panel.

Central area of live image in higher magnification to enable focussing

Live image to evaluate brightness and even illumination of image enables optimum camera adjustment

Mean (averaged) image

Red frame indicates position of current live image position

Set number of images (*frames*) that are used for averaging (maximum 100) with the slider. The chosen value is indicated below the slider.

The blue part of the bar represents the current number of averaged frames processed*

Timers (for ICG and fluorescein angiography only)

Laser off in (remaining laser on time)

Tracking time left (for OCT only) Tracking time is limited to meet light exposure safety standards

Memory

Images taken

Free memory available
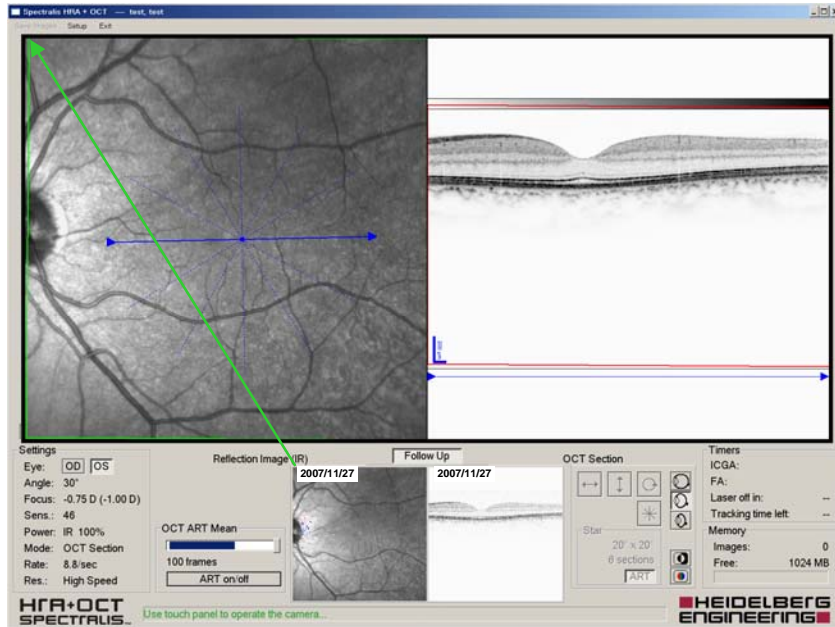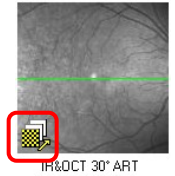
System Status Line   Acquisition mode

* If the current live image cannot be aligned to the mean image for more than 1 second, the mean image will be discarded, the blue bar will disappear, and the automatic averaging process will start anew. The same happens when ART mode is deactivated and then again activated.

*For Spectralis HRA and Spectralis HRA+OCT; for the latter, the OCT button must be deselected (see page 5)

Spectralis OCT and HRA+OCT allow the repeat of an OCT scan at the exact same location that was selected during a previous exam.

To be able to perform a follow-up acquisition, an image already stored in the HEYEX database must be defined as *baseline* or *reference* scan. To define a baseline image, right click on the image in the Patient File and select ***Progression, Set as reference.*** In the Patient File, the thumbnails of baseline images are marked with a special symbol in the bottom left corner. More than one baseline scan can be defined for every patient.

If a baseline image exists for the current patient, a ***Follow-up*** button is available below the live image in the Acquisition window (the camera must be in live mode). Pressing the ***Follow-up*** button will bring up a window with reference images. Click on the reference image a follow-up should be taken for and press **OK**.

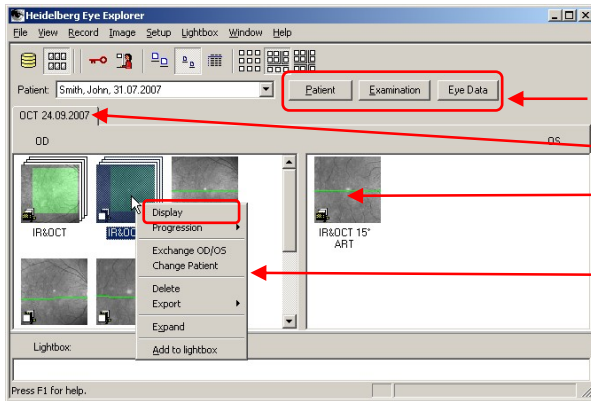The baseline exam will now be visible as a small image in the window below the live image.

For follow-up exams, the same fixation target chosen for the baseline exam is automatically activated.

Move the camera so that the infrared live image is showing approximately the same area on the retina as the baseline image. As soon as the overlap between live and baseline image is sufficient, a green frame appears on the live image, indicating the area of the retina imaged during the baseline examination. Optimize the camera position for maximum overlap between live and baseline image. A blue line indicates the OCT scan position. The blue line and green box follow the eye movement. If there is too much eye movement and the live image can not be matched to the baseline image, the blue line will appear dotted.

To capture the follow-up image, press ***Acquire*** on the control panel. To cancel a follow-up acquisition, press on the ***Follow-up*** button again. A change of the scanning parameters (e.g. scan angle) will also automatically cancel the follow-up acquisition.

*For the Spectralis HRA+OCT, the OCT button must be selected (see page 5)

Patient File

Patient data

Visit tab

Image icon

Context menu

The image viewing window represents the digital **Patient File**. It contains all patient data and images. Each thumbnail represents an image or scan of the right or left eye. Images can be viewed, analyzed, printed, imported, exported and archived. All images from one acquisition session are stored under the same visit tab.

To open the **Context Menu**, click on the image icon with the right mouse button. Choose the desired menu item by selecting it with either the left or right mouse button.

From the patient file, patient data regarding diagnosis, referring physician, operator, eye data, etc. can be accessed via the buttons **Patient, Examination** and **Eye Data**.

Viewing Images

To open an image double-click on the image icon or select **Display** from the context menu. The selected image will be displayed in a separate window with its own menu and tool bar.

Open images (from one or several patients) can be grouped or closed automatically. Use the **Window** menu with the options **Cascade**, **Tile** and **Close All** in the analysis window or in the **Patient File**.

The buttons shown on the right may be used to browse through images. When opening an image in the visit tab, all images of this eye and visit date will be displayed as image series using the black arrow buttons. If an image was opened via the **Lightbox**, all images in the **Lightbox** are used as image series.
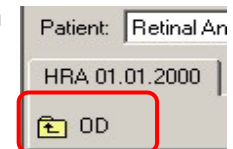
Use the second set of buttons to step through consecutive follow-up examinations of a progression series.

When viewing an image series from the same acquisition date or from a progression series, the respective button (forward / backward) is deactivated once the last / first image of the image series is reached.

Extracting Single Images from Image Series

Single OCT images can be extracted from a volume or star pattern scan and saved individually. These single scans can then, for example, serve as baseline image for follow-up examinations.

From the **Patient File**, select a volume or star pattern scan (left mouse click), open the **Context Menu** (right mouse click) and select **Expand**. A new tab will open, displaying the single images from the scan series. This tab is marked with a yellow folder symbol. Select a single image and choose the option **Extract Image** from the **Context Menu** in order to save this OCT image separately.

To return to the **Patient File**, click on the yellow folder symbol.

From the **Image** menu in the analysis window, select the menu item **Extract as Single Image** (only available in the **Display** tab).

Laser Scanning Image Analysis Window

Menu

Image

Contrast / Brightness	Ctrl+B
Sharpen	
Noise reduction	
Apply Defaults	Ctrl+D
View in Color / B&W	
Rotate view by 180°	
Export as BMP	
Copy to Clipboard	Ctrl+C
Add to lightbox	Ctrl+L
Print	Ctrl+P
Info	
Monitor Setup Tool	

Overlay

Draw Region	Ctrl+R
Draw Arrow	Ctrl+A
Enter Text	Ctrl+T
Insert ETDRS-Grid	Ctrl+E
Remove all Overlays	
Measure Distance	
Measure Circle	
Copy Overlays	
Paste Overlays	

Zoom

25 %	
50 %	
100 %	F5
200 %	
400 %	
600 %	
Fit to window	

Window

Display previous image
Display next image
Cascade
Tile
Close all

HRA2 01.01.2000, OD, AutoFluo 30°Mean Image (9) (57 %)

The window size can be adjusted with the mouse

Shortcut buttons (corresponding to Menu options)

Info: Display image information

Overlay tools (these are automatically saved, but may be removed at any time)

Draw Text: Insert text label

Draw Arrow: Draw arrow

Draw Region: Draw closed outline

Measure Distance

Measure Circle: Measure diameter (in mm) of drawn circle

Insert ETDRS-Grid: 4 concentric circles of 360, 600, 1800 and 3600 µm, 2 bisecting lines

Other tools

1:1 Scales the image to the original resolution & size.

Fit to window: Scales the image to fit into the actual window size

Rotate view by 180°

Display the previous / next image from the same examination date

Add to lightbox: Insert link to the selected image/s into the lightbox

Delete image (permanent)

Monitor Setup Tool

OCT Analysis – Display Window I

Menu

Image

Brightness & Contrast...	Ctrl+B
Image Information...	Ctrl+I
Export as Picture...	Ctrl+E
Print Report...	Ctrl+P
Previous image in examination tab	
Next image in examination tab	
Add to Lightbox	
Extract as Single Image	

Progression

Make Reference	
Unmake Reference	
Previous image in progression	PgUp
Next image in progression	PgDn

Options

Preferences...

HRA Image (left image)

Pan Mode	
Zoom Mode	
Unsmoothed Pixels	
Zoom In	+
Zoom Out	-
Zoom Factor	▶
✔ Show Scan Positions	

✔ Auto
50%
75%
100% F5
200%
400%
800%

OCT Image (right image)

Pan Mode	
Zoom Mode	
Unsmoothed Pixels	
Zoom In	+
Zoom Out	-
Zoom Factor	▶
Y-Scale	▶
Show Layer Segmentations	

✔ Auto
50%
75%
100% F5
200%
400%
800%

✔ 1:1 pixel
1:1 µm

Window

Cascade
Tile
Close all

Viewing different OCT scans

The green highlighted line in the infrared image (left) shows the location of the current OCT scan (right image). The arrow indicates the direction of the OCT scan.

For volume scans, a green frame in the infrared image indicates the borders of the scanned area. If the scans in this area are less than 8 pixels apart from each other, only the active OCT scan is indicated. Choose a different scan from the series by left-mouse clicking within the green frame.

If the scans of a volume scan are less densely spaced, the inactive scans are indicated in dark green. Left-click on these lines to view the corresponding OCT scans.

Save as image

Print Report

Show next/previous image of same eye or from lightbox

Add to Lightbox

Show next/previous image in progression

Click on the tabs to view the different analysis results:

Display (images taken during acquisition, this window)

3D View

Thickness Graph

Thickness Map

Image Info (see page 21)

Brightness & Contrast (see previous page)

Zoom functions:

Zoom Mode: Use left mouse button to zoom in or out

Zoom In

Zoom Out

Unsmoothed Pixels (only if zoom >100%)

Pan Mode: Move the enlarged image with the mouse

Hot Keys:

Ctrl – Zoom In
Ctrl+Shift – Zoom Out
Shift – Pan

Green slider on the horizontal green line in infrared image corresponds to location of the green line in OCT image

For volume or pattern scans:

Play

Stop

Save the movie

Speed of movie

For follow-up images:

Flicker between baseline and follow-up image

Speed of flicker

The zoom factor represents the ratio of monitor pixels to image pixels.

If the **Auto** option is selected in the drop-down list, the image is automatically scaled to fit the window. In this case, if the window size is changed, the image is re-scaled.

If a fixed **zoom factor** is set (e.g. 100%), changing the size of the window will change the image frame and not the scale. When the image is not shown in full size, scroll bars enable viewing of the full image and the button for the **pan mode** is active.

Y-Scale:

1:1 pixel: Shows all pixels acquired during the scan

1:1 µm: Shows a compressed view where the pixels are equally scaled horizontally and vertically

OCT Analysis – Thickness Graph Window

Thickness Graph Tab

IR (Infrared) image

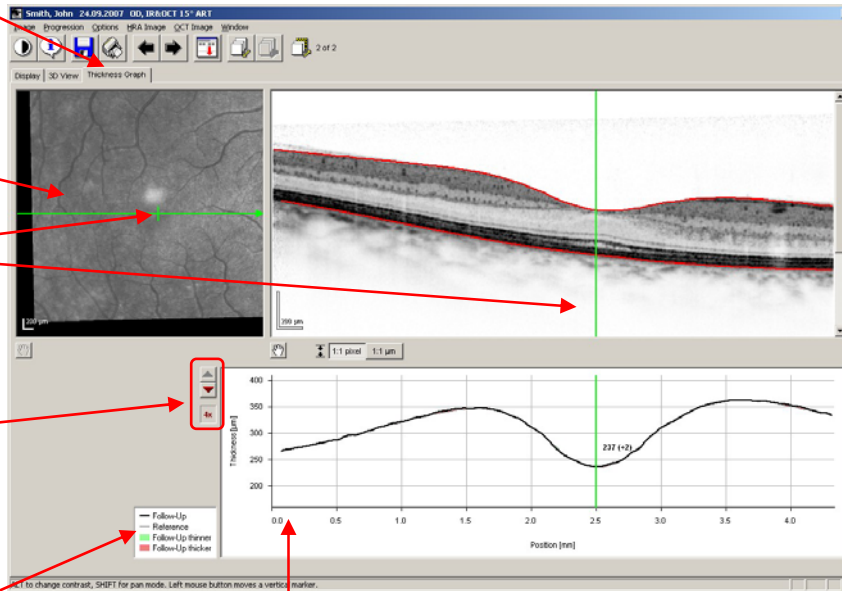Green highlighted pattern shows location of current OCT image (right image).

Green slider on the scan pattern in IR image corresponds to green line in OCT image (B-Scan)

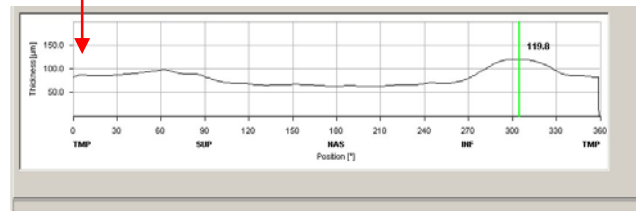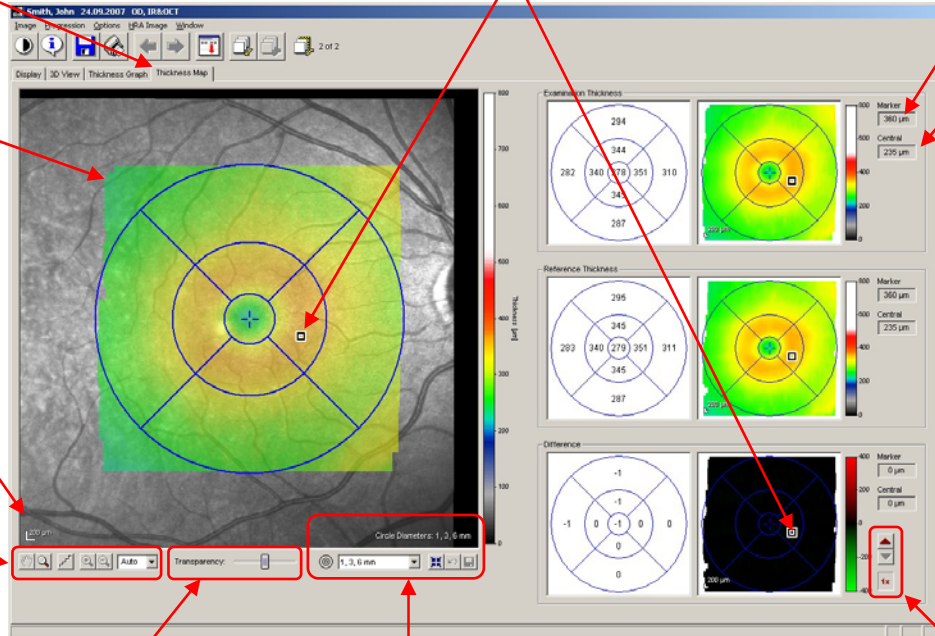Scale for y-axis of diagram

Default setting: **1x** (up to 4-fold)

Click on the arrows (up/down) to change scaling

Legend for diagram

Linear Scans: thickness in µm

Circular scans: sectors and degrees

OCT B-Scan

OCT pattern and location are indicated on the infrared image (scan corresponds to green pattern)

Thickness Profile

of retina calculated from OCT B-Scan above

For follow-up examinations: Locations with retinal thickness changes compared to baseline are marked in red (increased retinal thickness) or green (decreased retinal thickness)

Thickness Map Tab

Overlay in IR image
with current retinal thickness
values

Single pixel position can be altered by drag and drop (left mouse button),
pixel position is moved synchronously in all 4 images

Thickness value of chosen single
pixel position is displayed for all
three images

Thickness value at central location
of circle grid

Follow-up exam

Baseline exam

Difference / Change Map

Scale:

length of bar
equals 200 µm

200 µm

200 µm

Zoom functions:

🔍 *Zoom Mode:* Use left
mouse button to zoom
in or out

🔍 *Zoom In*

🔍 *Zoom Out*

🔍 *Unsmoothed Pixels*
(only if zoom >100%)

✋ *Pan Mode:* Move the
enlarged image with
the mouse

Hot Keys:

Ctrl – Zoom In
Ctrl+Shift – Zoom Out
Shift – Pan

-0- Transparency of overlay

Circle grid functions:

◎ Change the diameter of the circle grid
(options: „1, 2, 3 mm", „1, 2.22, 3.45 mm" and „1, 3, 6 mm")

❖ Center the circle grid in the image

↺ Reset cirle to the position last saved

💾 The position and size of the circle grid can be saved for each examination.
For follow-up exams, the position of the circle grid is automatically taken
from the baseline exam.

Set range of thickness difference
map down to +/- 50 µm
(default range +/- 400 µm)

3D View Tab

Display Options

Cube: Displays a volume scan as solid block

Surface: Removes the part of a volume scan above the ILM

Volume: (Not yet available)

Single: Displays volume or pattern scans as single slices

Show Grid: Shows a bounding box around the volume scan

Y-Scale: see p. 16

Reset View to standard display settings

Movie function for volume scans:

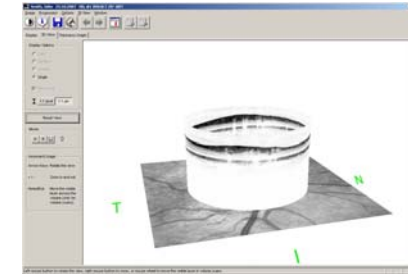Play

Stop

Save the movie

Speed of movie

Star-pattern scan

Use the keyboard keys to view the image as indicated. Or, alternatively, use the mouse to view the 3D image:

► right mouse button: zoom

► left mouse button: rotate object

► mouse wheel: scroll through scans

T – Temporal

N – Nasal

I – Inferior

S – Superior

Circular scan

Single scan

Volume scan

Monitor Setup Tool

This tool offers a gray scale target for optimal monitor setup, which is especially important for LCD screens.

The **Monitor Setup Tool** window can either be opened via the shortcut button, or by choosing the respective option in the **Image** menu.

In order to optimize the monitor settings, follow the instructions in the **Monitor Setup Tool** window.
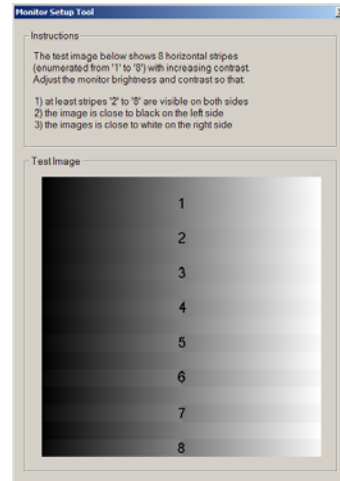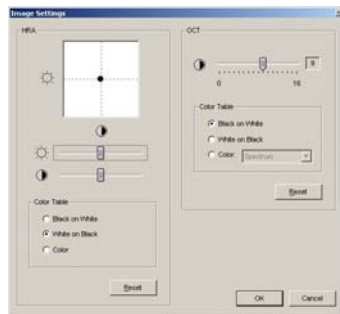
Image Settings (Brightness & Contrast)

OCT Analysis Window

Open the control window by selecting the shortcut icon or the option **Brightness & Contrast** from the **Image** menu.

For the scanning laser image, brightness and contrast can be adjusted together by moving the black dot in the white square (up and down = brightness, left and right = contrast) or separately using the respective slider below the white square. For the OCT image, contrast can be adjusted using the slider. Both images can be shown in **Grayscale (Black on White** or **White on Black)** or **Color**. The **Reset** button resets all controls to standard values.
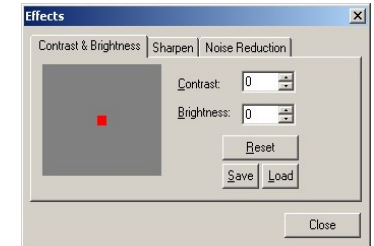
Image settings can also be adjusted by pressing the Alt-key and moving the mouse across the respective image in the same fashion as in the control window.

Laser Scanning Analysis Window

Open the control window by selecting the shortcut icon or the option **Brightness & Contrast** from the **Image** menu.

Brightness and Contrast can be adjusted together by moving the red dot in the grey square (up and down = brightness, left and right = contrast) or separately using the respective edit field. The **Reset** button resets all controls to standard values.
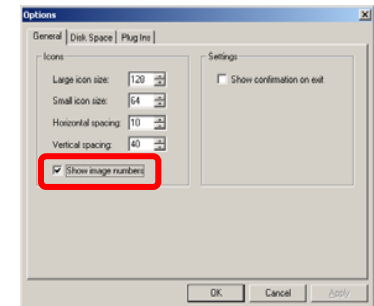
General Settings

In the caption line of the **Analysis** window, the image title is displayed in addition to patient name and acquisition date. If image numbers are activated via the menu option **Setup / Options**, this image number is also displayed.
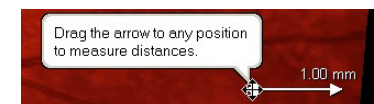
Icons: On the left side of this tab, the icon size and spacing in the **Patient File** can be chosen.

Settings: Closing the window of the HEYEX will shut down the program. As standard setting, you will be asked to confirm that you wish to close the program. This confirmation window can be switched off.
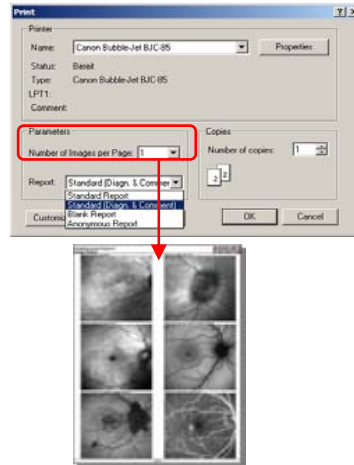
Preferences

To turn off information "bubbles", open the **Preferences** dialog from the **Options** menu, and remove the checkmark for the option **Display info bubbles**.

Printing

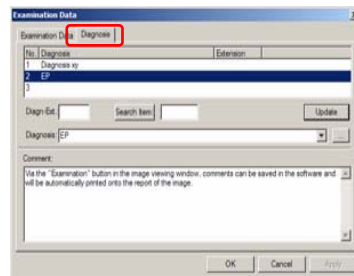To print one or multiple scanning laser images to one page, select the desired images in the patient file and select *Print* from the context menu. Then select the *Report* type from the drop-down menu, and the number of images you wish to print on one page.

To print OCT scans, open the *Analysis* window and select the tab that contains the information to be printed.

Print the content of the currently displayed tab using the *Print* button or the menu option *Image / Print Report*.

In order to insert a comment on the printout, click on the *Examination* button in the *Patient File* to open the *Examination Data* window and select the *Diagnosis* tab. Text entered in the *Comment* field will be automatically printed onto the report type *Standard (Diagn. & Comment*).
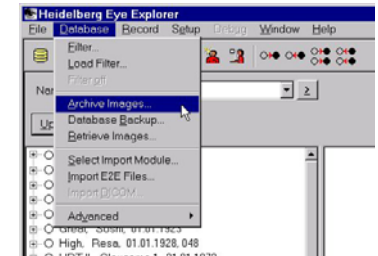
A **screen print** of the active window (topmost window displayed on the screen) can be obtained by holding down the CTRL and P key.

Archiving

Archiving creates a copy of all of your data on a second mirrored FireWire drive. This protects your data from a hard drive crash.

In the *Database* menu of the database window, the function *Archive Images* starts the process to archive the data to an external media.

Software Versions

The software release 3.1 includes the Spectralis Acquisition Module version 3.1, Spectralis Viewing Module 3.1 and Heidelberg Eye Explorer software version 1.5.12.

To check the versions of the Heidelberg Eye Explorer and the acquisition and viewing modules, please open the *About* box using the *Help / About* menu item in the database window.
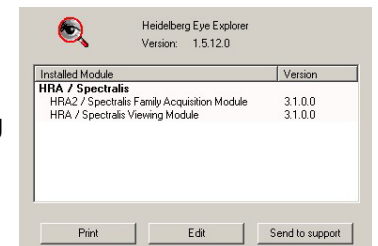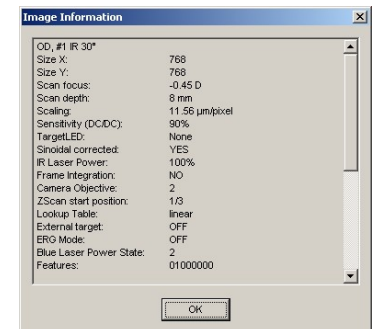
Image Information

Scan parameters of the scanning laser image are available in a separate window.

It is opened via the *Info* button or the menu option *Image / Image Information.*

E2E File Export

To export images and other data in an examination including patient data as an E2E file, select the desired image icon(s) from the image viewing window, and select the item **Export ► as E2E** from the **Context Menu** in the **Patient File**. Viewing an E2E file requires HEYEX software for the respective module.
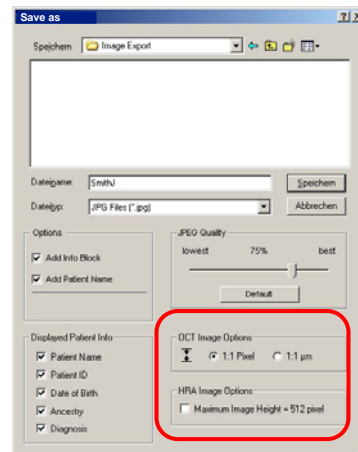
The **Batch ► Export E2E** feature in the database window enables export of multiple patient records at once.

Graphics File Export

Alternatively, images can be exported as graphics files. Use the **Export ► as Picture** option from the **Context Menu** or the menu item **Export as picture** in the **Image** menu of the **Analysis** window.

1. **Context Menu** or **Display**: The scanning laser and OCT images are displayed next to each other in full size, without further control elements.
   The y-scale of the OCT scan can be selected (**1:1 pixel** or **1:1 µm**), and it is possible to down-size the scanning laser image to the same height as the OCT image (512 x 512 pixels).
2. **3D View**: The content of the 3D window is exported without control elements.

.

Graphics File Export (cont.)

3. **Thickness Graph**: The displayed window is exported including the diagram.
4. **Thickness Map**: The displayed window is exported including the thickness map.

File Formats

Images can be exported in BMP, JPG, TIF or PNG format.

For export of images as TIF files, it is possible to select a compression method (None / LZW / Packbits). This reduces the size of the exported image file without loss of image information.
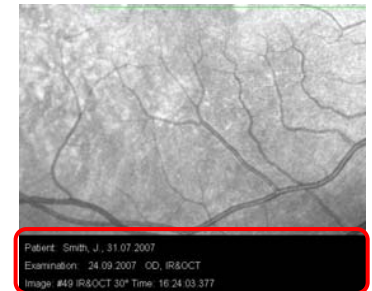
Additional Information

In addition to the image, the following information can be exported into the graphics file:

Patient – Name, ID, date of birth, ancestry

Examination – Date, OS/OD, image type, diagnosis

Image – Image type, time

In the **Save as...** window, select the option **Add Info Block** and choose the **Displayed Patient Info** by ticking the respective boxed.

HEIDELBERG ENGINEERING