

# Aesculap Aeos<sup>®</sup> Robotic Digital Microscope


See Your Patients in a Whole New Light



AESCULAP<sup>®</sup>

# Aesculap Aeos® Robotic Digital Microscope

Challenges of Traditional Optical Microscopes



Flawed ergonomics  
take a toll on the health  
and performance of  
surgeons

For every inch the head moves forward,  
the head, neck and upper back  
muscles must support an additional  
**10 pounds of weight.**<sup>1</sup>

Torso positions, such as forward  
flexion, lateral bending and  
axial twisting are associated  
with back pain.<sup>2</sup>

Potential consequences of this physical stress:  
Headaches  
Chronic pain  
Exhaustion<sup>3</sup>

Muscular pain in the head, neck and back which can radiate down the arms<sup>3</sup>

The user experience and overall concept of traditional optical microscopes have remained materially the same for over 20 years. Surgeons are tethered to their oculars which often forces them to choose between the view they need versus the view that's comfortable.

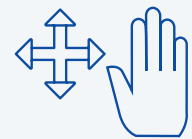
## There are also technology challenges.



**VISION**  
Small depth of field and field of view



**PAIN**  
Neck and back pain



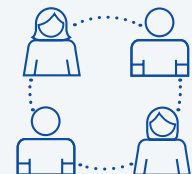
**ADJUSTMENTS**  
Manual repositioning and lack of robotic arm



**HEAT**  
Risk of burns from xenon light



**FLUORESCENCE**  
Inconvenient fluorescence imaging in 2D only



**WORKFLOW**  
Only the surgeon sees in 3D

1 Kapandji A. The Physiology of the Joints. Volume 3. 6th ed. London: Churchill Livingstone; 2008.

2 Keyserling WM, Punnett L, Fine LJ. Trunk Posture and Back Pain: Identification and Control of Occupational Risk Factors. Applied Industrial Hygiene; 3(3):87-92.

3 Kerstin Pingel. 7 Tips For Better Ergonomics in Neurosurgery. Leica Science Lab. 2014.



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Surgical Differentiators

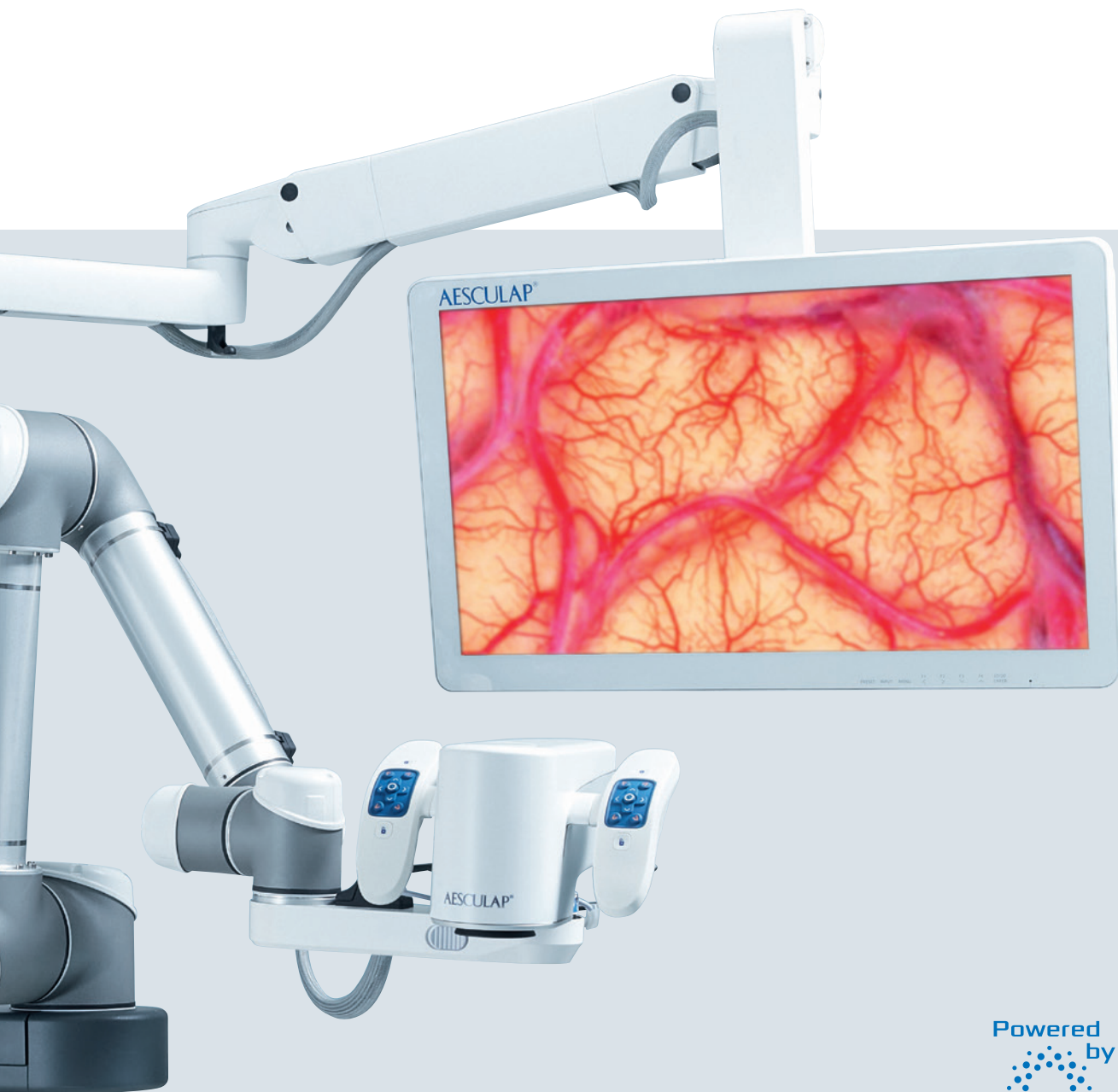
## Welcome to the Next Generation Surgical Visualization System

The Aesculap Aeos Robotic Digital Microscope combines the ergonomic and educational benefits typically found in "exoscopes" with the high-quality imaging and fluorescence capabilities of traditional optical microscopes along with proprietary digital and robotic functionalities.

*All these things have changed the game enough that I no longer own a traditional microscope, and I'll never go back. It clearly was a paradigm shift, and it's changed the whole way I operate.*

*Dr. Lee Warren, neurosurgeon*





Powered by **TRUE**  
DIGITAL  
SURGERY

## Improvements in



Ergonomics



Robotics



Immersive 3D Imaging



Fluorescence



Digital Platform

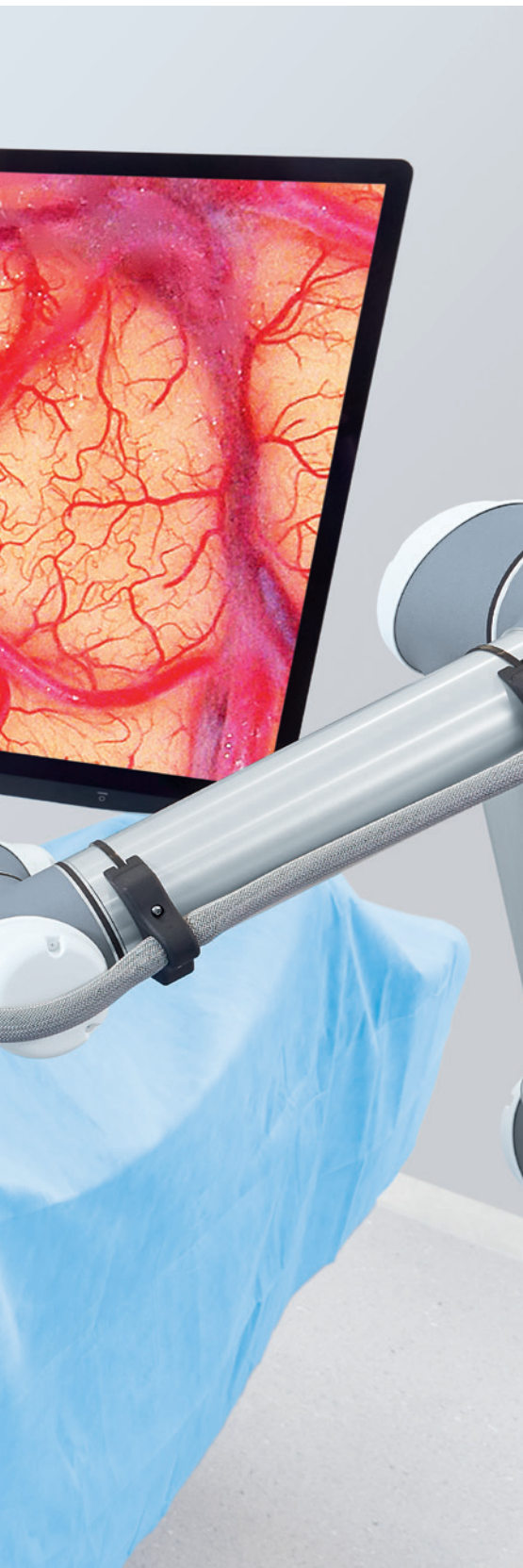


# Aesculap Aeos® Robotic Digital Microscope

Upgrade Your Ergonomics




The Aesculap Aeos Robotic Digital Microscope provides heads-up positioning which frees the surgeon from the ocular tether. The surgeon, not the microscope, dictates ergonomics, delivering a highly comfortable experience even in the most demanding procedures.



## Neurosurgery is hard enough. It doesn't need to be so hard on the surgeon.

 **4 in 5**  
neurosurgeons report pain after a  
day of surgery.<sup>1</sup>

 **83%**  
of these had musculoskeletal pain.<sup>1</sup>

 **1 in 2**  
surgeons confirm a negative  
effect on their performance.<sup>2</sup>

**ONLY 19%**  
of surgeons report  
occupational injuries  
to their institution.<sup>3</sup>

**35%**  
of surgeons performed  
fewer operations due  
to the injury.<sup>3</sup>

1 Pingel K for Leica Science Lab: 7 Tips For Better Ergonomics in Neurosurgery (2014).


2 Davis WT, Fletcher SA, Guillaumondegui OD. Musculoskeletal occupational injury among surgeons: effects for patients, providers, and institutions. J Surg Res, 2014 in Surgeon News, "Shape Shifters". 2017 Sep;28-30.

3 Epstein S, Sparer EH, Tran BN, et al. Prevalence of Work-Related Musculoskeletal Disorders Among Surgeons and Interventionalists: A Systematic Review and Meta-analysis. JAMA Surg. Published online February 01, 2018;153(2):e174947. doi:10.1001/jamasurg.2017.4947.



# Aesculap Aeos<sup>®</sup> Robotic Digital Microscope

Surgeon-Controlled Precision Robotics



The Aesculap Aeos Robotic Digital Microscope features a fully robotic arm with six degrees of freedom for a range of manual and semi-automated repositioning options. These precise movements, including sub-millimeter micro movements, place the camera head exactly where it needs to be and when the surgeon needs it there.





## Lock on Target

Pivot around a fixed focal point



## Waypoints

Seamlessly return to a previously saved location, including zoom and focus levels




Handgrip, wireless foot pedal and touchscreen monitor present a wide range of customization and available hands-free control options.



# Aesculap Aeos® Robotic Digital Microscope

See What You've Been Missing



The Aesculap Aeos Robotic Digital Microscope unlocks the power of the entire OR sharing the same high quality, immersive images at the same time. Full-time 3D visualization and 10x optical zoom allow you to work heads up without sacrificing image quality.





### See More Details

- Experience the surgical field in complete focus with outstanding depth of field
- Industry-leading 10x optical zoom delivers full resolution, regardless of magnification level
- Low heat co-axial illumination efficiently lights the entire surgical field, including deep and narrow cavities

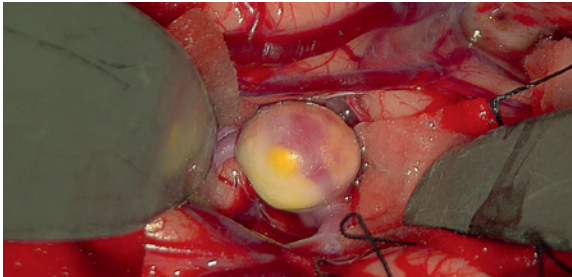
### Everyone Sees More

- Immersive 3D 4K imaging paired with High Dynamic Range (HDR) means everyone in the room has a great view
- Optimizes hands-on training opportunities for residents and fellows and overall OR teamwork

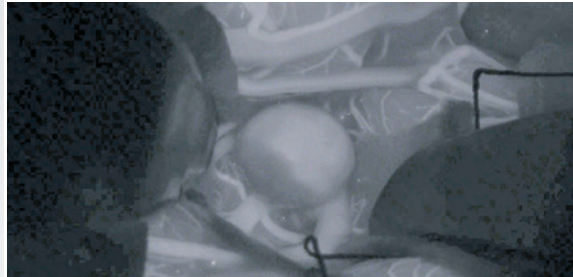


# Aesculap Aeos<sup>®</sup> Robotic Digital Microscope

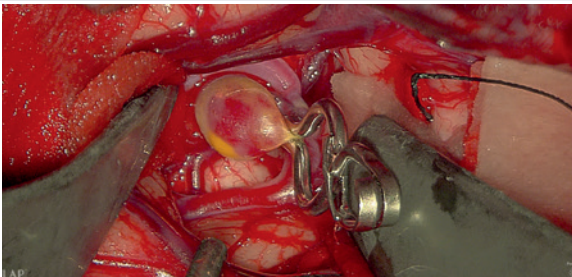
See Beyond Tissue



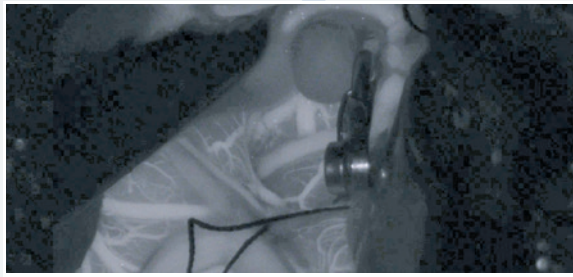
Aneurysm with white light



Aneurysm with DIR800



Aneurysm clipped with white light



Aneurysm clipped with DIR800

## DIR800 3D Digital Infrared

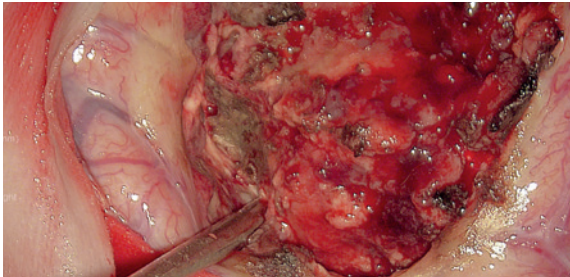
- Adjustable backlight illumination aids visualization of nearby non-fluorescing structures
- Slow-motion playback

The Aesculap Aeos Robotic Digital Microscope offers visualization beyond the human eye with LED-powered 3D digital fluorescence modes. Experience the same benefits of white light with fluorescence while the entire OR shares the same high-quality 3D image on multiple monitors.

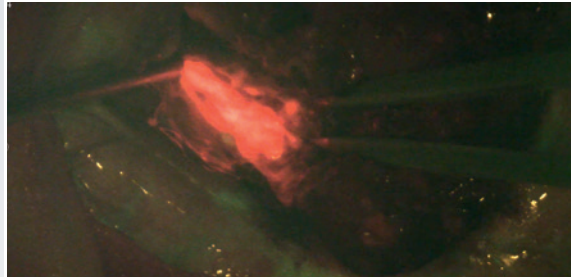
### Indications For Use

The DIR800 is an accessory for the Aesculap Aeos Robotic Digital Microscope and is used in viewing intraoperative blood flow in the cerebral vascular area including, but not limited to, assessing cerebral aneurysm and vessel branch occlusion as well as patency in neurosurgery. It also aids in the visual assessment of intraoperative blood flow and vessel patency in bypass surgical procedures in neurosurgery.

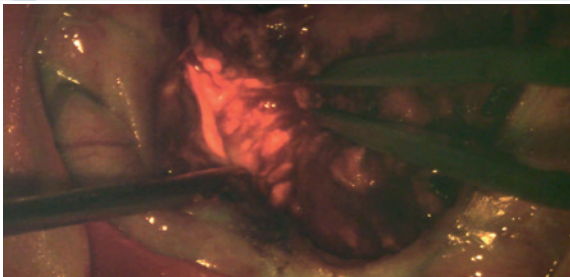




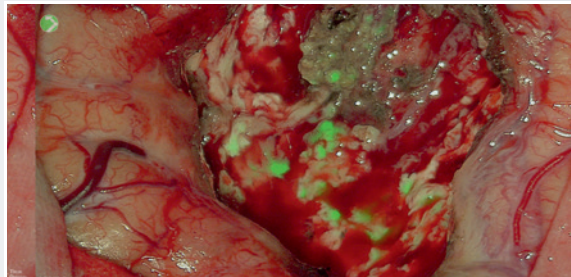
Glioblastoma with white light



Glioblastoma with DUV400 low intensity backlight



Glioblastoma with DUV400 high intensity backlight



Glioblastoma with white light + DUV400 AR overlay

## DUV400 3D Digital Ultraviolet

- Adjustable backlight illumination aids visualization of nearby non-fluorescing structures
- Optional augmented reality (AR) overlay provides additional insights from combined fluorescence and white light images

### Indications For Use

The DUV400 is an accessory for the Aesculap Aeos Robotic Digital Microscope and is used in viewing fluorescence of fluorophores, comprising:

- An excitation filter for blue spectral range between 390 nm and 420 nm
- An observation filter for visible light with spectral range greater than 510 nm

# Aesculap Aeos® Robotic Digital Microscope

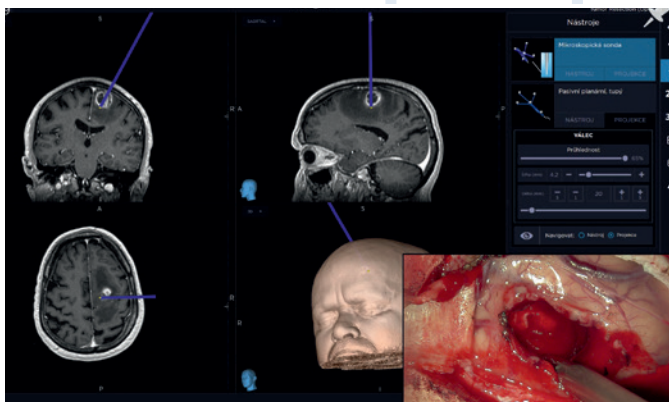
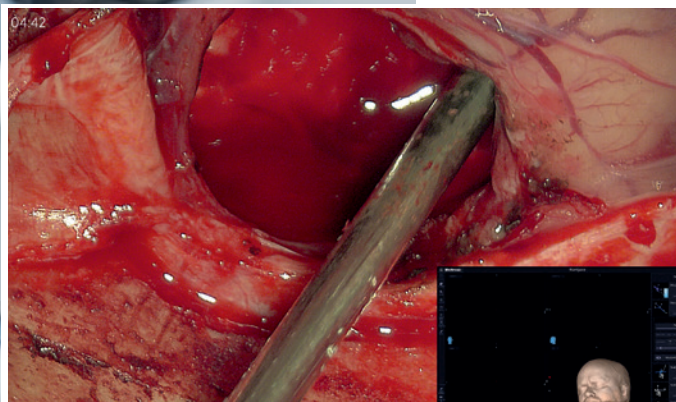
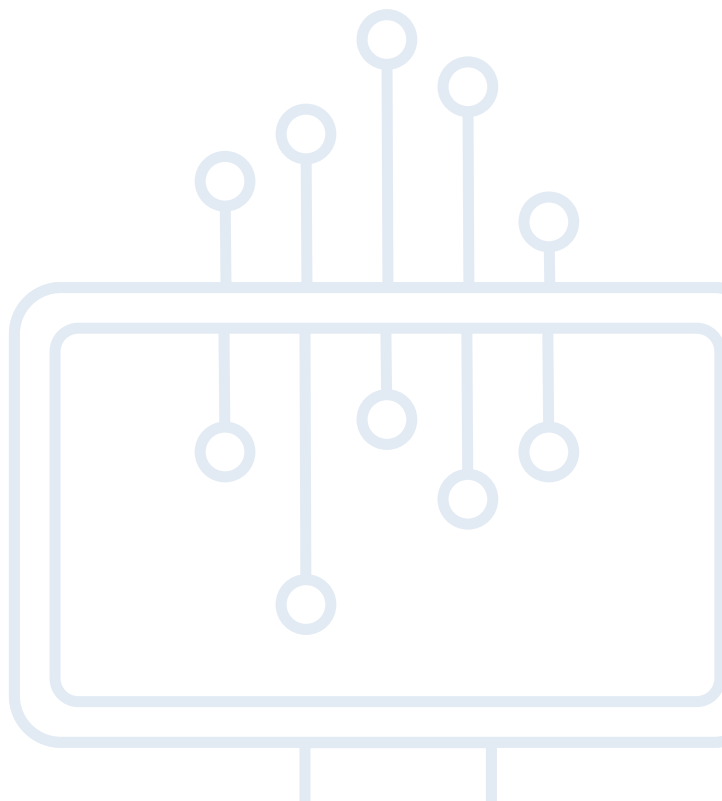
The Future is Digital



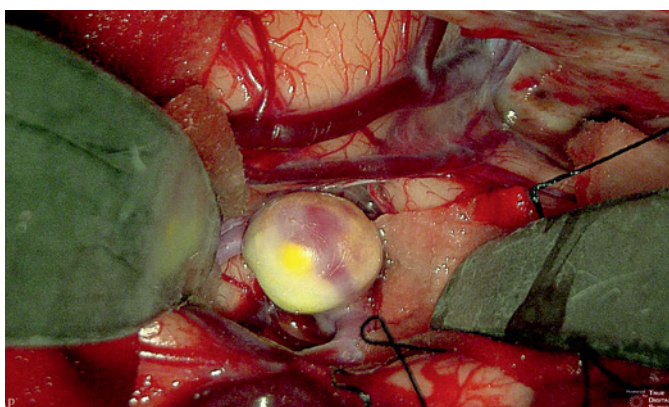
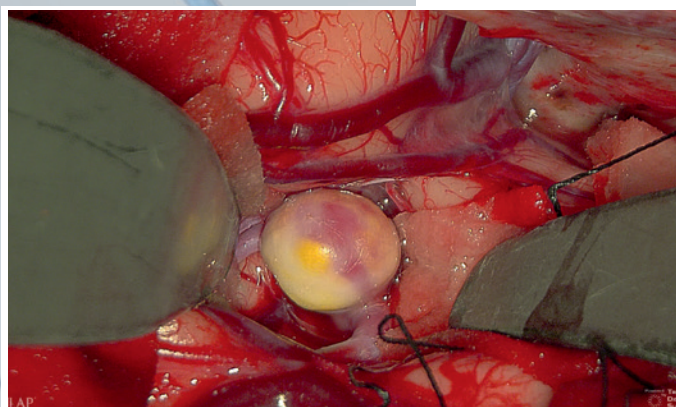
The fully digital platform of the Aesculap Aeos Robotic Digital Microscope combines the insights of digital visualization with the flexibility of an evolving software-driven ecosystem.

- Future-proof your investment with software updates and an upgradeable digital platform
- Unlimited profiles allow customized user settings for each surgeon and/or procedure
- Standard integrated 4TB hard drive allows for easy capture and export of intraoperative screenshots and 2D/3D video





Seamless, plug-and-play integration of a second digital image source, such as neuroendoscopes and navigation, via split screen or picture-in-picture layouts



Digitally augment on-screen images with multiple imaging modes

# Aesculap Aeos® Robotic Digital Microscope

## Specifications

### Robotic Arm

- Six joints
- Servo motors in each axis detect force/direction. Six axes of freedom (up/down, left/right, pitch, roll, yaw, forward/backward)
- Lock on target fixed point orbit
- Waypoint mapping with saved zoom and focus levels and unlimited number of positions

### Optics and Illumination

- 3D visualization
- 10x optical zoom
- Automatic or manually focus with press of a button
- 200 to 450 mm working distance
- HDR imaging
- 2x coaxial LED illumination

Base dimensions – 25" x 48" x 78"

Weight – 454 lbs.

Software	
DUV400	3D blue light fluorescence, backlight illumination, AR overlay mode
DIR800	3D infrared fluorescence, backlight illumination
DICOM	Image and video data integration with PACS







## System Control

- 16" touch screen control
- 22 camera buttons (11 per handle)
- 18 programmable camera buttons (9 per handle)
- 34 programmable camera functions
- Wireless or wired foot switch, joystick plus 10 programmable buttons

Digital Video	
Surgical Monitors	55" 3D 4K, 31" 3D 4K, 26" 3D HD (optional integrated boom arm)
Digital Aperture	Yes, customizable diameter and opacity
Image Rotation	Assistant 180°, assistant 90° clockwise, assistant 90° counterclockwise
Video Outputs	HDMI, DisplayPort
Video Inputs	HDMI, 6G-SDI
Video Recording	Integrated 4 TB HDD and USB media connectivity
Video Input Visualization	Picture-in-picture integration with Aesculap Aeos monitors, activate/deactivate/swap at press of a button

# Aesculap Aeos® Robotic Digital Microscope

## Ordering Information





# AESCULAP

## PRODUCT OVERVIEW

PV010

Aesculap Aeos®  
Robotic Digital Microscope

PV014

Footswitch, wireless

PV012SU

Sterile Drape  
5/box

## SURGICAL MONITORS AND MONITOR STANDS

PV011

Upgrade kit for 3D monitor  
integration (PV008)

PV008

26" Full HD 3D monitor

PV016

Mobile monitor stand  
(for 55" monitor)

PV015

55" 4K 3D monitor

PV818

Mobile monitor stand  
(for PV644 & PV008)

PV644

31" 4K 3D monitor

PV648

32" Full HD 3D monitor

## SOFTWARE MODULES

PV022

DUV400 software

PV023

DIR800 software

PV024

DICOM software

## ACCESSORIES

PV030

White balance cards  
5/box

PV032SU

Test card for DUV400

PV033SU

Test card for DIR800,  
10/box

PV034

Locking HDMI cable, 5 m

PV035

HDMI cable, 10 m

PV052

DP-HDMI cable, 5 m

PV053

DP-HDMI cable, 10 m

PV056

DP-DVI cable, 5 m

PV621

3D polarization glasses  
15/box

PV622

3D anti-fog glasses  
5/box


PV624

3D eye shield glasses kit  
1 frame + 3 shields/box

PV969

HDMI to DVI cable, 3 m





Through collaborative  
excellence we will improve the  
quality of a patient's life and  
meet the needs of the changing  
healthcare environment.

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See Instructions for Use for complete Indications, including Contraindications, Warnings and Precautions.  
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DOC1641 Rev A 1M 08/21