OPMI pico from ZEISS
FAQ HD camera

1. HD camera in general

1.1 Which outputs does the HD camera offer?

720p version
- HDMI, 720p with 50 or 60 fps
- Component YPbPr, 720p with 50 or 60 fps
- Composite Video (BNC) PAL or NTSC

1080 version
- HDMI, 1080p or 720p with 50 or 60 fps
- Component YPbPr, 1080i or 720p with 50 or 60 fps
- Composite Video (BNC) PAL or NTSC

1080p Live & streaming with recording license
- DVI, 1080p or 720p with 50 or 60 fps
- Component YPbPr, 1080i or 720p with 50 or 60 fps
- S-Video Y/C (Mini-Din) PAL or NTSC
- USB
- Ethernet

1.2 Can the customer use a third-party monitor with HD video cameras?

- Yes, he or she can use SD and HD monitors.
- Yes, all video outputs can be used simultaneously.

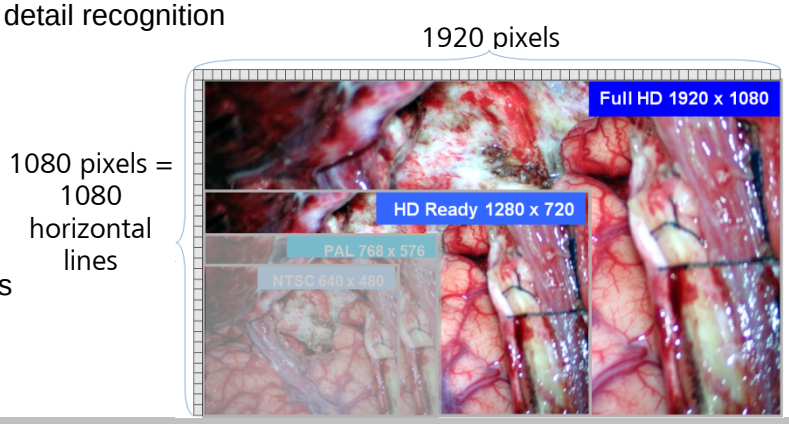
1.3 What is the difference between SD, HD ready and Full HD?

“Upgrade in resolution results in improved definition and in better visualization of image details.”
- Standard definition e.g. PAL (720x576 pixels) → 415,000 pixels
- HD ready 720p (1280x720 pixels) → 921,000 pixels
- Full HD 1080p (1920x1080 pixels) → 2,074,000 pixels

What does HD mean?
HD = High Definition, for razor-sharp detail recognition

16:9 format
1080 horizontal lines = Full HD
720 horizontal lines = HD ready

Full HD video chain is necessary
- HD camera
- HD capable connectors/cables
- Full HD monitor



1.4 What is the difference between SD and HD cameras? What does that mean for the customer?

High definition offers:

- More anatomical details
- Crisper and more detailed still images
- Improved co-observation and documentation
- High resolution videos for presentation on big screens or projectors
- Still images can also be captured from the HD video after the procedure

1.5 What is the difference between interlaced (e.g. 1080i) and progressive (e.g. 1080p) mode?

A progressive video is scanned line by line. The video frames do not have interlace artifacts and can be captured as still photos.

1.6 How does the camera's digital zoom function help the customer?

- It increases the magnification of the video images even beyond the maximum magnification of the surgical microscope
- Switch on/off the zoom on the monitor's image without changing the doctor's view seen through eyepieces.

2. HD recording

2.1 What is at least needed to record videos and capture images with the integrated Full HD camera?

OPMI® pico from ZEISS with the new HD 1080p Live & streaming with recording license needs:

- 1x HD monitor
- 1x HD video cable (DVI/HDMI) to connect with the HD monitor

The images and videos can be captured and recorded on the USB stick and can be shown/presented on the HD monitor.

2.2 Is it possible to select any still image from the stored video in Full HD quality?

Yes, it is possible to create still shots out of the videos in Full HD quality.

2.3 Is there a perceived delay between the view seen through the eyepieces and that seen on the monitor?

- There is nearly no delay seen between a live view on a video monitor and a HD video cable.
- Connection via LAN (network cable to computer) is dependent on the performance of the used network and software. We have seen a delay time of 1 second.
- Connection via LAN and connected WLAN is based on the performance of the used software. We have seen a delay time of less than 2 seconds.

2.4 How long is the recording time on the attached USB-stick (32GB)?

- 1 hour treatment recording time needs approx. 4 GB storage space with high video quality
- 8 hours treatment recording time needs approx. 32 GB storage space with high video quality
- Therefore the 32 GB USB-stick is useful for 8 hours of treatment recording time with high video quality and without interruption.

2.5 What does it mean to change the video quality (high, medium, low) in the settings for the daily routine?

- No noticeable difference for still scenes
- High video quality is recommended for short recordings in the best possible quality
- Low video quality is recommended for limited storage capacity

2.6 Why do we have a different output with the new HD 1080p Live & streaming with recording license?

- This new HD camera device has the DVI interface to get connected via cable to the HD monitor input.
- The connection can be tightened at the device, which makes the connection more stable.
- 2 HD video cables are available:
  - System cable DVI-D, 5 m (Material No: 302681-8767-000)
  - HD video cable-HDMI to DVI-5 m (Material No: 308203-1070-000)


302681-8767-000


308203-1070-000

2.7 Is the onscreen display always visible, regardless of the choice of output connection (DVI, YPbPr, S-Video) to the monitor?

- The onscreen display is definitely visible with DVI and YPbPr connection.
- The onscreen display is not visible with S-Video (Y/C) connection.

2.8 What is the main difference between the ZEISS integrated camera and the integrated camera of Leica?

A customer is using a surgical microscope at the dental workplace and wants to store images on a computer:

- With Leica M320, the customer has to unplug the memory flash drive from the surgical microscope and then plug it into a computer to download the video / still image files.
- With ZEISS OPMI pico the customer can record onto a shared network and can easily transfer still images and HD videos to the patient management system.
- With ZEISS OPMI pico the customer can stream live video into the network for viewing through various devices.

2.9 Is additional hardware needed for the new HD 1080p Live & streaming with recording license?

No additional hardware is needed:

- The delivered system is an entire HD video recorder.
- The data could be stored either on a USB stick or into a network.

- As an alternative it is possible to share the video signal within the network via the streaming function. To play the video on the computer a media player which supports streaming protocols (e.g. VLC media player) is required.

2.10 What is the advantage of using the new HD 1080p Live & streaming with recording license in comparison to external camera systems?

Benefits from integrated HD recording:

- Fully integrated, no interference with ZEISS OPMI ergonomics and maneuverability.
- Factory calibrated focus and geometrical alignment of camera and surgical microscope.
- Easy and effective to capture and record the ZEISS OPMI image.
- High light sensitivity of the integrated video camera. Better than external digital SLR or compact cameras to avoid blurred images because of long camera exposure times.
- Full day recording nonstop without overheating the sensor.

2.11 Is there a possibility of retrofitting an existing ZEISS S100 / OPMI pico with an integrated Full HD camera?

There are 3 options available:

1. UC Kit for HD 1080p live video
   UC integrated HD video camera and control unit

2. UC Kit HD 1080p Live & streaming with recording license
   UC integrated HD video camera Live & streaming with recording license (control unit / camera / recording)

3. UC Update for existing HD cameras
   UC HD update control unit Live & streaming with recording license

2.12 The video files created cannot be read on the Mac computer. What can I do?

<u>Background information</u>

The HD recording system uses the following storage format:

- Video Codec H.264
  - The video stream itself is coded with the help of a codec, in our case with a H.264 codec.

- File format (container): MPEG program stream (*.mpg)
  Behind this is a "container format"
  - It defines how audio and video streams are saved.
  - It contains additional META data which describe, for example, the resolution and frame rate of the stream.

The problem with the Mac computer:

- Mac computer does not expect the mpg container which we use for the H.264 stream
- This container can incorporate such streams, but not every program can handle them

ZEISS chose the container format *.mpg for security reasons:

- The mpg container, which holds the META data at the beginning of the file, is still readable and usable in the case of a power failure, or if ZEISS OPMI is turned off or the USB stick is removed during the recording
- In such a case, other containers must be "repaired"

What can be done?

There are 2 workarounds:

- Use of a video editor on the Mac computer, which can deal with the container format *.mpg
  • e.g. Adobe® Premiere® Elements software, video-editing software

- Copy the file into a new container.
  • E.g. conversion from container *.mpg to container *.mov
  a small program is necessary to do this.
  • Recoding with a different codec is not necessary, so hardly any time or computing power are required (e.g. 1GB file in 5 sec).
  This file can then be viewed or worked on using most standard Mac computer programs, e.g.
    - QuickTime application program (viewing)
    - iMovie application program (processing)

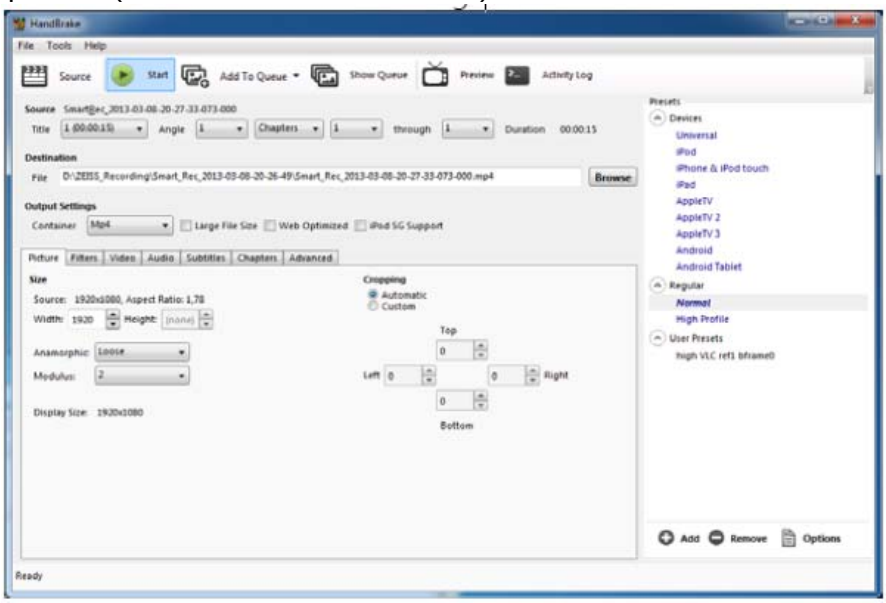
Free video file conversion tools available, for example:

- HandBrake (Windows® operating system, Mac computer)
- Smart Converter (Windows® operating system, Mac computer)
- FFmpeg (Windows® operating system, Mac computer) for batch processing

Attachment * – see next page

***Free video file conversion tools available, for example:**

- HandBrake (Windows® operating system, Mac computer) supports different output presets (iPad, Android™ Platform, …) and allows advanced H.264 settings.



- Smart Converter (Windows® operating system, Mac computer) supports different output presets (iPad mobile digital device, Android™ Platform, Xbox® video game system, …) and allows very fast re-muxing without re-encoding is easy to use with drag&drop enables batch processing with pro version.

- FFmpeg (Windows® operating system, Mac computer) for batch processing allows very fast re-muxing without re-encoding and advanced H.264 settings.