



OPMI Pentero
Complexity Simplified



We make it visible.



OPMI Pentero

Complexity Simplified

With OPMI® Pentero® a surgical microscope is no longer just at the center of the microsurgical procedure, it is now an information and communication cockpit. A window to the operating field and a gateway to the outside world.

But how can a sophisticated, high-tech surgical microscope assist in simplifying very complex surgical procedures?

OPMI Pentero is the answer.

Best of the Basics

“OPMI Pentero has exceeded all my expectations. The motorized X/Y movement, increased headroom, single-lever pistol grip movement, completely internalized video, cameras, and cables, elimination of the drape bulk with a vacuum system, single-button autobalance, and unparalleled binocular vision with superb lighting make this highly integrated microscope system the most important tool for the practice of neurosurgery.”

Robert F. Spetzler, M.D., Chairman and Medical Director Barrow Neurological Institute, Phoenix, Arizona, USA

“I have been using Carl Zeiss microscopes for the last two and half decades. They have provided the best in optics and have been constantly upgrading the technology. My team and I trust Carl Zeiss optics.”

Dr. A. S. Hegde, Chairman Neurosciences, Sri Sathya Sai Institute of Higher Medical Sciences, Bangalore, India

The challenge: to develop an optical system design that substantially improves depth of field, light delivery and working distance.

Bringing It All Within Reach

State-of-the-art apochromatic optics deliver the legendary crystal-clear images, sharp details and natural colors associated with Carl Zeiss. The innovative optical design, with Varioskop® technology, provides a large working range and virtually ensures comfortable working conditions – even when using long instruments. Also, the depth of field perception can be doubled by activating the DeepView function.

Bringing Light to the Darkness

Surgeons now have 20% more light compared to the previous systems. The Automatic Iris Control™ precisely adjusts the light cone to the desired field of view without creating any reflections and minimizing unnecessary light tissue exposure. The patented, two-channel illumination system delivers light wherever it is needed providing higher-contrast images in narrow and deep channels.

Focus at the Push of a Button

The high-speed autofocus feature automatically delivers razor-sharp images at all times, regardless of magnification. During manual focusing an intuitive laser-focusing aid assists in selecting the exact focal point – particularly helpful when using the mouth switch.

Stress Free

Whether the surgeon remains standing or seated, the compact design of the OPMI Pentero's optical system allows for freedom of hand and instrument movement while still providing a short distance to the surgical field. The flexible overhead design of the suspension system allows placement in any position – even behind the surgeon.





Riding on rails down the hallway: FlexiTrak™.



Single-button balancing: AutoBalance.



Air evacuation for an excellent fit: AutoDrape® System.



Changing lamps and modules has never been easier: Superlux® 330.



System control via ergonomic handgrips

Intuitive system control

Mouth switch

Wireless or wired 14-function foot control panel

Simply Unique.
Uniquely Simple.

“OPMI Pentero is an operating microscope designed by surgeons for surgeons. It incorporates cutting edge technology in a compact, innovative and brilliant design. Carl Zeiss has combined efficiency, efficacy and ergonomics to create a microscope that brings neurosurgery and spinal surgery to an exciting new level.”

Daniel L. Barrow M.D., Professor and Chairman, Neurosurgery Department, Emory University, Atlanta, USA

Smooth Maneuverability

Whether using the handgrip or the mouth switch, the Contraves® suspension system enables smooth maneuverability and effortless repositioning.

Robotic X/Y Movements

OPMI Pentero can move in a X/Y direction enabling fine, precise adjustments of the OPMI body without releasing the system brakes.

AutoBalanced at the Touch of a Button

The patented AutoBalance™ system provides outstanding balancing with a single, simple touch of a button.

Beauty and Functionality All in One

The rotatable, easy-to-use video touchscreen has been perfectly integrated into the system. It intuitively guides the user through all functions and system settings. Digital patient files allow instantaneous access to relevant information – even during surgery. Various surgeon user settings can be quickly retrieved. The touchscreen also serves as a display for the integrated MediLive® digital video camera with a full-screen mode for convenient viewing.

Intraoperative Fluorescence

“Anatomical⁽¹⁾ and ICG angiographic image⁽²⁾ showing a large paraclinoid aneurysm after surgical clipping. ICG angiography demonstrates complete clip occlusion of the aneurysm and the patent internal carotid artery. Note the high spatial image resolution of the ICG angiography with visibility of flow even in vessels of sub-millimeter diameter.”

Prof. Dr. Andreas Raabe, Chairman, Department of Neurosurgery, Bern University Hospital, Bern, Switzerland

Surgeons can only treat what they can see. OPMI Pentero is the world's first surgical microscope to offer completely integrated support for fluorescence-based surgeries. There are no external components adding extra weight or impairing working comfort.

INFRARED 800 with FLOW 800*

INFRARED 800™ aids in the visual assessment of intraoperative blood flow as well as vessel patency in fluorescence-guided surgeries using indocyanine green (ICG). FLOW® 800 is a unique tool enabling visual analysis of vascular blood flow dynamics by

compiling the information from the INFRARED 800 video sequences into maps and diagrams. It supports an in-depth interpretation by creating an objective evaluation of results visually and in color (3). INFRARED 800 with FLOW 800 allows visualization of blood flow in bypass surgeries, cerebral aneurysms, arteriovenous malformation (AVM) surgery, and in cerebral vessel branch occlusion. It enables visual assessment of vessel patency in bypass surgery and patency of very small perforating vessels in the cerebral vascular area. Detection of AVM vessels via real-time visualization of blood flow

in feeding arteries, nidal vessels and draining veins is also supported.

BLUE 400

Developed by Carl Zeiss in close cooperation with neurosurgeons around the world, BLUE 400™ is capable of supporting fluorescence-based surgery for research applications by providing visualization in the wavelength range between 620 nm to 710 nm. BLUE 400 is fully integrated into OPMI Pentero.



(1)

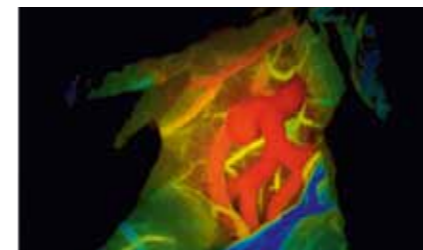


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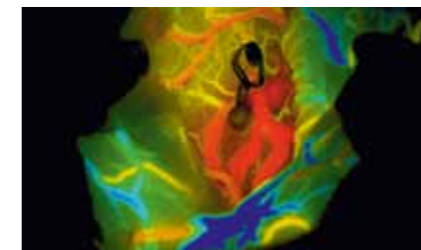


BLUE 400 application image obtained with investigational new drug.

*INFRARED 800 with FLOW 800 is cleared for use with all ICG drugs for applications noted in the 510(k) summary.



(3)



The comparison function in FLOW 800 enables direct side-by-side comparison of fluorescence imaging sequences intraoperatively to visualize blood flow changes. No more tedious advancing and rewinding of video sequences is needed to filter out changes. The surgeon is able to easily compare blood flow before and after clipping in cerebral aneurysm surgery.

Integrated Digital Visualization

“It’s really here – a completely integrated digital video chain in a surgical microscope. I can immediately produce and process my digital video and take it with me on a DVD.”

Professor Dr. Yoshiaki Shiokawa, Chairman, Department of Neurosurgery, Kyorin University Hospital, Tokyo, Japan

Record several hours of surgery, find and edit the most important sequences, integrate them into presentations or save them to DVD for archival in the patient file. All video functions are incorporated into one, very easy-to-use platform.

Digital Dreams Become Reality

The integrated 3-chip, standard definition MediLive video camera (also available as an integrated stereo 3D version) enables OPMI Pentero to

digitally capture videos and images. Digitally processed from creation to output, the entire video image chain delivers outstanding quality. Data can be digitally saved directly onto the internal hard drive and simultaneously stored on USB or DVD/CD. In addition, the integrated camera is equipped with both a Progressive Scan and DV output, providing flicker-free images with even higher resolution. The integrated digital video chain is further proof of OPMI Pentero’s unique user-focused design.

The apochromatic, 3-chip, high-definition video cameras – TRIO 620 and TRIO 630 – offer unmatched image quality for higher video demands. The semi-integrated TRIO 620 and the fully integrated TRIO 630 camera are custom designed for OPMI Pentero ensuring ergonomics and freedom of movement.



Record. The touchscreen-interface easily guides the user.



Select a video sequence or application image.



Mark, edit and add comments to selected sequences.



Review the edited sequences before archiving or presentation.



Archive to the hard drive, DVD, CD-ROM or USB memory stick.



Present. Moving pictures enhance your lecture.

Hospital Workflow Integration

"Carl Zeiss has created a virtual cockpit which allows me to access my information at any time. Everything I need is displayed in the eyepiece at the push of a button."

Professor Dr. Yoshiaki Shiokawa, Chairman, Department of Neurosurgery, Kyorin University Hospital, Tokyo, Japan

How can a surgeon process the constant stream of diagnostic, navigation and system information while remaining focused on the operating field?

MultiVision

MultiVision™ technology enables the surgeon to superimpose color data into both eyepieces. Additionally, video data and the entire touchscreen interface can be injected into the MultiVision display and controlled using the joystick further enhancing surgical workflow.



Navigation Ready

The navigation interface enables fast and easy connection to leading navigation systems without external components and wiring. OPMI Pentero has an open interface to ensure not only a seamless, but also a reliable integration with the navigation systems. The innovative robotic X/Y design, with three motorized axes, provides real tool tracking for viewing every point in the working and tilting range of the OPMI depending on the functionality of the connected navigation system.

The laser-guided, high-speed autofocus system delivers precise navigation by focusing to a fraction of a millimeter and precisely identifying the displayed point.

OPMI Pentero can export or import patient data including demographics, images and video clips to hospital computers via the network or DICOM interface. Preoperative data can also be imported.



In Case of an Emergency

OPMI Pentero is supported globally by a network of support centers providing reliable, 24/7 service utilizing a help-desk database. Diagnosis and troubleshooting is carried out via the internet or telephone with assistance from the Service Online Protocol.

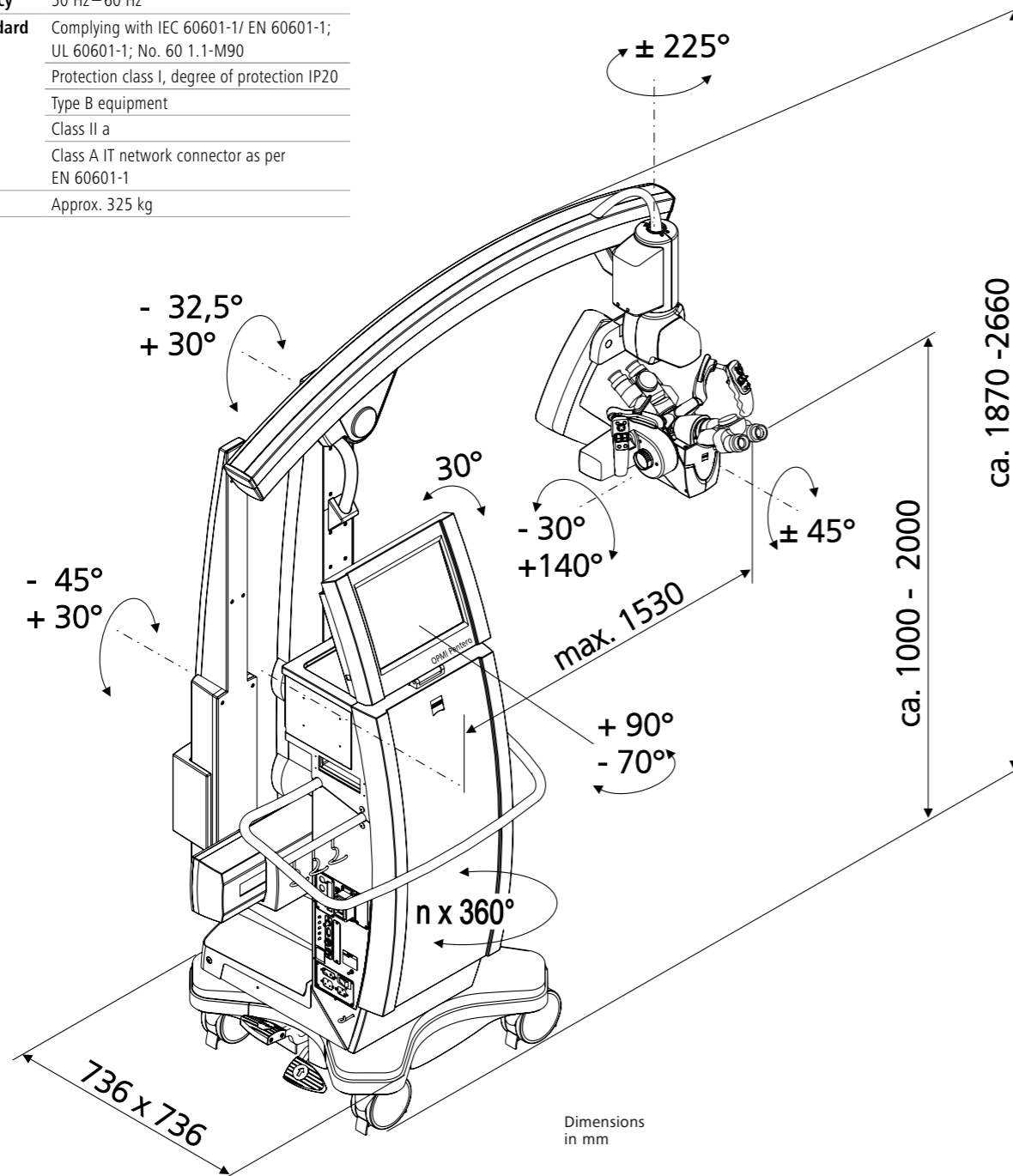


OPMI Pentero

From a technical standpoint

Technical Data

Rated Voltage	(115 V): 100 V – 125 V (230 V): 220 V – 240 V
Current Consumption	max. 1.200 VA
Rated Frequency	50 Hz – 60 Hz
Electrical Standard	Complying with IEC 60601-1/ EN 60601-1; UL 60601-1; No. 60 1.1-M90 Protection class I, degree of protection IP20 Type B equipment Class II a Class A IT network connector as per EN 60601-1
Weight	Approx. 325 kg

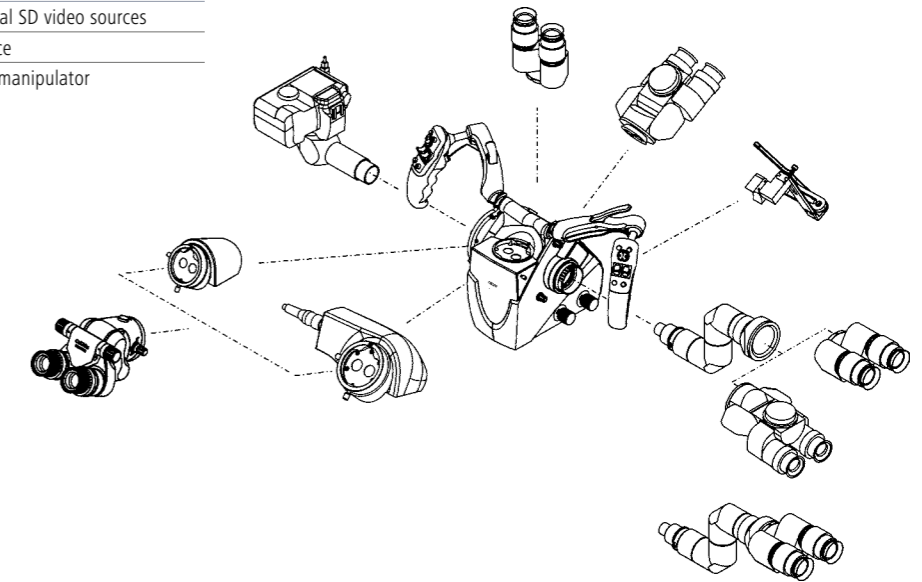


Standard Configuration

Apochromatic 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® 330 light source with 2 x 300 W xenon Automatic Iris Control for adjusting the illumination to the field of view Individual light threshold setting Display of remaining lamp life time
System Operation	Multifunctional programmable handgrips Magnetic clutches for all system axes Central user interface XY robotic movement in 3 axes (variable speed)
System Setup	AutoBalance AutoDrape – air evacuation system Mouth switch fine balance
Video	15" video touchscreen Integrated 3-CCD 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

Options

Video	Integrated SD video recording and editing Adaptation of consumer (SLR) photo/video camera TRIO 620 HD Camera System TRIO 630 integrated HD Camera System
Intraoperative Fluorescence	BLUE 400 INFRARED 800 INFRARED 800 with FLOW 800
Connectivity / Data Management	DICOM module for patient data transfer from/to PACS
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 Mouth switch



Images Courtesy of:

Barrow Neurological Institute, Phoenix, Arizona, USA (p. 5, 6, 9 top, 10, 11, 13)
 Andreas Raabe, MD, PhD, Department of Neurosurgery, Bern University Hospital, Bern, Switzerland (p. 8)
 Walter Stummer, MD, PhD, Department of Neurosurgery, University Hospital Münster, Münster, Germany (p. 8)
 Yasuo Murai, MD, PhD, Department of Neurosurgery, Nippon Medical School, Tokyo, Japan (p. 9 bottom)

The moment you expand the surgical
boundaries beyond what seems possible.
This is the moment we work for.



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