OPMI PENTERO 900
The Next Generation
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Evolution in Excellence
OPMI® PENTERO® 900 represents the next generation visualization system. Building on the groundbreaking innovations introduced in 2004, it combines unique design concepts and new functionalities in a proven, fully-integrated platform. Key functions have been enhanced and new visualization methods integrated, raising OPMI PENTERO 900 to a new level of performance. OPMI PENTERO 900 continues the evolutionary process, turning technological progress into medical innovations effectively advancing what is possible in modern microsurgery.

Experience the new OPMI PENTERO 900.

- Brilliant Visualization
  Experience optical immersion with state-of-the-art apochromatic optics, razor-sharp video images in full HD quality and innovative fluorescence methods.

- Superior Performance
  Smooth, intuitive system handling and superior functionality ensure efficient surgery and fast system set-up.

- Beyond Visualization
  OPMI PENTERO 900 interacts with current and emerging workplace technologies and workflow based solutions to create a better OR experience.

1953 First surgical microscope: OPMI 1
1976 Contraves® suspension: OPMI 1 / NC 1
1993 First microscope-integrated navigation system: OPMI ES MKM autopilot
1998 First microscope-integrated fluorescence: OPMI Neuro FL
2004 A new dimension in surgical microscopes: OPMI Pentero
2011 Another defining moment
Experience Optical Immersion

OPMI PENTERO 900 delivers state-of-the-art apochromatic optics providing crystal-clear images, sharp details and natural color rendition. Whether viewing through the eyepieces or on its flexible and integrated HD touchscreen display, OPMI PENTERO 900 elevates visualization of the surgical field to the next level. The entire HD video chain – camera, recorder, editor and monitor – is fully integrated into the system without the need for external components, exposed cabling or the use of multiple control interfaces. The HD video system can be configured and controlled via the central HD touchscreen, handgrip or foot switch for maximum flexibility and surgical performance. OPMI PENTERO 900 offers a unique HD experience with visual brilliance for live demonstrations, teaching presentations and patient documentation.

Continuation of Scientific Progress

Carl Zeiss has partnered with visionary thought leaders in the development of innovative intraoperative fluorescence technologies. The first fluorescence module, INFRARED 800™, successfully established intraoperative fluorescence as a key visualization technology. FLOW® 800 is a unique tool enabling the visual analysis of blood flow dynamics, further establishing Carl Zeiss as a leader in intraoperative fluorescence. With BLUE 400 and now, with the introduction of YELLOW 560™, we further broaden the capability for fluorescence-based research applications. With its intuitive workflow, automated functions and unmatched performance, the PENTERO 900 platform supports fluorescence-based surgeries like no other system.

Uniquely Designed Apochromatic Optics

The distinctive design concept with ZEISS apochromatic optics throughout the entire optical pathway allows the system to deliver unmatched optical clarity, detail resolution and color reproduction, both through the eyepieces and the video image.

Fully Integrated HD Video

The fully integrated HD video camera, recorder and editor enable surgeons to capture razor-sharp images for teaching, documentation and presentation purposes. All video functions can be centrally controlled from the intuitive graphical user interface.

Brilliant High-Definition Video Display

The large touchscreen display delivers impressively crisp images in HD quality. The extendable suspension arm allows the display to be rotated, tilted or moved into different viewing positions.

High-quality Data Injection

The advanced MultiVision™ display significantly enhances image quality and enables efficient data injection during procedures. Higher resolution, enhanced contrast and better color rendition ensure outstanding quality leading to improved outcomes.

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INFRARED 800¹ Intraoperative visual assessment of blood flow and vessel patency during AVM, bypass and aneurysm surgery. INFRARED 800 is indicated for use in neurosurgery, plastic and reconstructive procedures and coronary artery bypass graft surgery.

FLOW 800² Unique fluorescence application enabling visual analysis of vascular blood flow dynamics. It compiles INFRARED 800 video sequences into visual maps, diagrams or side-by-side images, enabling an in-depth interpretation of fluorescence videos.

BLUE 400² Capable of supporting fluorescence-based surgery for research applications by providing visualization in the 620-710 nm range. BLUE 400 is a completely integrated module with no external components or cables. Optionally available in HD quality.

YELLOW 560² Visualizes in the 540 to 690 nm wavelength range for supporting research applications. It is the first ZEISS fluorescence module capable of highlighting fluorescent structures while viewing surrounding structures in their natural color.

¹ For the complete 510(k) summary for INFRARED 800 with FLOW 800 option, visit http://www.accessdata.fda.gov/cdrh_docs/pdf10/k100468.pdf.
² Image obtained with investigational new drug.
³ Image obtained with drug under investigation for new intended use.
Maximum Efficiency

OPMI PENTERO 900 is a unique surgical visualization platform specifically conceived and designed for even the most demanding microsurgical applications. Extended system ergonomics and functions provide increased convenience, streamlining the surgical workflow. All relevant functions are combined into a cohesive system that can be controlled from the intuitive touchscreen user interface. Smooth system handling and superior performance are delivered through proven functions like mouth switch control, a unique depth of field, AutoFocus™ and many more. The Foldable Tube f170/f260 and wireless foot control panel enhance ergonomics, improving surgeon comfort and performance.

OR Turn-Around Simplified

Designed as much for the OR staff as for the surgeon, OPMI PENTERO 900 incorporates workflow-conducive features that reduce prep time for the nursing staff before each surgical case. AutoBalance™ quickly balances the microscope at the touch of a button, AutoDrape® facilitates a quick and easy draping process, and the unique FlexiTrak™ enables the OR staff to easily maneuver the system in the clinical environment. Additionally, the intuitive user interface allows for easy access to all microscope functions through a large, HD touchscreen monitor including patient data, pre-configured surgeon settings and video recording. More than any other surgical microscope system, OPMI PENTERO 900 streamlines the surgical workflow and maximizes OR efficiency.
Workflow-based Solutions
OPMI PENTERO 900 provides tailored, workflow-based solutions that are accessible through a common interface. The modules were designed with surgeons for surgeons to meet the requirements of clinical applications and are seamlessly integrated into the surgical workflow.

Application-driven Technologies
Focused on enhancing clinical outcomes, OPMI PENTERO 900 provides surgeons with application-driven solutions like MultiVision and fluorescence-based visualization. Each integrated module introduces a new level of simplicity, speed and accuracy to the surgical procedure.

Universal Connectivity
OPMI PENTERO 900 offers comprehensive connectivity with workplace technologies and data management functionality. Integrated modules like MultiVision and DICOM ensure a seamless connection with other visualization systems and into the hospital’s communication infrastructure, respectively.

Intelligent Design
From complete cable and component integration to overall intuitive system design, OPMI PENTERO 900 creates the optimal surgical environment. One cohesive touchscreen interface serves all system configurations and functions.

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Technical Data

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<th>Rated Voltage</th>
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<td>Current Consumption</td>
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<td>Rated Frequency</td>
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<td>Class II laser product as per EN 60 825-1:2002</td>
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<tr>
<td>Weight</td>
<td>Weight approx. 358 kg</td>
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<tr>
<td>Weight of system incl. transport container</td>
<td>approx. 610 kg</td>
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</table>
**OPMI PENTERO 900**

**Standard and Optional Features**

### Standard Configuration

**Achromatic Optics**
- Motorized focus, VarioSkop® with working distance 200 – 500 mm
- Motorized zoom, 1:6 zoom ratio
- 10x magnetic widefield eyepieces with integrated eyecups
- Autofocus with 2 visible laser dots, automatic mode with magnetic brakes

**Illumination**
- SuperLux® 550 light source with 2 x 300 W xenon
- Automatic Iris Control for adjusting the illumination to the field of view
- Individual right threshold setting
- Focus light link, working distance controlled light intensity
- Display of remaining lamp lifetime

**System Operation**
- Multifunctional programmable handgrips
- Magnetic clutches for all system axes
- Central control interface
- XY robotic movement in 3 axes (variable speed)

**System Setup**
- AutoBalance
- Autodrape – air evacuation system
- Mouthpiece fine balance

**Video**
- 22” HD video touchscreen on extendable arm
- Mouthpiece fine balance
- Integrated 3-CMOS SD video camera
- Integrated video still image capturing on HDD and USB media

**Connectivity / Data Management**
- Video-in for external SD video sources
- Navigation interface
- Interface for micromanipulator
- Remote diagnosis via internet/VPN

### Options

**Video**
- Integrated 3-CMOS HD video camera
- Integrated SD or HD video according to setting
- Adaption of consumer (SLR) photo/video camera

**Intraoperative Fluorescence**
- BLUE 400
- INFRARED 800
- INFRARED 900 with FLOW 800
- YELLOW 560

**Connectivity / Data Management**
- DICOM module for patient data transfer

**Accessories**
- 12.5x magnetic widefield eyepieces with integrated eyecups
- Straight tube, focal length f = 170mm
- Stereo co-observation tube
- Foldable tube f170/f260, including the PROMAG function for additional 50% magnification and integrated rotate function
- Wired foot control panel
- Wireless foot control panel

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Image Courtesy of:
- BrainLAB AG, Feldkirchen, Germany (p. 4, 8)
- Barrow Neurological Institute, Phoenix, Arizona, USA (p. 1, 4, 5, 8)
- Michael Buchfelder, MD, PhD, Neurosurgery Department, Erlangen University Hospital, Erlangen, Germany (p. 5)
- Walter Stummer, MD, PhD, Department of Neurosurgery, University Hospital Münsingen, Münzingen, Germany (p. 5, 8)
- Yasuo Murai, MD, PhD, Department of Neurosurgery, Nippon Medical School, Tokyo, Japan (p. 8)
- Yasushi Takagi, MD, PhD, Department of Neurosurgery, Kyoto University Graduate School of Medicine, Kyoto, Japan (p. 5)