

revolutionising  
the world of  
microsurgery

# RoboticScope®

head-gesture controlled 3D visualisation





## What if:

- relaxed posture and freely selectable working position could be your new normal?
- you and your assisting surgeon could both sit or stand straight during the surgical procedure?
- you both could view anatomical structures with the realistic depth perception of modern 3D visualisation right in front of your eyes?
- you could adjust all the important functions of the visualisation system hands-free?



Scan the QR code and get  
the first impression of  
RoboticScope®!

# Enter a new era of digital surgical technologies with RoboticScope®

**RoboticScope® is a hands-free 3D visualisation system for microsurgery designed to prioritise ergonomics for the surgeon. It consists of three precisely coordinated components: Head-Mounted Display (HMD), robotic arm and full digital camera unit.**

*RoboticScope®* offers the visualisation of the operating field during the surgical procedure. It is a visualisation system that replaces the traditional combination of the fixed eyepieces and the microscope with a Head-Mounted Display (HMD), robotic arm and a full digital camera system. As a result, it enables the surgeon to keep their most essential instruments – their hands and their eyes on the surgical field.

HMD. The HMD detects the head gestures of the surgeon and controls the camera unit accordingly. The surgeon can guide the camera intuitively with gentle head gestures always keeping an eye on the operating field and without having to remove the hands off the operational field.

Sounds like the future? With *RoboticScope®* it is the present.

The robotic camera is located above the operating field and transmits in a real-time, high-resolution 3D image to the



## Free

A surgical tool must adapt to the surgeon – not the other way around. Keep your hands and your sight on the surgical field and stay free from distractions.



## See

The surgeon can view the selected anatomical structure from different perspectives controlled through an intuitive user interface within the Head-Mounted Display.



## Easy

*RoboticScope®* supports an efficient workflow, as all functions are easily accessible with the lightest of head gestures.

## Touch Screen

- For surgical set-up and assistant control
- Also possible to connect with external screen for effortless observation by OR staff

## Head-Mounted Display

- Detects the head gestures of the surgeon
- Simultaneously presenting a live view of the surgical area
- Enabling a hands-free control over the visualisation system and offering undistracted focus on the surgical field

## Camera Unit

- 2x Extended Full HD/HDR+
- Merged 4K resolution (4928 x 2056px)
- Producing and transporting a high quality 3D live image from the surgical area to the HMD
- Optimised format for usage in surgical procedure (4:3)
- 2x LED lighting
- 11x zoom lens
- Absolute magnification 2.7-30.1x

## 6-Axis Robotic Arm

- Precision  $\pm 0.03\text{mm}$
- Calculated range: 1840mm
- Enables exact movements of the camera even in the smallest structures



# Head-Mounted Display

**Our specially developed Head-Mounted Display (HMD) plays a crucial role in controlling the *RoboticScope*®.**

With the HMD, the surgeon has two digital micro displays right in front of their eyes, presenting a real-time 3D image of the operational field. The HMD detects the head gestures of the surgeon and controls the robot camera accordingly. Changing the perspective, zooming, and focusing – it all can be done without having to remove the hands off the operational field.

Measured by sensors in the Head-Mounted Display, *RoboticScope*® interprets the head movements of the surgeons. The robotic arm and camera head then carry out the corresponding movement with high precision. Thus, all important functions of *RoboticScope*® can be selected and used with light head gestures during the operation.



## Perform without restrictions

The ergonomic working position and lightweight HMD can help minimise the strain on the surgeon's neck and back during surgical procedures. Your hands remain free to operate. The surgical instruments remain with the patient and you can operate ergonomically and without distractions.



## Full flexibility

Put the HMD on, sit straight, relax your shoulders - and let the robotic arm do all the bowing and bending over the operational field. Choose the Orbit Mode and reach angles that were hard or even impossible to reach before.



## Robotic arm & camera

**The 6-axis robotic arm allows for exact 3D movements of the camera unit above the operational field.**

The precision of  $\pm 0.03$  mm ensures that any perspective changes, even in the smallest structures, can be defined accurately. Using light head gestures the surgeon can define direction and speed of the movement and therefore easily change the operating position, totally hands-free.

During the operation, the robot camera is placed over the operational field. Through controlled movements over the surgical field, the camera can be positioned easily into viewing angles that could be hard to reach with a traditional microscope.

Through the application of the latest optics technology, we have created optimal visualisation for the operational scene. Made in Austria: the optics are developed, manufactured, and assembled directly in our production centre in Innsbruck.



# User Interface

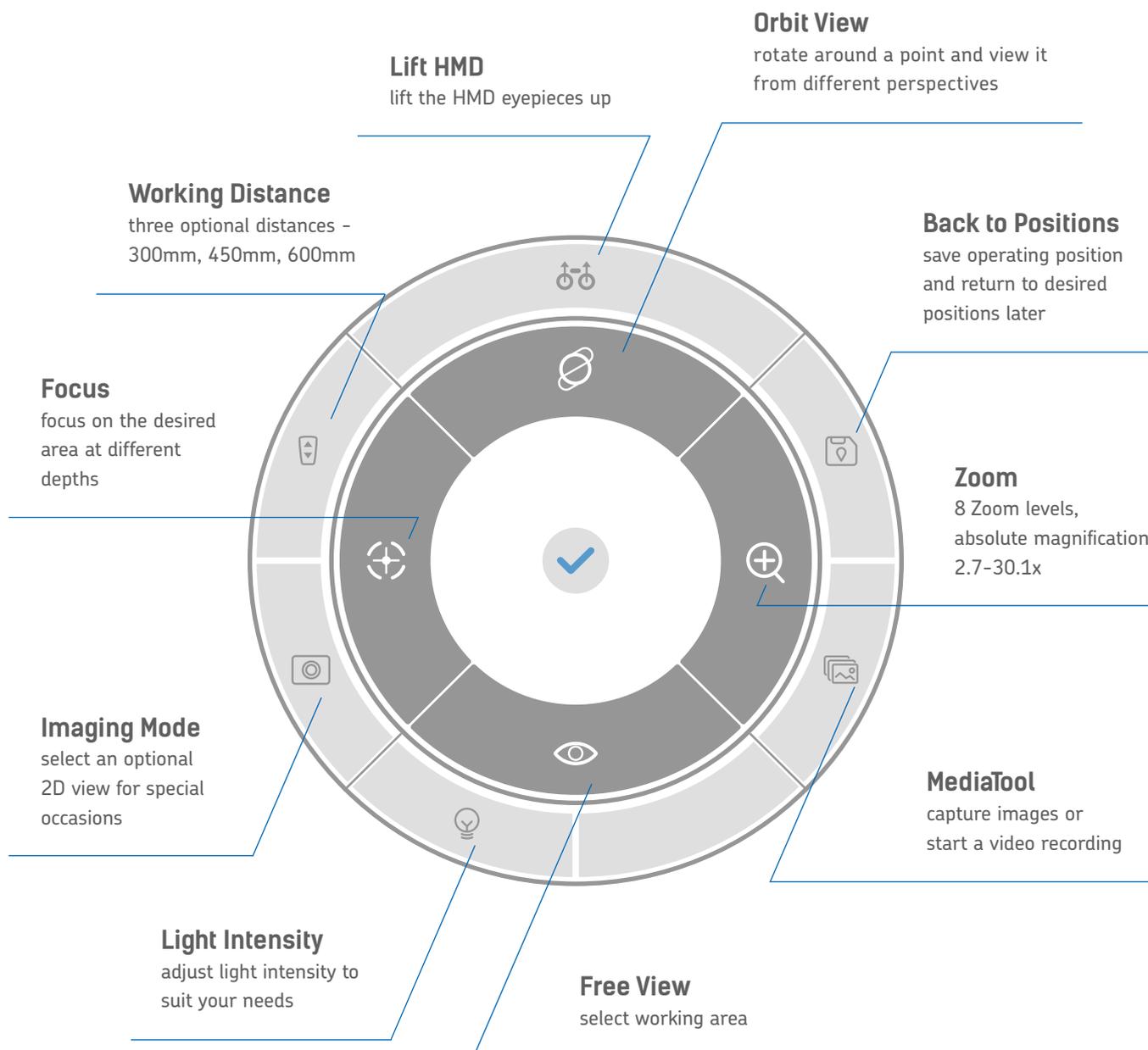
The intuitive user interface of *RoboticScope*<sup>®</sup> ensures easy selection and usage of all functions of *RoboticScope*<sup>®</sup>. There are no complex submenus. Regardless of magnification and other parameters, you can make all adjustments with the HMD through simple and intuitive procedures - step by step. As a result, you can keep your undistracted focus on the surgical field.

## Primary functions

Primary functions are the most important tools that are used most often during the operation. They are located on the inner function ring and are the fastest to select.

movements you can control the robotic arm as well as navigate in the HMD interface and select the needed functions. You can maintain an ergonomic, comfortable working position.

To control the *RoboticScope*<sup>®</sup>, all you have to do is raise or lower your head, turn it to the left or right. With these head



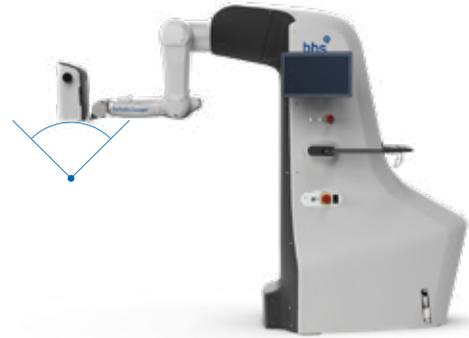
## Free View

In Free View you can change the view of the operational field within the horizontal dimension as you please. As soon as the point to be observed has been found, you can switch to the Orbit View.



## Orbit View

In Orbit View, you can fix a point and view it from numerous perspectives. The focal dimension remains the same and can be changed with zoom settings after finding the right viewing angle.



## Focus View

The focal point is fixed at the respective working distance (300mm, 450mm, 600mm). However, it can be moved along the viewing direction to focus at different depths. The working distance remains the same during the entire process.

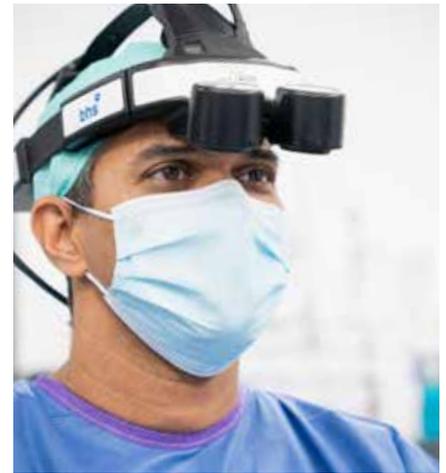


## All in one view

Functions in the HMD interface are organised in two rings - the inner function ring with primary functions and the outer function ring with secondary functions.

Ergonomics as the key aspect

# RoboticScope® in Lucerne



„With the *RoboticScope*® we can simplify and improve the ergonomics, because we are moving the whole microscope just by little movements of our head. With the traditional surgical microscopes, you use your hands to control them, but with the *RoboticScope*® your hands are always free to operate and you can still control the microscope. For me this is one very big advantage. *RoboticScope*® just takes these certain things to the next level. It's been a very exciting journey.“ says Prof. Dr. Gunesh Rajan from the ENT Department Lucerne.

For me as a surgeon, one of the key aspects is the ergonomics during the surgery. Sometimes we work for hours in static positions when we have these long tumour operations and reconstructions. So, ergonomics is a very big aspect in our work.

**Prof. Dr. med. Gunesh Rajan**  
Co-Chairman & Professor of  
Otolaryngology, Head & Neck Surgery,  
Lucerne Cantonal Hospital



## Ergonomic

The surgeon's field of vision is completely independent of their posture. Only, when actively changing the camera position by moving their head, the viewing angle changes. No stretching over the surgical field needed anymore.

## Intuitive

Just a gentle head gesture and the camera focuses on an anatomical structure. Another movement and the robotic arm rotates the camera accordingly around the structure. As a result - intuitive and natural perception without distractions.

## Hands-Free

All the adjustments and functions of the visualisation are thoroughly hands-free. Zooming, focusing and taking in new perspectives - all this is possible with the lightest of head gestures.

## Electrical Data

Voltage	<b>230 V</b>
Current consumption	In normal operation < <b>10 A</b>
HMD-port	<b>12 V</b>
USB 3.0 port	Rated Value: <b>5 V</b>

## Robot Controlling

Repeatability – ISO 9283	<b>± 0.03 mm</b>
Calculated range of robotic arm	<b>1840 mm</b>
Maximal speed of movement	<b>250 mm/s</b>

## HMD

Display resolution	<b>2x 1600x1200</b>
Display ratio	<b>4:3</b>
Dioptre compensation	<b>± 5 dpt</b>
HMD weight	<b>&lt; 500 g</b>

## Integrated Full HD Camera

Camera system resolution	<b>2 x Extended Full HD/HDR+</b>
Merged 4K Resolution	<b>4928 x 2056 px</b>
Camera dynamics	<b>70.8 dB</b>
Frames per second	<b>60 fps</b>
Dynamics	<b>12 Bit</b>

## Optics

Working distance	<b>300 – 600 mm</b>
Absolute magnification	<b>2.7x – 30.1x</b>
Magnification range	<b>11.1</b>
Zoom levels	<b>8</b>
Smallest viewing area	<b>5.8 x 4.3 mm</b>
Largest viewing area	<b>64.5 x 48.4 mm</b>
Magnification settings	<b>purely optical</b>

## Illumination

Performance	<b>2x 11 W</b>
Lighting technology	<b>LED</b>
Light spectrum	<b>White light CRI &gt; 95</b>
Limited max. luminous intensity	<b>25 – 100 %, automatic regulation</b>

## BHS MediaTool

Data volume	<b>64 GB</b>
Output format	<b>png and mp4</b>
Maximal recording capacity	<b>500 Photos or 8 h Video</b>

## Mechanical Data

Dimensions in transport position (WxHxD)	<b>920 mm x 1880 mm x 1740 mm</b>
Total weight of the device	<b>360 kg</b>
Total weight of the device incl. transport packaging	<b>max. 540 kg</b>



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