



Product Information  
Version 2.0

## **ZEISS Axio Scan.Z1**

Your Fast and Flexible Slide Scanner for Fluorescence and Brightfield



# Your Fast and Flexible Slide Scanner for Fluorescence and Brightfield

- › **In Brief**
- › The Advantages
- › The Applications
- › The System
- › Technology and Details
- › Service

Digitize your specimens with Axio Scan.Z1 – the reliable, reproducible way to create high quality virtual slides. The excellence of the components guarantees the excellence of the image – just as you would expect from a ZEISS device. And the quality of the virtual slides remains consistently high, even when capturing fluorescence images at unprecedented speed.

This outstanding image quality is based on plan-apochromatic objectives with numerical aperture up to 0.95. Highly automated and very simple to operate, Axio Scan.Z1 tackles the most demanding research tasks as easily as it handles your routine work, controlled by familiar ZEN software from ZEISS: operation is designed specifically for the workflow of capturing virtual slides for your research tasks. ZEN image analysis tools process your data accurately.

Virtual slides are organized in a web-based database where you can view your data at any time, regardless of where you are or what operating system you are using. Share your images online with colleagues and organize entire projects, even when you are on the go.



# Simpler. More Intelligent. More Integrated.

- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

## Fluorescence Images:

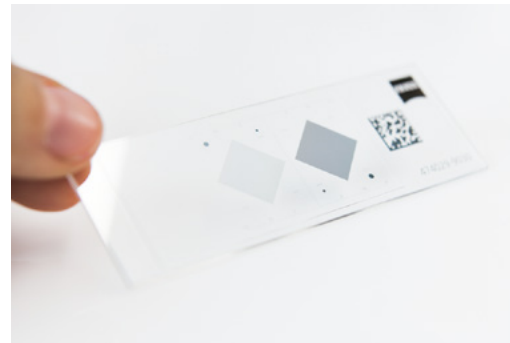
### High Speed. Top Quality.

Now you can digitize up to five fluorescence channels using three synchronized high-speed filter wheels for excitation, beam splitting and emission. Using standard filter cubes it is possible to capture up to 9 fluorescence channels. Even so, speed alone is not enough. With its sensitive cameras, highly corrected optics and perfected light sources, Axio Scan.Z1 achieves the best possible image quality. The fast LED light source Colibri 7 treats your samples very gently. You can switch excitation wavelengths in milliseconds and when using triband and quadband filter sets, no mechanical components will move in the optical beam path.



## Reproducible Results Through Automatic Adjustment Routines

Calibrate your Axio Scan.Z1 automatically from geometry to color rendition. Your virtual slides will be reproduced precisely at any time: comparable between systems and over time. Your Axio Scan.Z1 is designed to generate a high volume of reproducible data - unattended and over long periods of time. You can now add ZEISS Predictive Service: expert service technicians remotely monitor your system performance. They diagnose component status and preventive maintenance can be scheduled to your convenience. You profit from maximum system uptime.



## The Modular Tray Concept: Allow Your System to Grow

Decide how many slides, what detection modes and what camera you want to use at the outset, then retrofit your Axio Scan.Z1 as required: as your tasks grow, it grows alongside them. The tray design affords you maximum freedom with very broad tolerances for the slides, giving you the capacity for digitizing specimen slides of 26 mm x 77 mm, 52 mm x 77 mm and 106 mm x 77 mm.



# Your Insight into the Technology Behind It

- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

## Gentle and Fast LED Illumination Gives You Reproducible Data

Speed, gentle treatment and the optimal wavelength are what counts when it comes to multispectral fluorescence imaging. That's why Axio Scan.Z1 employs fast and reproducible LED illumination. Automatic calibration guarantees reproducible output power levels for each wavelength. You always get consistent quantitative data. Using triband and quadband filter sets, Axio Scan.Z1 generates multichannel images within milliseconds for highest acquisition speed. You can acquire up to 9 spectrally separated fluorescence channels with single band filtersets. Highly sensitive cameras give you perfect image quality. You profit from shortest possible exposure times, maximum specimen protection and unparalleled information density. You get highest imaging speed without compromising data quality.



## Freely Definable Profiles:

### Flexibility Meets Ease of Operation

Axio Scan.Z1 affords you maximum freedom in the choice of components as well as in controlling your imaging. You will always have access to all the settings yet it's very easy to operate, thanks to automated and monitored profiles for your experiments.



# Expand Your Possibilities

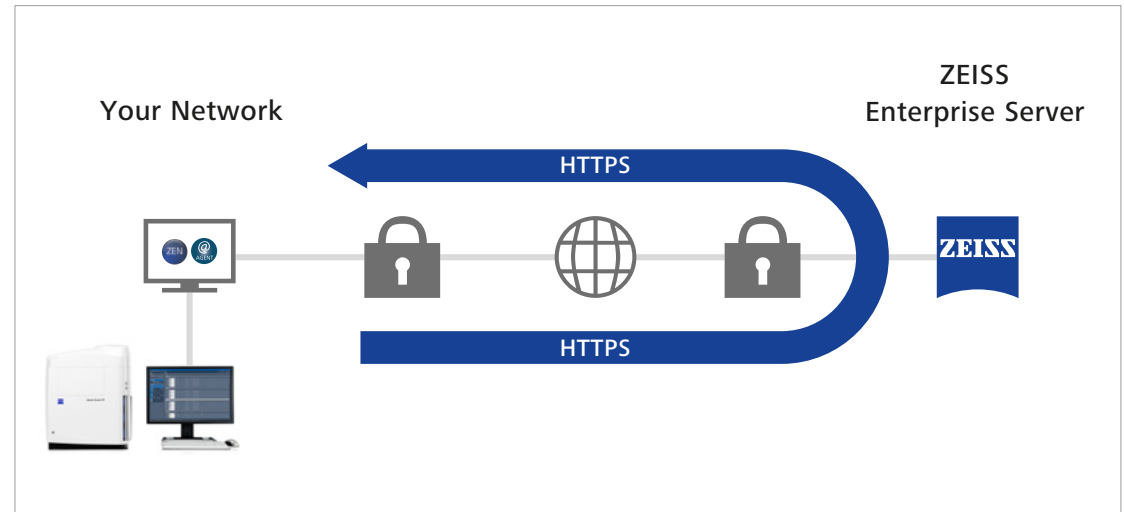
- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

## **ZEISS Predictive Service Maximizes System Uptime**

Once connected to your network and activated, this advanced technology will automatically track the health status of your instrument and collect system log files in the background to improve remote diagnosis.

Relevant technical data such as operating hours, cycle counts or voltages are periodically monitored via a secure connection to our data center. The ZEISS Predictive Service application evaluates the performance of your microscope as system data can be received and analyzed.

Our support engineers will diagnose any issues by analyzing data on the Enterprise Server – remotely and without interruption to your operation.



- **Maintain highest system availability**  
Increase your uptime through close monitoring of the system's condition as remote support can often provide immediate solutions
- **Fast and competent support**  
Use secure remote desktop sharing to easily get an expert connected
- **Optimum instrument performance**  
As the status of your system is monitored, necessary actions can be planned before they become urgent
- **Data security**  
Ensure highest data security standards using well established technologies like PTC Thingworx and Microsoft Azure Cloud. No personal or image data is uploaded, only machine data

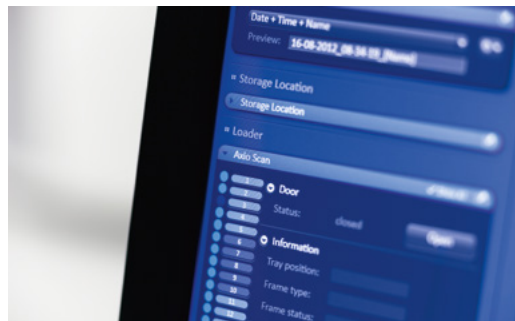


# Expand Your Possibilities

- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

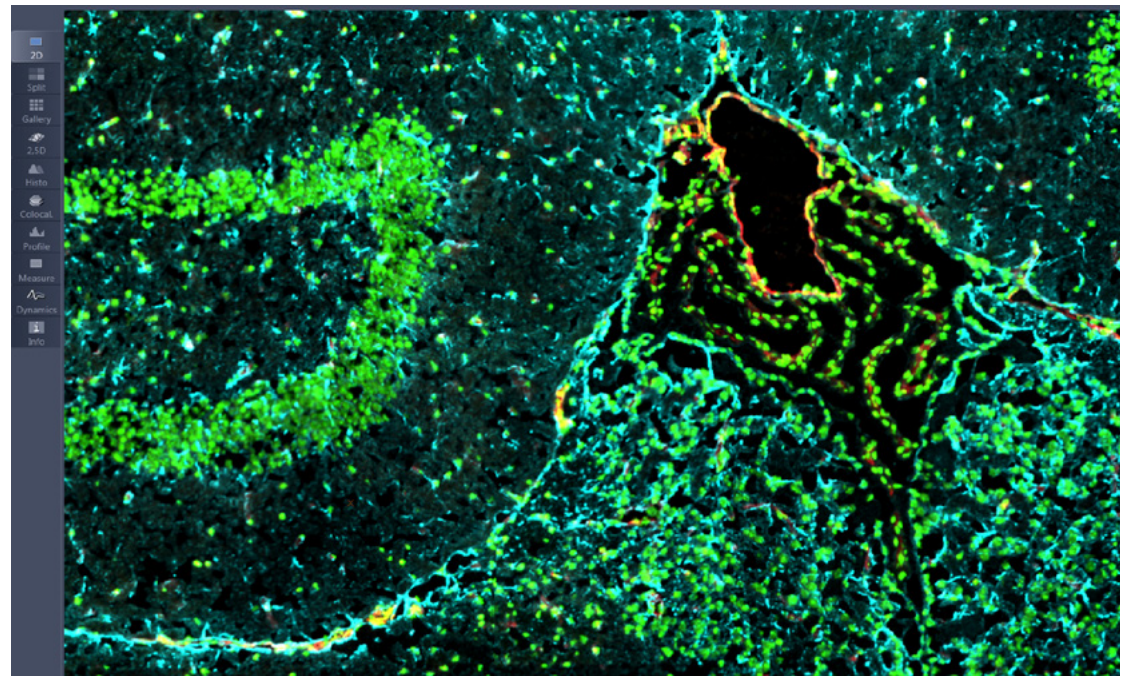
## ZEN Software: Versatile and Easy

Advanced imaging software brings real benefits to biomedical research, coping with your wideranging and complex tasks while remaining easy to operate. ZEN imaging software from ZEISS is founded upon an intuitive user concept. You define the functions for users and user groups according to knowledge and responsibilities. ZEN then responds by proposing settings and following up with action where appropriate. Smart Setup, for example, provides you with an intuitive interface and workflow even for complex fluorescence samples. Just choose the dyes and ZEN will propose all the other settings. That way you can work quickly and safely – especially when several peers are accessing one device.



## Seamless Imaging: Capture and Process

ZEN lets you capture virtual slides as well as analyze them and then continue processing the image data – all on the one and same platform. A wizard sorts the image analysis functions and you can create an algorithm with just a few mouse clicks. ZEN makes your images sharper and smoother, reinforcing contours and contrasts, and you can also control brightness and color. Meanwhile deconvolution produces crystal clear images that correspond to an optical section, free of out-of-focus light.



# Expand Your Possibilities

- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

## **Open Platform:**

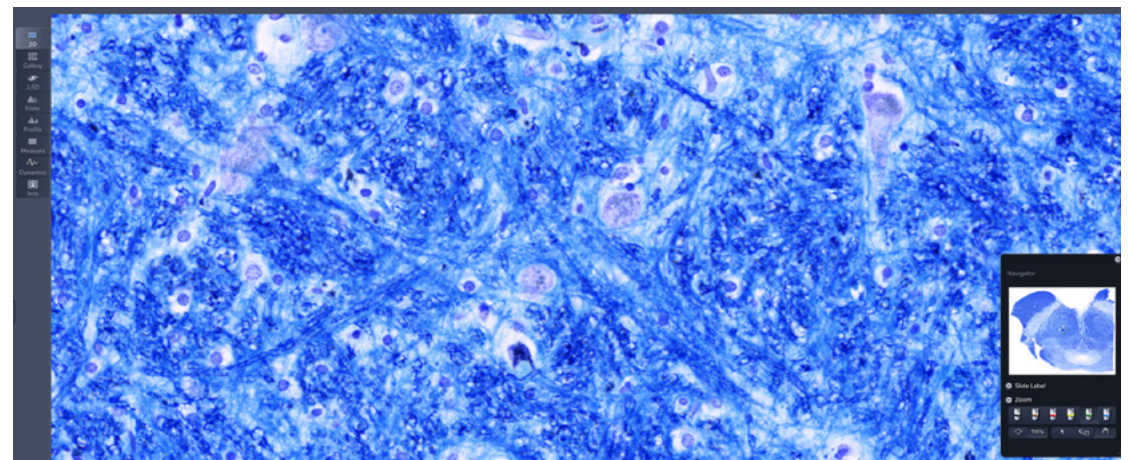
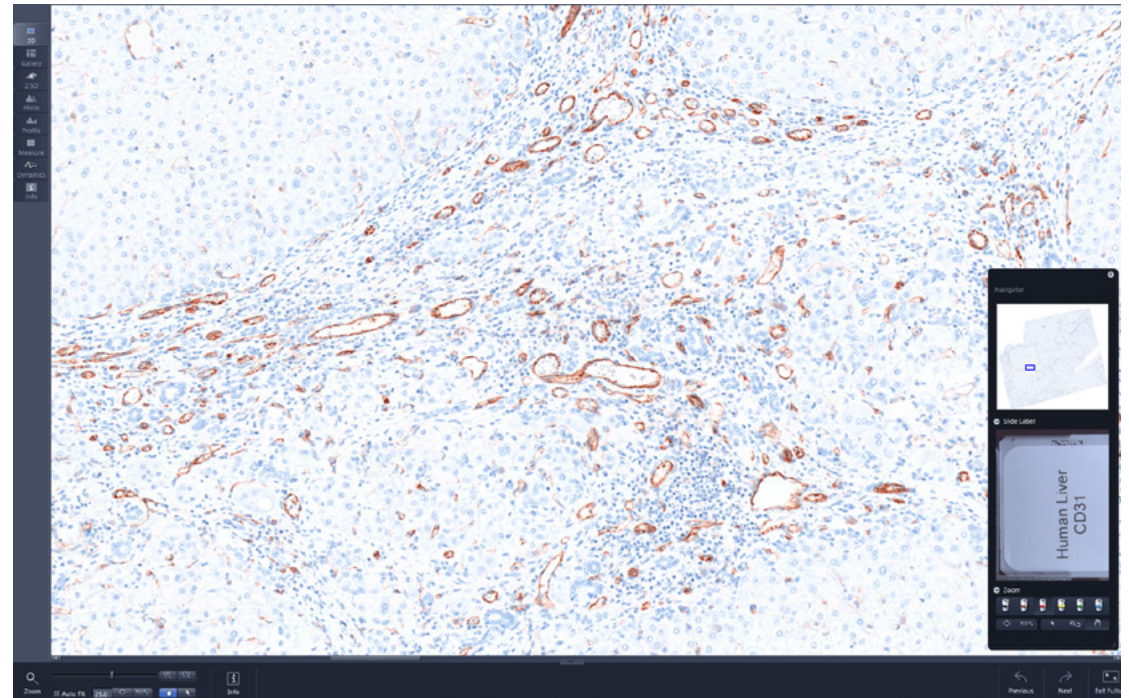
### **Securely Storing Your Images**

You will usually capture a large number of slides with Axio Scan.Z1. These images are valuable, of course, and you will naturally want to be able to evaluate them in future analyses. ZEN works with an open and documented interface that lets you access your data with your own programs. Unlike a closed platform, this means you can export the images and continue using the data in any way you choose.

## **Images with Metadata:**

### **Ready at the Click of a Button**

In addition to image data, ZEN stores metadata, putting away a complete record of all the operations in a log file so you can retrieve the data at the click of a button. This facilitates documentation and reproducibility.



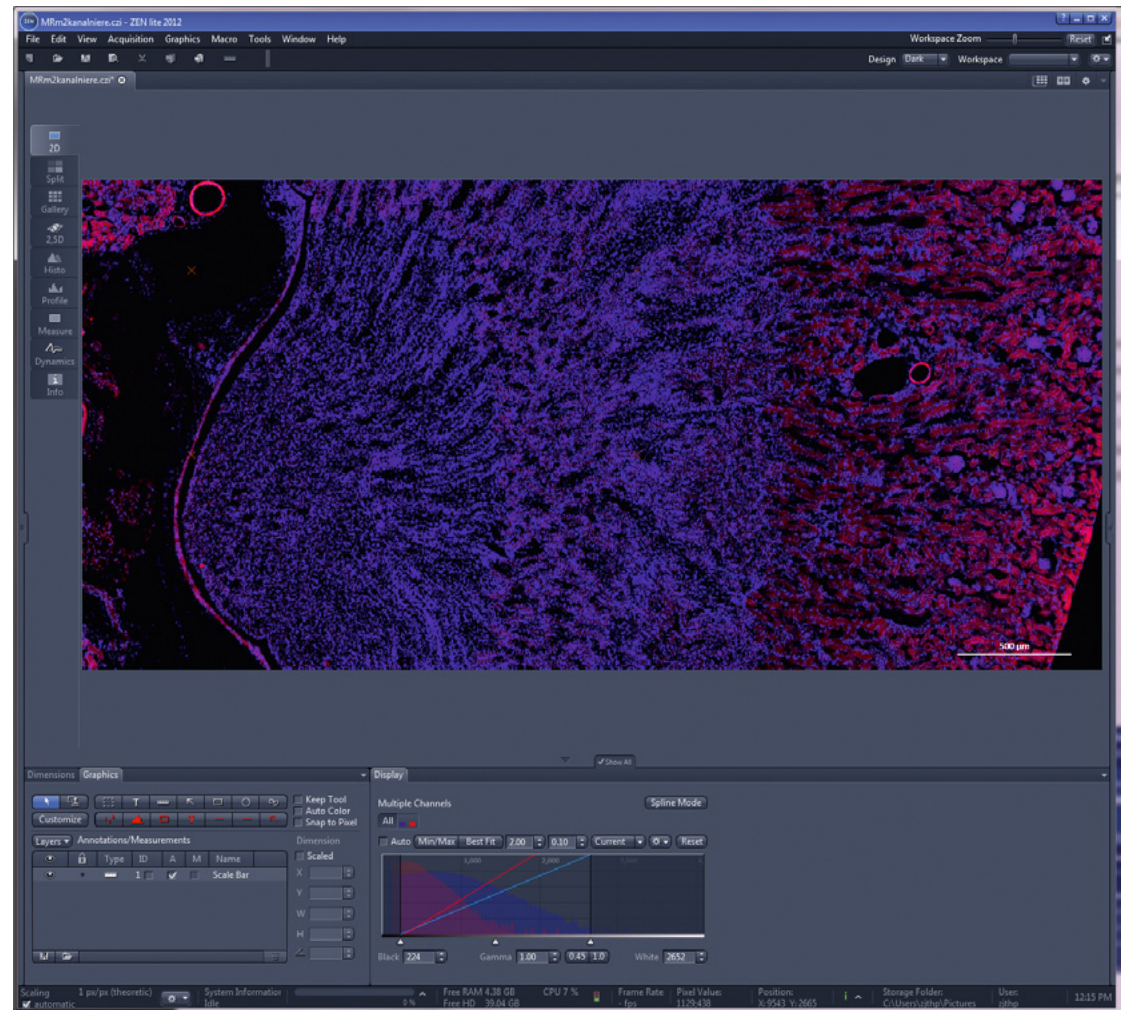


# Expand Your Possibilities

- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

## ZEN lite: Free Basic Software from ZEISS

Axio Scan.Z1 comes complete with ZEN lite, the standard software package for editing and viewing your images. You can use the overview screen to navigate to your regions of interest. Even the labeling area of the slide is always visible. Make annotations at will with circles, rectangles, lines, arrows, text, contours and profiles. Compare up to 16 images and then link them for navigation, thus – for example – creating a way to make a direct comparison with serial sections. You can process the CZI file format from ZEISS as well as images in TIFF, JPEG, PNG and GIF format. Choose 2D or other views, or use the gallery. Use sharpen, blur, geometric functions and color adjustments in single and batch mode. With ZEN lite, you can carry out simple interactive measurements and export your measurements (such as lengths, areas and angles) as data tables for your spreadsheet program. Rounding off the ZEN lite solution are the zooming workspace, design schemas for darkened and bright areas.





# Expand Your Possibilities

- › In Brief
- › **The Advantages**
- › The Applications
- › The System
- › Technology and Details
- › Service

## ZEN browser:

### It's Easy to Organize Your Data

Virtual slides provide you with a multitude of valuable data so you will need plenty of storage space and a good filing structure to achieve high throughput. ZEN browser organizes your data online and cross-platform via an intuitive web interface. That keeps your images filed together with metadata and supporting documents. The user management function restricts access to authorized individuals only. Simply go to [www.zeiss.com/zen-browser](http://www.zeiss.com/zen-browser) to access our demo server with impressive Axio Scan.Z1 imaging data.

Use the free ZEN browser app for iPads to access your image database via a mobile front end. Download the app to your iPad via [www.appstore.com/zenbrowser](http://www.appstore.com/zenbrowser). Now you can access your data wherever work takes you: just imagine presenting your latest virtual specimen to an astonished colleague at the next conference! You can insert annotations and view images in transmitted light and multichannel fluorescence images with a Z stack.

The CZI format from ZEISS provides a wealth of benefits, and is supported by a growing number of other manufacturers. For an updated list, please visit [www.zeiss.com/czi](http://www.zeiss.com/czi).



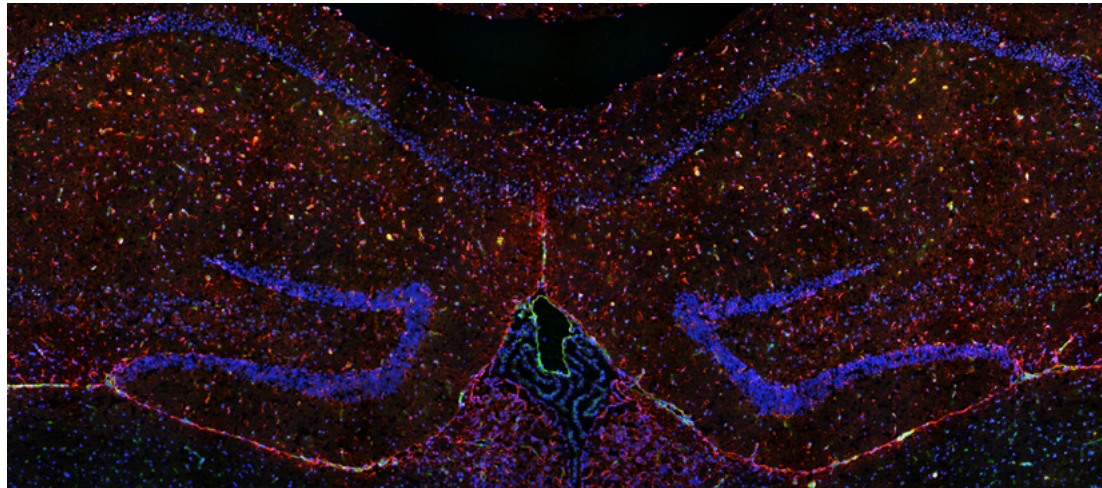
# Tailored Precisely to Your Applications

- › In Brief
- › The Advantages
- › **The Applications**
- › The System
- › Technology and Details
- › Service

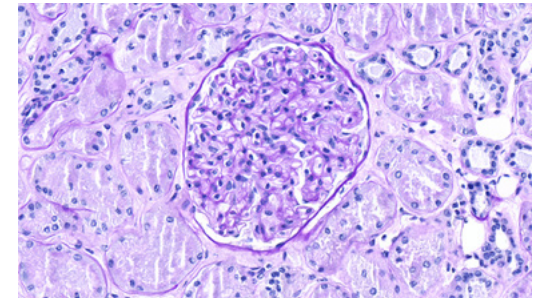
Typical Applications / Typical Samples	Task	ZEISS Axio Scan.Z1 Offers
The pathogenesis of Alzheimer's and other age-related diseases	Developing analytical models for amyloid deposition (plaques)	High-resolution virtual slides in brightfield with image analysis
Cancer research	Researching the basics of cancer	Excellent image quality in fluorescence combined with high throughput thanks to fast filter wheels and sensitive cameras
ADME / Toxicology	Automated image analysis workflow and peer reviews with colleagues at other locations	Findings are reproducible thanks to automated calibration, image analysis, and remote viewing
Fluorescence in-situ hybridization (FISH)	Determining the number of single sequence copies in the genome	Multichannel fluorescence, extended depth of field
Target identification and characterization	Identifying and characterizing targets for pharmaceutical active substance searches	Sensitive fluorescence imaging combined with gentle treatment of specimens, image analysis functions
Immunological response to allografts and xenografts	Identifying specific cell phenotypes and developing an understanding of cellular interactions in tissues	High dynamic range and zero artifact imaging
Research in the area of neurotraumas	Quantifying brain injury measurements, including functional pathways of regeneration and microglia	Z stack imaging and robust digitization of the samples with high throughput
Tissue microarrays (TMA)	Resource-friendly use of reagents and tissues with increased throughput	Reliable sample detection and robust scanning process
Contract research in the biomedical field	Use of slides that are hard to standardize and various applications	Flexible and configurable imaging options and tray concept
Organization of expert networks	Organizing the efficient exchange of information from experts around the world (e.g., cancer centers, tumor databases)	Database with integrated platform-independent access to images and documents
Inter-study group information management	Sustained organization of the data pool in local study groups and evaluation of research findings	Multi-user access to database with specific access rights
Exchange of information during spur of the moment discussions/meetings	Discussing findings with peers spontaneously, irrespective of location	Excellent image quality and remote data access, including by iPad
Publishing projects online	Making own data and images accessible to other people	Project-based web-centric database system with integrated web-viewing

# ZEISS Axio Scan.Z1 at Work

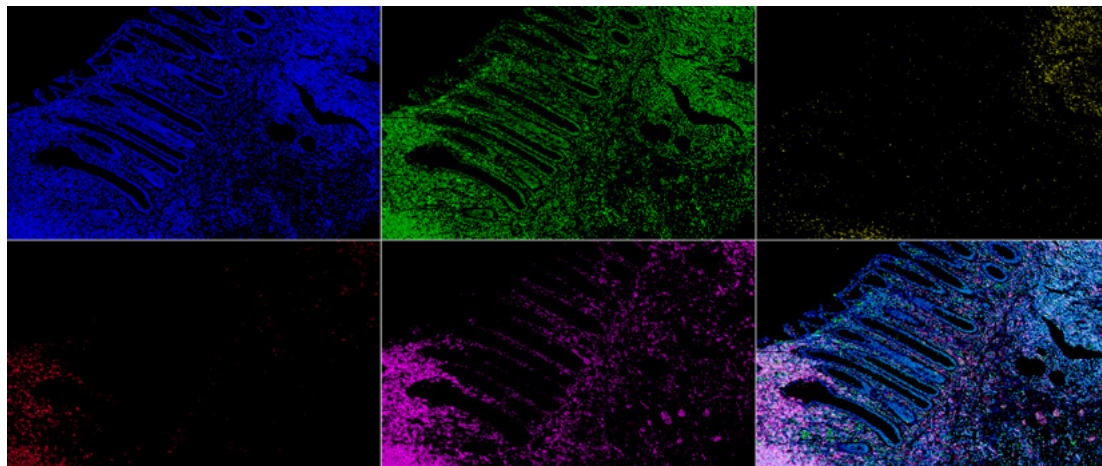
- › In Brief
- › The Advantages
- › **The Applications**
- › The System
- › Technology and Details
- › Service



Mouse brain, 5  $\mu\text{m}$ , cryo section, qDOT labeled: DAPI, CD31 (endothel), GFAP (astrocytes). Courtesy of K. Isse, Department of Pathology, University of Pittsburgh, USA; T. Starzl, Transplantation Institute, USA



Kidney section, 4  $\mu\text{m}$ , PAS (Periodic acid-Schiff reaction) stained glomerulus. Courtesy of K. Isse, Department of Pathology, University of Pittsburgh, USA; T. Starzl, Transplantation Institute, USA

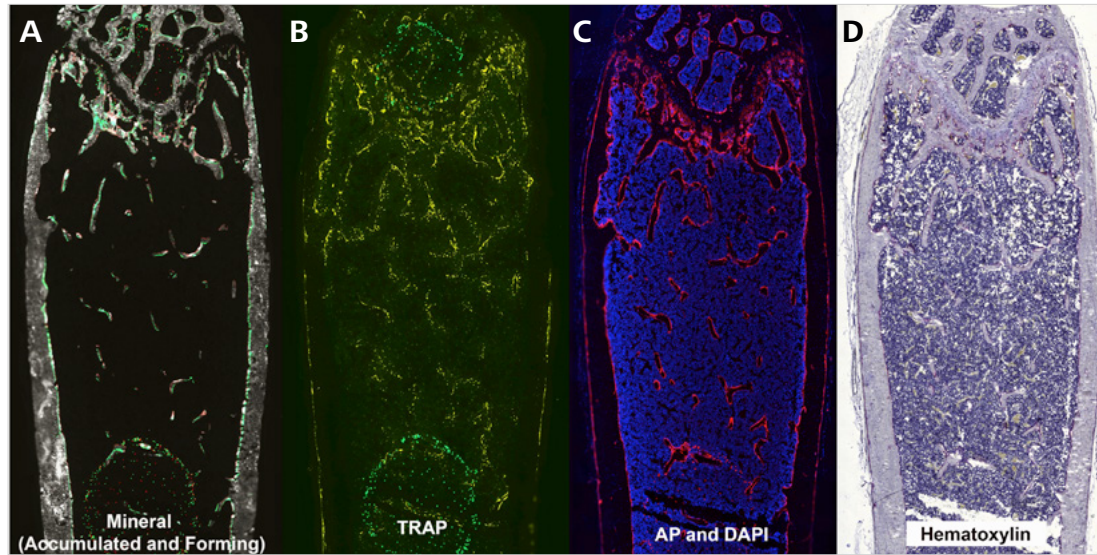


Colon tissue, 4  $\mu\text{m}$ , qDOT labeled: DAPI, CD56, CD3, CD68 and CD20. Courtesy of K. Isse, Department of Pathology, University of Pittsburgh, USA; T. Starzl, Transplantation Institute, USA

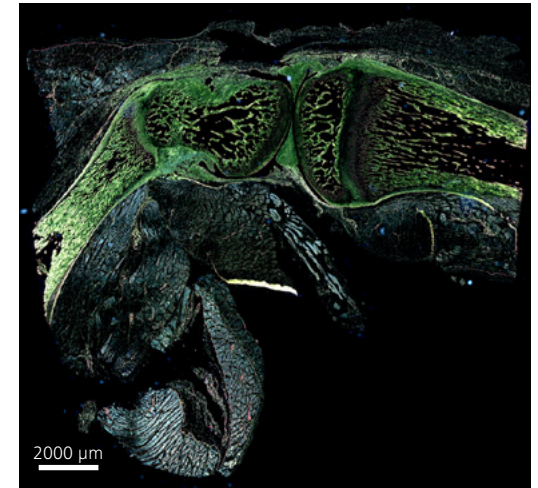


## ZEISS Axio Scan.Z1 at Work

- › In Brief
- › The Advantages
- › **The Applications**
- › The System
- › Technology and Details
- › Service



*Cryohistology of Mineralized Tissue. Multiple rounds of staining and imaging allowed the analysis of unique biological relationships between different labeled structures in mouse femur serial sections. Fluorescent reference markers at the periphery were used to align individual images of the same sections. (A) Mineralized tissue containing mineral labels (green, red) and stained with calcein blue (white), (B) tartrate resistant acid phosphatase (TRAP) stain for osteoclasts (yellow), (C) alkaline phosphatase (red) and DAPI nuclei (blue), and (D) hematoxylin stain.*



*Rat knee, 5 μm, Sirius red. Linear crossed polarization is a good method to analyze structures which cannot be differentiated by standard bright field. Samples can be digitized faster than with fluorescent labels. This is especially useful for fibrosis analysis, validation of implantation progress and analysis of bone structures.*



# ZEISS Axio Scan.Z1: Your Flexible Choice of Components

- › In Brief
- › The Advantages
- › The Applications
- › **The System**
- › Technology and Details
- › Service



## 1 Microscope

- Axio Scan.Z1
- Magazines for 12 or 100 slides
- Trays for four 26 mm × 77 mm slides, two 52 mm × 77 mm slides or 48 mm × 26 mm and 106 mm × 77 mm slides

## 2 Objectives

- N-Achroplan (2.5×, 10×, 20×, 40×)
- Fluor (2.5×, 5×)
- Plan-Apochromat (10×, 20×, 40×)
- Other objectives on request

## 3 Illumination

- Transmitted light: LED (wavelength 400 to 700 nm, maximum at 460 nm)
- Fluorescence: LED: 385 nm, 423 nm, 511 nm, 555 nm, 590 nm, 631 nm, 735 nm or HXP 120 V
- Filter wheels:
  - 10-position ACR for filter cubes or
  - 6-position high-speed excitation
  - 6-position high-speed beamsplitter
  - 6-position high-speed emission

## 4 Cameras

- Hitachi HV F202
- Axiocam 506 mono
- Hamamatsu ORCA-Flash 4.0

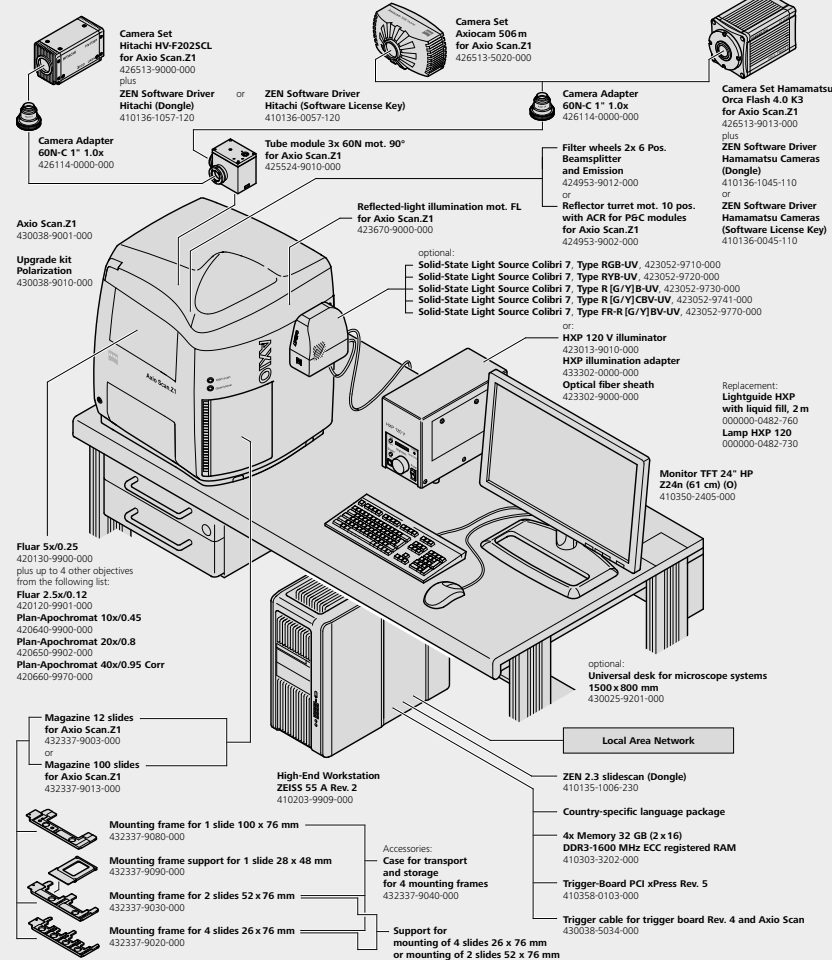
## 5 Software

- ZEN slidescan
- ZEN lite
- ZEN browser

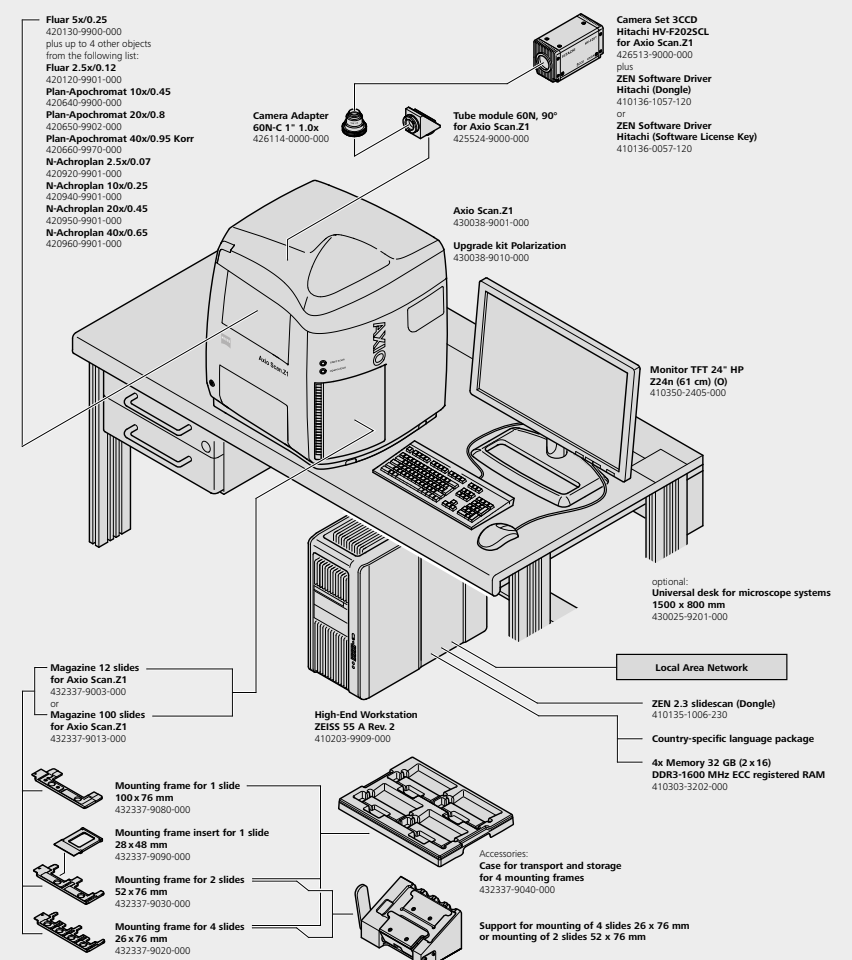
# System Overview

- › In Brief
- › The Advantages
- › The Applications
- › The System
- › Technology and Details
- › Service

System Overview Axio Scan.Z1 for brightfield and fluorescence applications



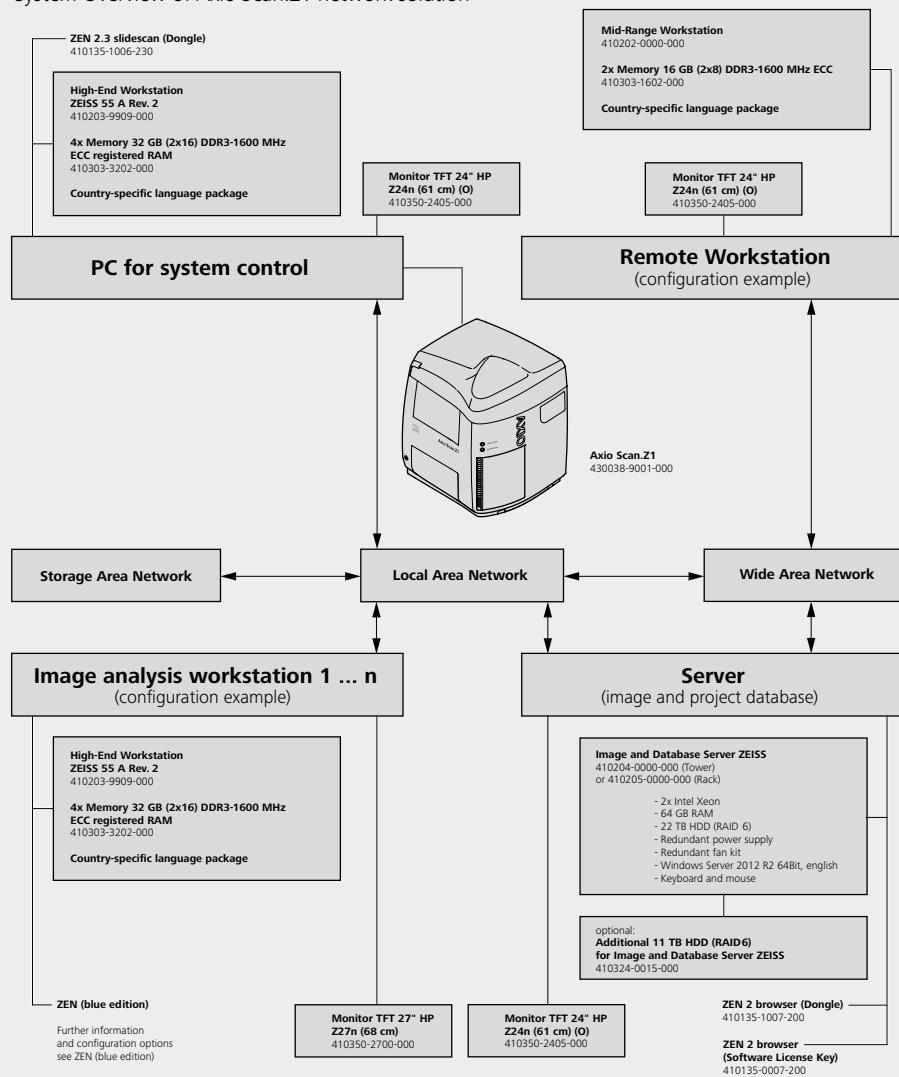
System Overview Axio Scan.Z1 for brightfield applications



# System Overview

- › In Brief
- › The Advantages
- › The Applications
- › **The System**
- › Technology and Details
- › Service

System Overview of Axio Scan.Z1 network solution



# Technical Specifications

- › In Brief
- › The Advantages
- › The Applications
- › The System
- › **Technology and Details**
- › Service

## Dimensions (width × depth × height)

Axio Scan.Z1 (brightfield)	approx. 695 mm × 579 mm × 813 mm
Axio Scan.Z1 (brightfield and fluorescence with Colibri 7)	approx. 912 mm × 579 mm × 813 mm

## Mass

Axio Scan.Z1 (brightfield, 12 slides)	approx. 98 kg
Axio Scan.Z1 (brightfield and fluorescence with Colibri 7 and 100 slides)	approx. 112 kg

## Environmental conditions for transport (in packaging)

Permissible ambient temperature	-40 °C to +70 °C
---------------------------------	------------------

## Storage

Permissible ambient temperature	+10 °C to +40 °C
Permissible relative humidity (without condensation)	max. 75 % at 35 °C

## Operation

Permissible ambient temperature	+10 °C to +30 °C
Permissible relative humidity	max. 75 % at 30 °C
Highest permitted altitude of use	max. 2000 m
Atmospheric pressure	500 hPa to 1060 hPa
Degree of pollution	2

## Operating data

Operational area	closed spaces
Protection class	I
Ingress protection rating	IP 20
Electrical safety	conforms to DIN EN 61010-1 (IEC 61010-1) in consideration of CSA and UL directives
Overvoltage category	II
RFI suppression	under EN 55011 class A
Noise immunity	under DIN EN 61326-1
Input voltage, basic unit (Mains voltage does not need to be converted!)	100 V AC to 240 V AC
Power frequency	50 / 60 Hz
Power consumption	max. 260 VA
Fuses	2 × T 5.0 A/H 250 V, 5 × 20 mm



# Technical Specifications

- › In Brief
- › The Advantages
- › The Applications
- › The System
- › **Technology and Details**
- › Service

## Pixel resolution (example: Hitachi HV F202)

10x	0.44 $\mu\text{m}/\text{pixel}$
20x	0.22 $\mu\text{m}/\text{pixel}$
40x	0.11 $\mu\text{m}/\text{pixel}$

## Reflector turret

Reflector turret with ACR for push and click filter sets

Number of channels	10
Type	Optically encoded (no detents)
Switching time	Approx. 400 ms (from eye to eye)

## High-speed filter wheels for single filter or beamsplitter

Number of channels	6
Type	Optically encoded (no detents)
	Separate control of excitation, beamsplitter and emission filter wheel
Switching time	Approx. 50 ms (from eye to eye)

## Motorized condenser wheel

Number of positions	9
Type	Optically encoded (no detents)

## Contrasting techniques

Transmitted light brightfield

Transmitted light Ring Aperture Contrast (RAC)

Transmitted light linear polarization

Reflected light fluorescence

# Technical Specifications

- › In Brief
- › The Advantages
- › The Applications
- › The System
- › **Technology and Details**
- › Service

Fluorescence light sources		Transmitted light source
Colibri 7		VIS-LED
HXP 120 V		
<b>Thumbnail generation</b>		
Labeling area		Separate camera with reflected light illumination
Specimen area (brightfield)		Separate camera with transmitted light illumination
Specimen area (fluorescence)		2.5x or 5x objective with transmitted light illumination (RAC) or reflected light illumination (fluorescence)
<b>Z stack</b>		
Imaging of Z stacks and application of the extended depth of field		
<b>Bar codes and optical character recognition</b>		
List of readable 1D bar codes		List of readable 2D bar codes
Code 11 (ASCII encoding)	Code Interleaved 2 of 5	DataMatrix (Numeric encoding, Alpha encoding, AlphaNumericPunc encoding, AlphaNumeric encoding, ASCII encoding, ISO8 encoding)
Code 39 (ASCII encoding)	Path code	PDF417 (Standard encoding type) AlphaNumeric encoding, ASCII encoding
Code 39 Extended (ASCII encoding)	EAN-8 (Numeric encoding)	QR Code (QR code Model 1, 2 encoding)
Code 93 (ASCII encoding)	EAN-13 (Numeric encoding)	Micro QR Code
Code128 (UCC/EAN128) (ASCII encoding)	UPC-A (Numeric encoding)	
Codebar (ASCII encoding)	UPC-E (Numeric encoding)	
<b>Optical Character Recognition (OCR)</b>		
<b>Compression</b>		
Lossless or compression with JPEGXR (quality can be adjusted)		
<b>Optional software components</b>		
Image analysis	ZEN (blue edition) image analysis modules	
Database and remote viewing	ZEN browser	
Image viewing	ZEN lite (freeware)	

# Technical Specifications

- › In Brief
- › The Advantages
- › The Applications
- › The System
- › **Technology and Details**
- › Service

<b>Magazine</b>			
Capacity	12 slides (26 mm × 77 mm)	100 slides (26 mm × 77 mm)	
Tray	for 4 slides (26 mm × 77 mm)	for 2 slides (52 mm × 77 mm or 48 mm × 26 mm)	for 1 slide (106 mm × 77 mm)
Usable slides	Length	Width	Thickness
26 mm × 77 mm (DIN ISO 8037/1 and A-A 50831)	73.5 mm ... 77.0 mm	24.0 mm ... 26.0 mm	0.8 mm ... 1.3 mm
52 mm × 77 mm (DIN ISO 8037/1)	73.5 mm ... 77.0 mm	50.0 mm ... 52.0 mm	0.8 mm ... 1.3 mm
106 mm × 77 mm	73.5 mm ... 77.0 mm	99.0 mm ... 106.0 mm	0.8 mm ... 1.3 mm
48 mm × 26 mm	26.0 mm ... 28.2 mm	46.0 mm ... 48.2 mm	1.0 mm ... 1.5 mm
Other dimensions on request			
<b>Speed</b>			
Brightfield 15 mm × 15 mm @ 0.22 µm/pixel	4 min		
<b>Objectives</b>			
Number of usable objectives	up to 5 with automatic switching		
<b>List of usable objectives (other objectives on request)</b>			
Fluar 2.5×/0.12 M27	Plan-Apochromat 20×/0.8 M27	N-Achroplan 20×/0.45 M27	
Fluar 5×/0.25 M27	Plan-Apochromat 40×/0.95 Corr M27	N-Achroplan 40×/0.65 M27	
Plan-Neofluar 20×/0.5 M27	N-Achroplan 2.5×/0.07 M27	N-Achroplan 20×/0.45 Pol M27	
Plan-Apochromat 10×/0.45 M27	N-Achroplan 10×/0.25 M27		
<b>Cameras</b>			
Number of cameras	up to 2 with automatic switching		
<b>List of usable cameras</b>			
Hitachi HV F202 (brightfield)			
Axiocam 506 mono (fluorescence)			
Hamamatsu ORCA-Flash 4.0 (fluorescence)			

## Count on Service in the True Sense of the Word

- › In Brief
- › The Advantages
- › The Applications
- › The System
- › Technology and Details
- › **Service**

Because the ZEISS microscope system is one of your most important tools, we make sure it is always ready to perform. What's more, we'll see to it that you are employing all the options that get the best from your microscope. You can choose from a range of service products, each delivered by highly qualified ZEISS specialists who will support you long beyond the purchase of your system. Our aim is to enable you to experience those special moments that inspire your work.

### **Repair. Maintain. Optimize.**

Attain maximum uptime with your microscope. A ZEISS Protect Service Agreement lets you budget for service costs, all the while reducing costly downtime and achieving the best results through the maintained performance of your system. Choose from service agreements designed to give you a range of options and control levels. We'll work with you to select the service program that addresses your system needs and usage requirements, in line with your organization's standard practices.

### **Enhance Your Microscope System.**

Your ZEISS microscope system is designed for a variety of updates: open interfaces allow you to maintain a high technological level at all times. As a result you'll work more efficiently now, while extending the productive lifetime of your microscope as new update possibilities come on stream.



*Profit from the optimized performance of your microscope system with services from ZEISS – now and for years to come.*

>> [www.zeiss.com/microservice](http://www.zeiss.com/microservice)





**Carl Zeiss Microscopy GmbH**  
07745 Jena, Germany  
microscopy@zeiss.com  
www.zeiss.com/axioscan



Not for therapeutic, treatment or medical diagnostic evidence. Not all products are available in every country. Contact your local ZEISS representative for more information.

EN\_41\_011\_023 | CZ 06-2018 | Design, scope of delivery, and technical progress subject to change without notice. | © Carl Zeiss Microscopy GmbH