

# Axio Imager 2

Progress Meets Performance



Trend-setting technology for brilliant results  
in all life science research applications



We make it visible.

# Axio Imager 2 from Carl Zeiss. Success in Series.

Always provide the best tools for the study of life – with this objective in mind Carl Zeiss introduced Axio Imager in 2004. This objective still applies. The result: the new Axio Imager product generation. With outstanding performance. With unrivaled optics. With an unmatched range of application. And with maximum ease of use.

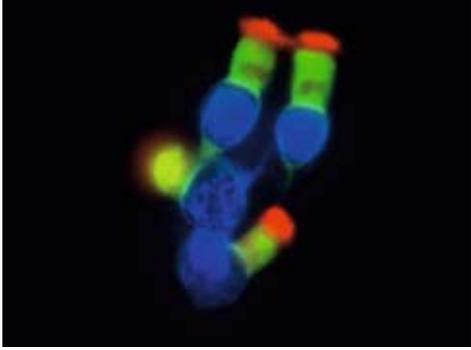
## **Axio Imager: Trailblazer in Terms of Performance**

More flexibility for more performance: from simple observation and image acquisition to highly complex analyses, there are six different stands available, which allow you to adapt the system exactly to your individual application by providing many different system components. Taken together these are trend-setting performance characteristics and technical innovations for outstanding research results.

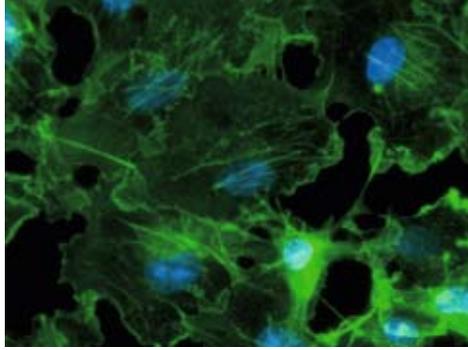
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*Respiratory epithelium cells*



*COS cell culture*

- Encoding: Readout of magnification, illumination or contrast settings, respectively, and transfer to the AxioVision image processing software.
- Motorization for reproducible settings and automatic procedures.
- Excellent optics and uniform illumination in transmitted light and fluorescence applications.
- Highest precision due to new high-performance focus, even in cases of constant load and heavy stages.
- Intelligent control concept for ergonomic work and multi-user operation
- Preconfigured stand configurations for a broad application spectrum
- Assured future use supported by modular system architecture



# Optics. Brilliant Performance.

Excellent optical quality: That is what the Carl Zeiss research class stands for. Axio Imager 2 boosts this performance even further. From the transmitted light beam path to the new motorized DIC turret to the high-performance objectives Axio Imager provides excellent results even with extremely weak signals.

## Visibly more information: the IC<sup>2</sup>S beam path

IC<sup>2</sup>S stands for Infinity Contrast & Color Corrected System. This patented beam path is based on the optimization of the proven Carl Zeiss ICS Infinity Optics (ICS). New: the transmitted light beam path for uniform illumination. The optics of the universal and long-distance condensers have been adapted to all applications. Even at low magnifications and large working distances considerably better resolution and contrast is achieved. Axio Imager's optical system provides you with remarkable performance: higher image contrast, perfect uniformity and unrivalled resolution in every contrast technique.

## Simple upgrading: the freely accessible infinite space

With its freely accessible infinite space, Axio Imager allows additional components such as light sources and detectors to be added as needed. An individual system solution that is tuned to the respective application can be simply and rapidly configured.

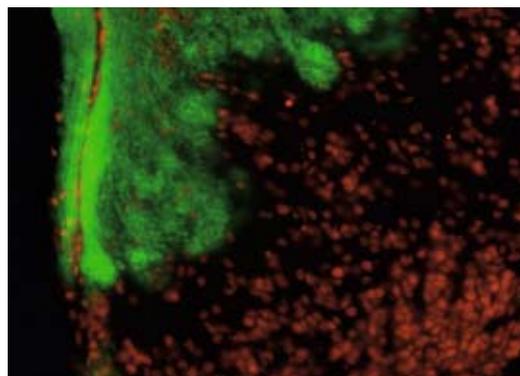
## Unrivalled in every respect: the objectives

For the new Axio Imager 2 product line Carl Zeiss has extended the high-performance objectives especially for high magnifications, for both fixed and live cell imaging applications.

- The EC Plan-NEOFLUAR universal objectives. The consistent stray light minimization results in a definite contrast enhancement, which is critical in all microscopic techniques.
- The Plan-APOCHROMAT objectives convince through their outstanding point spread function and their unparalleled planar and chromatic correction.
- The  $\alpha$  Plan-APOCHROMAT objectives 100x/1.46 Oil and 100x/1.57 HI Oil (available from Fall 2009) provide maximum resolution in fluorescence and transmitted light DIC techniques because of their high numerical apertures.
- The LCI Plan-NEOFLUAR objectives 25x/0.8 and 63x/1.3 Imm. korr. were conceived for live cell imaging techniques and calibrated for specific temperature intervals as well as immersion media from water to glycerin.



Olfactory bulb (frog), image taken with DIC.  
Objective: EC Plan-NEOFLUAR 20x/0.5



Olfactory bulb (frog), multichannel fluorescence with ApoTome.  
Green: projections of olfactory sensory cells.  
Red: cell nuclei. Objective: EC Plan-NEOFLUAR 20x/0.5.  
D. Schild, Univ. Göttingen, Germany



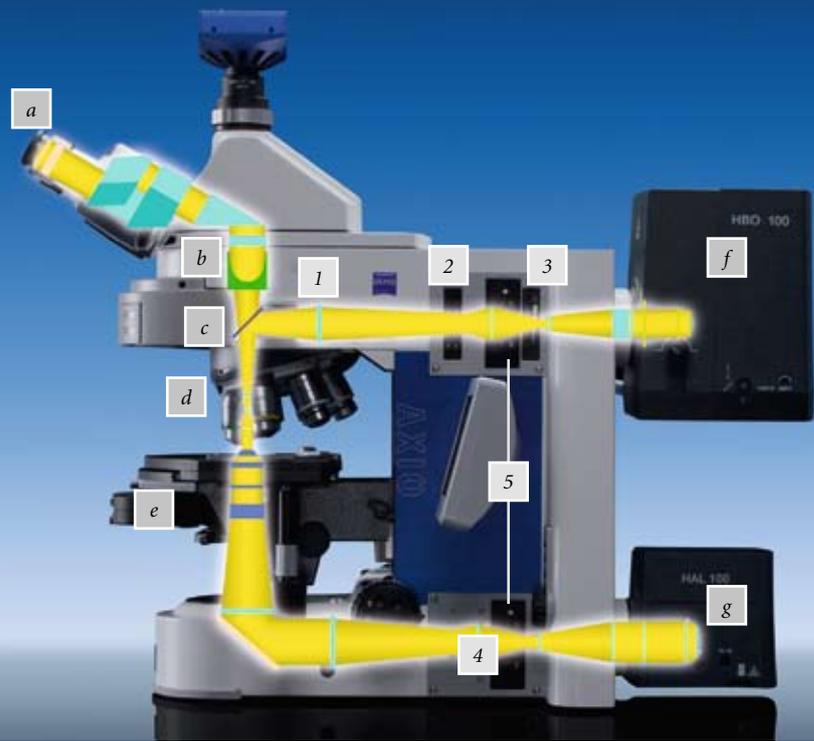
The new motorized DIC turret

#### Beam path optics

- a Ocular
- b Accessible interface to the  $\infty$  space
- c Reflector
- d Objective
- e Condensor
- f HBO
- g HAL

#### Flexible interfaces

- 1 Accessible interface to the  $\infty$  FL space
- 2 Reflected light-field diaphragm
- 3 Reflected light-aperture diaphragm
- 4 Transmitted light-field diaphragm
- 5 Filter wheels



#### See more: DIC or DIC + Fluorescence

Optimized DIC for the new generation Axiio Imager: uniform interference contrast at all magnifications from 5x to 100x across the entire field of view. Particularly in digital imaging the shading correction becomes obsolete. You always have a uniformly illuminated DIC image. For the first time these advantages are now also reproducible and can be adjusted via motorized control. With the new motorized DIC turret for transmitted light DIC you can now automatically shift between high-resolution and high-contrast interference contrast. The contrast settings can be separately stored for each user and for each magnification used. You can also combine DIC imaging with fluorescence excitation extremely simple and automatically. Without sample-induced artifacts.

#### Constant color temperature: the LED illumination sources

The interesting alternative to conventional halogen illumination with compelling advantages: constant color temperature independent of the brightness, low heat radiation and long service life. LED illumination also has a filter mount for individual setting of the color temperature. For the first time such an illumination source is also offered with a trigger input for high frequency switching. For more simple applications there is a variant available which is attached directly beneath the condenser. In accordance with the Fixed Köhler Principle, for simple adjustment with all contrast techniques.



Motorized DIC turret for reproducible contrast adjustment



LED – the new light source for Köhler illumination



LED for Fixed Köhler illumination

# Fluorescence. Strong Components for Weak Signals.

Brilliant signals for the finest structures and extremely rapid processes – that is what Carl Zeiss fluorescence microscopy stands for. And all the components of the new generation of Axio Imager have been designed to meet this standard. With fast image acquisition in AxioVision and light sources such as Colibri. With filter sets for new dye combinations. And with high ease of operation.

## Motorized reflector turret for rapid imaging

The investigation of rapid processes is becoming increasingly important. The motorized reflector turrets are custom tailored to this end. Six filter modules can be accommodated. Even for the use of more than six dyes simultaneously, for example, in multi-color FISH applications, the Axio Imager.Z2 provides the best possible results. The motorized 10-position reflector turret synchronized with the fast Colibri LED light source provides a wide selection of excitation wavelengths and brilliant results without pixel shift.

## Reproducible settings by means of motorized diaphragms

The intelligent, motorized aperture and luminous field diaphragm automatically controls contrast and illumination. In the reflected-light beam path as well as in the transmitted-light beam path. Objective-specific aperture adaptations can be saved and loaded again at any time for reliable reproducibility.

## Versatile as never before: the High Efficiency Filter Sets

The HE Fluorescence Filters for Axio Imager provide an excellent signal-noise ratio, high transmission for excitation and emission, and for up to 50 % shorter exposure times. This protects sensitive samples to the greatest



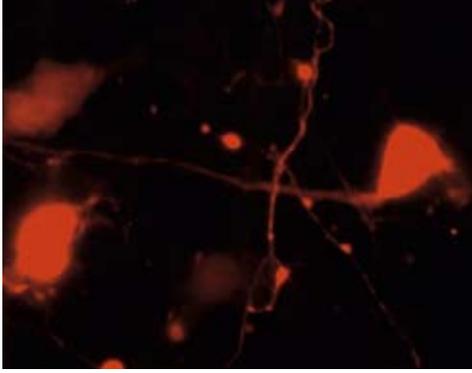
*Simply fast: the change from manual to motorized reflector turret*



*Changing to HE filter set*



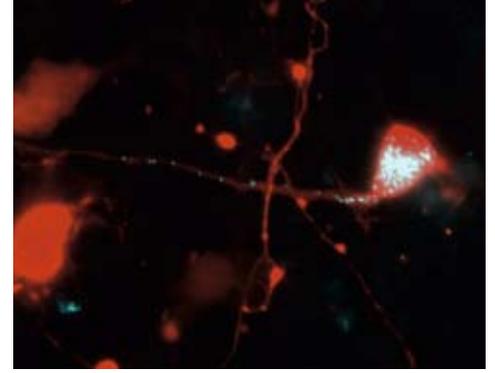
*Motorized diaphragm sliders*



Red: YFP-labeled cell body  
 Primary neurons (rat) in culture.  
 Objective: EC Plan-NEOFLUAR 40x/0.75.  
 Y. Okada, Dept. Cell Biol. & Anatomy, Grad.Sch.Med,  
 Univ. Tokyo Hongo, Tokyo, Japan



Cyan: CFP-labeled peroxisomes



Multi-channel image: red and cyan channels superimposed

possible degree. Seven new filter sets and multi-color combinations with double and triple filter sets were developed especially for combination with new fluorescing proteins. The trend toward red dyes such as mRFP, mCherry, mPlum, mTomato was considered in optimizing the range of LED options integrated into Colibri. As a result, the energy of the available LEDs can be completely exploited.

### Light sources for every requirement

For Axio Imager you can select exactly the light source which ideally meets the specific demands of your fluorescence application.

- The self-adjusting HBO lamp has been the illumination source of choice for all standard fluorescence applications since 2004. After each lamp change and each time the device is switched on, it centers itself

automatically such that uniform illumination is guaranteed.

- Metal halide lamps such as HXP 120 exhibit an emission spectrum similar to HBO lamps. Remote coupling via liquid light guide, minimizes heat transfer to the stand making it ideal for live cell imaging.
- Exact intensity control and thus ideal specimen protection, Specific wavelength selection, and flexible mixing of different wavelengths, long lifetime, and – above all – switching time in the microsecond range characterize the Colibri LED light source. It is ideal for complex applications at extremely high speeds.
- HXP 120 and Colibri can also be used in combination. In this manner dyes for which there is no LED today can be excited.



There are 11 different LEDs available for Colibri: from UV to dark red



Each LED is continuously adjustable and can be switched in the microsecond range

# Applications Infinite Diversity.

The more diverse the applications, the more flexible the imaging platform – that is what Axio Imager stands for. The modular architecture of Axio Imager 2 allows you to use a technology that optimally supports your application. And which grows with your performance requirements.

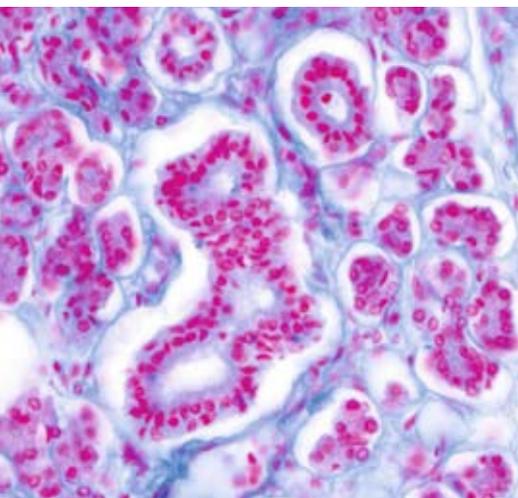
## Pathology

Axio Imager.A2 with LED illumination, the coded stand with Fixed Köhler illumination is ideal for pathology. In conjunction with EC Plan-NEOFLUAR or Plan-APOCHROMAT objectives it is the standard equipment for histological evaluation. The economical LED illumination has a long service life, consumes little energy, and requires no maintenance or adjustment. It provides incredible images, for instance with the typical H.-E-, DAB- or Azan staining techniques. Its constant color temperature ensures uniform light quality and brilliant image presentation over the entire intensity range.

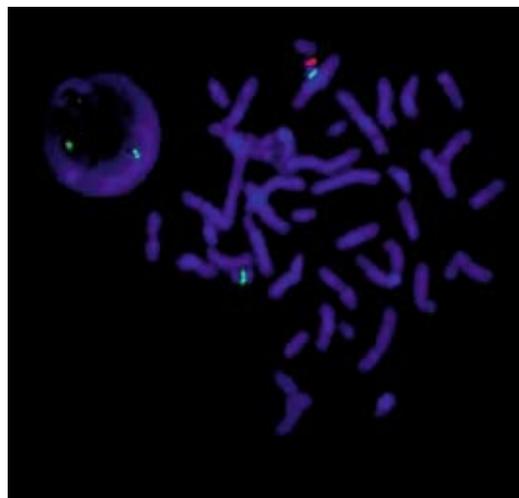
## Human genetics

For the diagnosis of diseases which are due to a mutation in genetic material, genome analysis is a standard tool

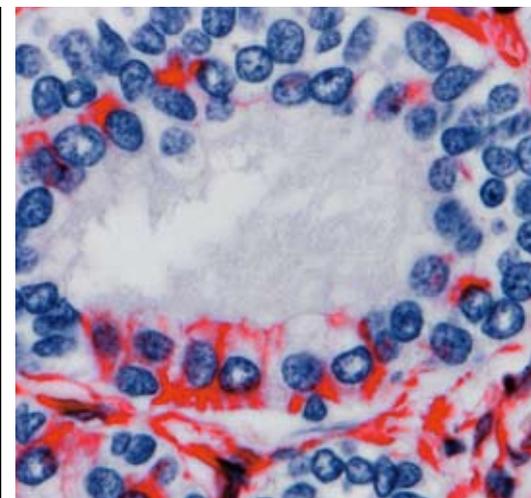
in human genetics. Karyograms are acquired and analyzed in transmitted light brightfield. The Fluorescence In Situ Hybridization (FISH) method identifies the gene loci on the chromosomes based on the DNA probes used and helps detect deviations from the healthy condition. In this context the Axio Imager provides complete support: the apochromatically corrected IC2S beam path illuminates the object field uniformly for all colors. The integrated light traps eliminate stray light in the illumination and imaging beam path. The 6-position reflector turret for Axio imager.A2 and Axio Imager.M2 as well as the 10-position reflector turret for Axio Imager.D2 and Axio Imager.Z2 allow rapid multi-channel image acquisition, the basis for FISH analyses. Control with AxioVision or MetaCyte from MetaSystems make the use of such complex applications as simple and reliable as possible.



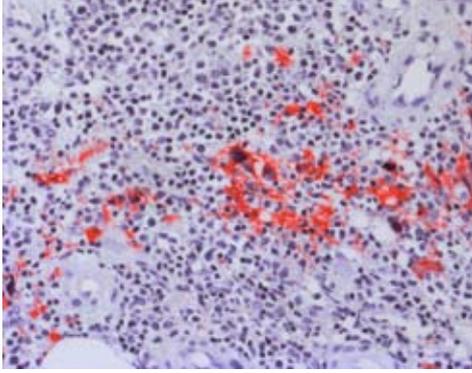
Salivary gland: azan staining; Orange: cytoplasm, Red: nuclei, Blue: collagen.  
Objective: Plan-APOCHROMAT 20x/0.8



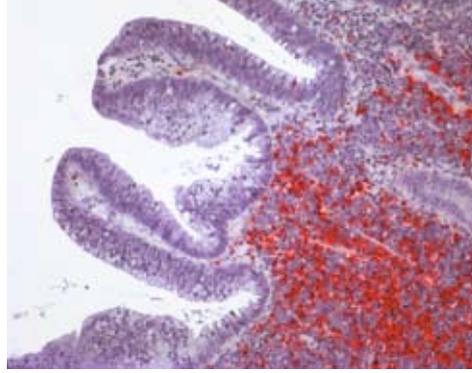
Multi-color FISH preparation.  
Objective: Plan-APOCHROMAT 63x/1.4 Oil



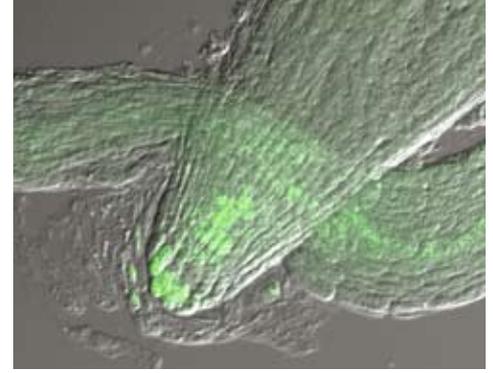
Histological section – brightfield. Red: Anti-CD. Blue: nuclear counterstaining.  
Objective: Plan-APOCHROMAT 63x/1.4 Oil



*Histological section – Red: CD61. Blue: nuclear counterstaining.  
Objective: EC Plan-NEOFLUAR 20x/0.5*



*Histological section – Red: MPOX2. Blue: nuclear counterstaining.  
Objective: EC Epiplan-NEOFLUAR 10x/0.3.  
A. Schmitt-Gräff, Pathology, Univ. Freiburg, Germany*



*Arabidopsis root thread – DIC superimposed fluorescence  
Green: GFP. Objective: EC Plan-NEOFLUAR 40x/0.75*

### Histology

The requirements in histology and anatomy are optimum resolution in the image, perfect color presentation in the documentation of details and overviews and rapid, precise relocalization of diagnostically conclusive locations in the specimen. Ideally tailored to this: the EC Plan-NEOFLUAR and Plan-APOCHROMAT objectives in conjunction with motorized stages.

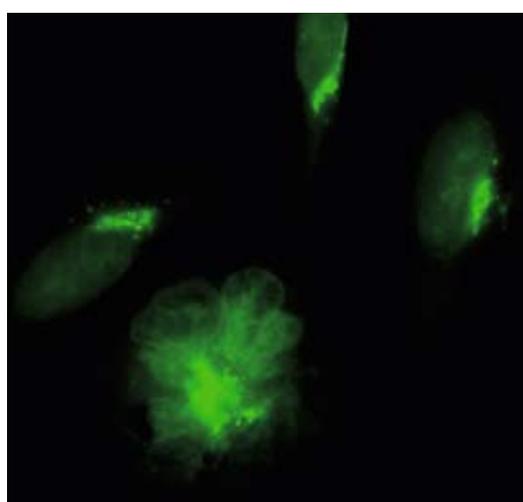
### Cell biology

The investigation of subcellular compartments such as the cell nucleus, mitochondria, vesicles or dynamic processes such as motility, mobility and cell division make special demands on the respective microscope systems. Axio Imager allows brilliant DIC, phase contrast, darkfield applications, and optical sections with ApoTome as well

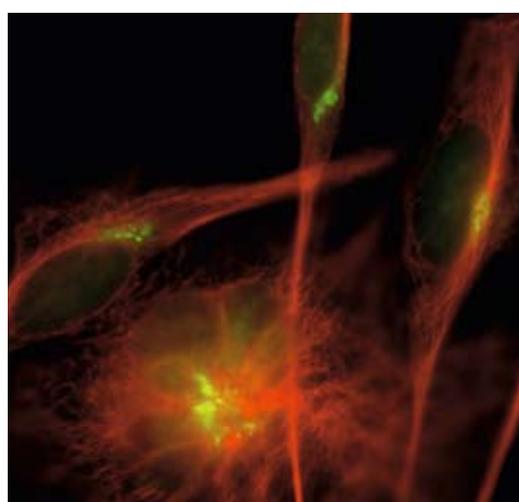
as fluorescence at the highest resolution. DIC and fluorescence can be combined most conveniently with the motorized Axio Imager.Z2 stand.

### Neurobiology

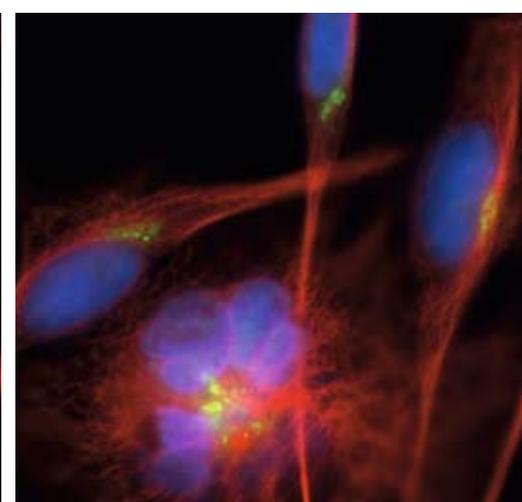
The samples are as different as the diverse range of topics in neurobiology: meaningful results must be obtained from individual cells and thin sections to thicker brain sections up to entire brains. Axio Imager is the ideal platform for this: excellent image quality in brightfield and fluorescence, high-resolution DIC for thick preparations and high-contrast DIC images for very thin sections. MosaIX provides high-resolution overview images of large specimens. The motorization of all important components and the use of the motorized DIC turret on Axio Imager.Z2 allow the storage of all important



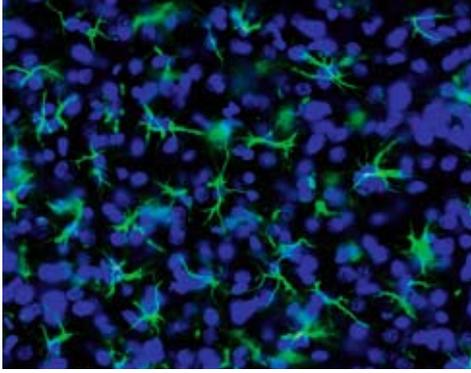
*HeLa cells – multichannel image. Green: GFP  
Objective: Plan-APOCHROMAT 63x/1.4 Oil.  
L. Pelletier and T. Hyman,  
MPI for Molecular Cell Biology and Genetics, Dresden,  
Germany*



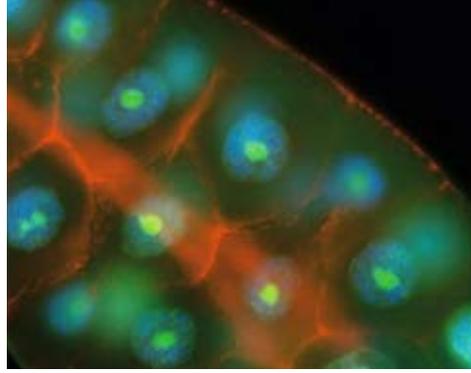
*Red: alpha-tubulin*



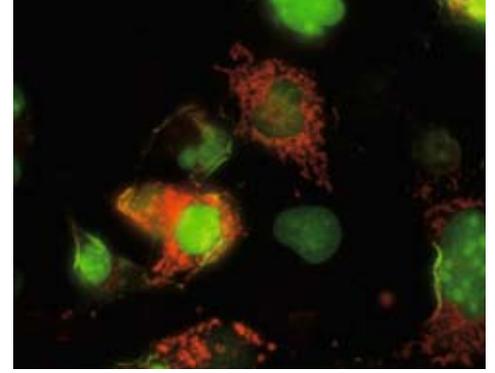
*Blue: cellular nuclei (DAPI)*



*Brain section (rat) – multichannel image with ApoTome. Green: GFP-labeled astrocytes. Blue: cell nuclei (DAPI). Objective: Plan-APOCHROMAT 20x/0.6. E. Fuchs, S. Bauch, DPC, Göttingen, Germany*



*Drosophila larval stage. Red: fibrillar. Green: Venus-CG 8571-Transgene. Blue: cell nucleus (DAPI). Objective: EC Plan-NEOFLUAR 40x/0.75. M. Buszcak, A. Spradling, CIW-Dept. Embryology, MD, USA*



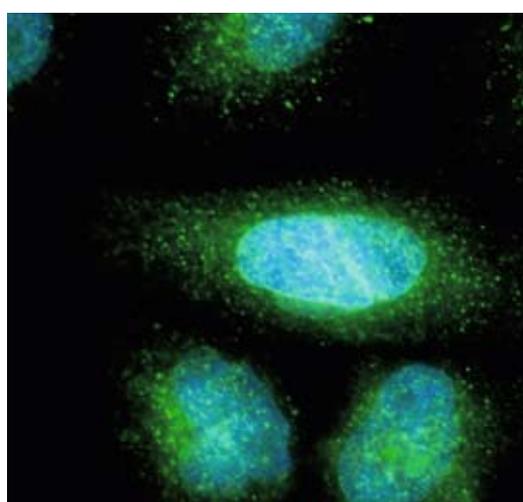
*CHO cell culture. Green: GFP-histone. Red: dsRed, Objective: EC Plan-NEOFLUAR 40x/0.75. S. Haxelmans, R. Nitschke, Inst. Biologie I. Univ. Freiburg, Germany*

settings for reproducible imaging and subsequent image analysis tasks.

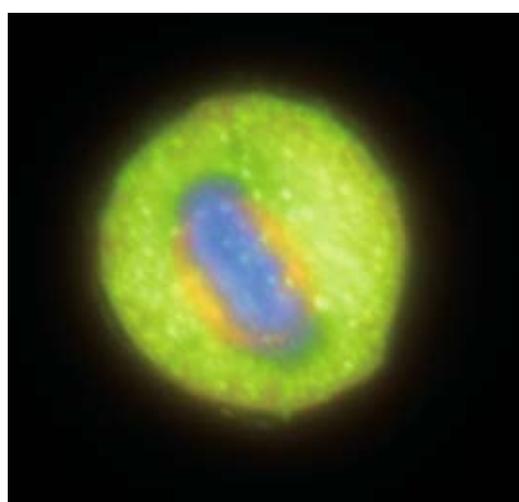
### Developmental biology

The documentation and analysis of the processes which result in differentiation, regeneration or growth of cells, tissues and organisms make particularly high demands on a microscope system. Regardless of the animal model used, the highest performance of color fidelity, resolution and contrast is critical. Axio Imager provides you with the ideal uniform illumination in the common transmitted light contrast techniques, the best optical resolution, the extremely sample protecting fluorescence illumination with optimum signal-noise ratio to ensure brilliant image quality. With Axio Imager as the basis for an imaging system the processes to be investigated can be imaged

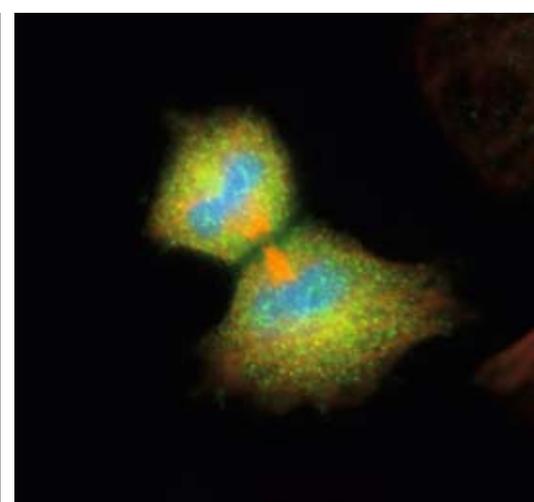
at high spatial and temporal resolution and analyzed with different AxioVision Modules. The motorization of Axio Imager M- and Z-stands allows efficient and reproducible imaging. Beyond this the manipulation of the sample is clearly facilitated and the sample turnover increased with the help of the docking station and scanning stage.



*Interphase HeLa cells – mitosis stages. Red: Alexa Fluor 594-DM1-alpha. Green: Alexa Fluor 488-Mad2. Blue: DNA (DAPI). Objective: EC Plan-NEOFLUAR 100x/1.3 Oil H.Y. Li, Y. Xheng, HHMI & CIW, Dept. Embryology, MD, USA*



*Metaphase*



*Telophase*

# Imaging Systems. From Simple Observation to Analysis.

The type of task determines the system solution. Axio Imager 2 provides the appropriate system for every requirement of life science research. Sophisticated modularity and a wide spectrum of perfectly coordinated components guarantee perfect results. Quickly. At any time.

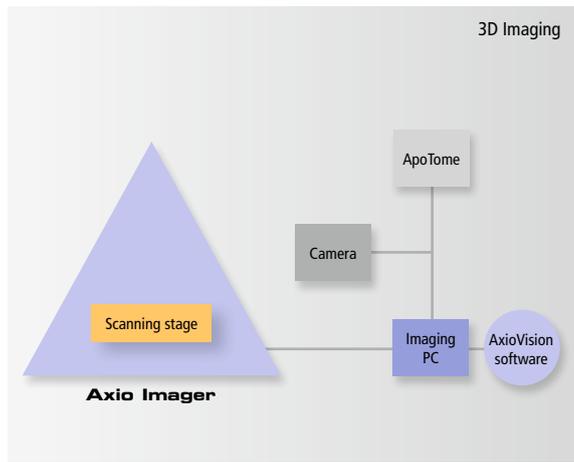
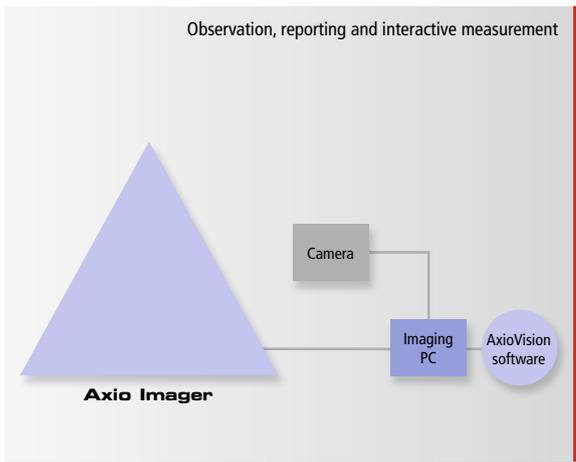
## Preconfigured and individual: the systems

The demands on the relevant systems are as different as the nature of the tasks in life science research. The modular architecture of Axio Imager 2 allows you to make an individual configuration which is exactly tuned to your requirements. For the digital image documentation of 3 (x, y, z) to 6 dimensions (additionally t,  $\lambda$  and x,y location) Axio Imager can be expanded with highly sensitive cameras from the AxioCam family. AxioVision offers a large number of specific modules for subsequent image analysis.

## Digital intelligence: AxioVision

AxioVision is the high-performance software for user-oriented solutions in digital imaging. From image acquisition and processing to image analysis and archiving. AxioVision is practice-oriented, can be operated intuitively, and can be easily adapted to individual requirements. The modular design of the Carl Zeiss imaging software can be expanded in many ways. For example, for Z-stack, multi-channel fluorescence or time-lapse images. AxioVision is the solution for growing demands.

Stand	Standard Equipment	Options	Fields of Application	Materials	Applications
<b>A2 LED</b>	<ul style="list-style-type: none"> <li>• LED – Fixed Köhler Illumination transmitted light</li> <li>• Lightmanager</li> <li>• Encoded</li> </ul>	<ul style="list-style-type: none"> <li>• Transmitted light beampath with manual filter wheel</li> <li>• Reflected light beampath</li> <li>• ApoTome</li> <li>• Encoded stage</li> </ul>	<ul style="list-style-type: none"> <li>• Pathology</li> <li>• Histology</li> <li>• Cytology</li> </ul>	<ul style="list-style-type: none"> <li>• Histological staining</li> <li>• Antibody staining</li> <li>• Fluorescence In situ Hybridisation (FISH)</li> <li>• Live cell staining on samples of               <ul style="list-style-type: none"> <li>- Living cells</li> <li>- Fixed cells</li> <li>- Tissue sections</li> <li>- Whole-mount-samples</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Evaluation</li> <li>• Fast routine work</li> </ul>
<b>A2</b>	<ul style="list-style-type: none"> <li>• Universal stand transmitted light</li> <li>• Lightmanager</li> <li>• Encoded</li> <li>• Neutral density filter wheel</li> </ul>	<ul style="list-style-type: none"> <li>• Reflected light beampath</li> <li>• ApoTome</li> <li>• Encoded and 2-plate scanning stages</li> </ul>	<ul style="list-style-type: none"> <li>• Biosciences research</li> <li>• Medical sciences research</li> <li>• Industrial research</li> <li>• Bio-material-research</li> </ul>		<ul style="list-style-type: none"> <li>• Observation</li> <li>• Image acquisition and reporting</li> <li>• Interactive measurements</li> </ul>
<b>D2</b>	<ul style="list-style-type: none"> <li>• Universal stand transmitted light</li> <li>• Encoded</li> <li>• Partly motorizable: Reflector turret</li> </ul>	<ul style="list-style-type: none"> <li>• Reflected light beampath</li> <li>• Reflector turret 6x or 10x</li> <li>• ApoTome</li> <li>• Encoded and 2-plate scanning stages</li> </ul>	<ul style="list-style-type: none"> <li>• Human Genetics</li> <li>• Animal Genetics</li> <li>• FISH-applications</li> </ul>		<ul style="list-style-type: none"> <li>• Evaluation</li> <li>• Image acquisition and reporting</li> <li>• Semiautomatic measurements</li> </ul>
<b>M2p</b>	<ul style="list-style-type: none"> <li>• LED – Fixed Köhler illumination transmitted light</li> <li>• Convenience-Motorization: Parfocality, Condenser</li> <li>• Encoded nosepiece</li> <li>• Motorized z-drive with 25 nm step size</li> </ul>	<ul style="list-style-type: none"> <li>• Transmitted light beampath with motorized luminous field stop</li> <li>• Reflected light beampath</li> <li>• TFT</li> <li>• ApoTome</li> <li>• LSM (entry level)</li> <li>• 2- and 3-Plate scanning stages</li> </ul>	<ul style="list-style-type: none"> <li>• Pathology</li> <li>• Histology</li> <li>• Cytology</li> </ul>		<ul style="list-style-type: none"> <li>• Evaluation</li> <li>• Image acquisition and reporting</li> <li>• Fast routine work</li> <li>• Confocal Imaging (entry level)</li> </ul>
<b>M2</b>	<ul style="list-style-type: none"> <li>• Universal stand transmitted light</li> <li>• Motorized: Luminous field stop</li> <li>• Lightmanager</li> <li>• Contrastmanager</li> <li>• Motorized z-drive with 25 nm step size</li> </ul>	<ul style="list-style-type: none"> <li>• Reflected light beampath</li> <li>• ACR for objectives</li> <li>• ApoTome</li> <li>• 2- und 3-plate scanning stages</li> <li>• 2 TV Tube motorized</li> </ul>	<ul style="list-style-type: none"> <li>• Biosciences research</li> <li>• Medical sciences research</li> <li>• Industrial research</li> <li>• Bio-material-research</li> </ul>		<ul style="list-style-type: none"> <li>• Automatic image acquisition and analysis</li> <li>• 3D Imaging</li> <li>• Medium sample throughput</li> <li>• Multi-User environment</li> </ul>
<b>Z2</b>	<ul style="list-style-type: none"> <li>• High performance stand transmitted light</li> <li>• Motorized: Luminous field stop</li> <li>• Lightmanager</li> <li>• Contrastmanager</li> <li>• Motorized focus drive:               <ul style="list-style-type: none"> <li>- 10 nm step size</li> <li>- designed for loads up to max. 9 kg</li> <li>- designed for continuous operation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Reflected light beampath</li> <li>• ACR for objectives and filter cubes</li> <li>• ApoTome</li> <li>• 2- and 3-plate scanning stages</li> <li>• LSM</li> </ul>	<ul style="list-style-type: none"> <li>• Biosciences research</li> <li>• Medical sciences research</li> <li>• Industrial research</li> <li>• Bio-material-research</li> </ul>		<ul style="list-style-type: none"> <li>• Automatic image acquisition and analysis</li> <li>• Certified image acquisition and archiving (CFR 21 part 11)</li> <li>• 3D imaging</li> <li>• DIC-Fluorescence Imaging</li> <li>• Confocal Imaging</li> <li>• High sample throughput</li> <li>• Multi-User environment</li> </ul>



### Proven and appreciated: the AxioCam family

Carl Zeiss offers a broad spectrum of digital cameras in different performance classes. The monochrome cameras are characterized by optimum resolution and highest sensitivity (12 or 14 bit dynamics) particularly in cases of faint fluorescent samples. The color cameras stand for the best color reproduction and highest resolution up to 12 megapixels per color channel. All the cameras have thermoelectric cooling and provide the option of rapid shutter synchronization. All AxioCam cameras are characterized by rapid live image and complete integration in the Carl Zeiss system world.

### Highly stress resistant: motorized focus and high-performance focus

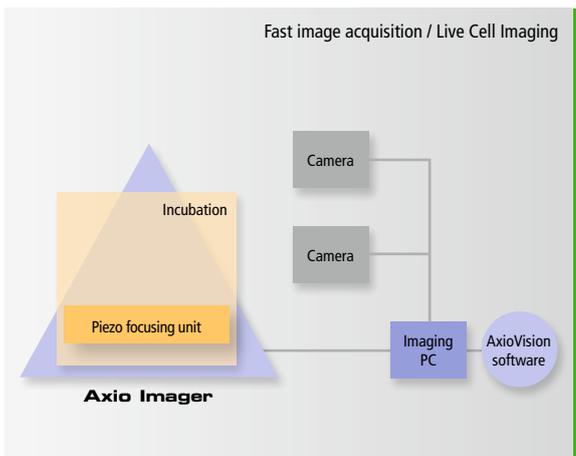
The Axio Imager offers you two different versions of the z-motor. The standard design with a step size of 25 nm at a reproducibility of  $\pm 75$  nm is always part of the M-stand configuration. And for the highest requirements such as LSM or Z-stack imaging with small intervals, a high-performance focus is available for the Axio Imager.Z2. It has a step size of only 10 nm with a reproducibility of  $\pm 10$  nm – and that at a 3-fold higher traverse rate. It was specifically developed for continuous use (24 hours / 7 days) and even with large stages guarantees absolutely precise focus movements over long periods.

### Optical sections with ApoTome

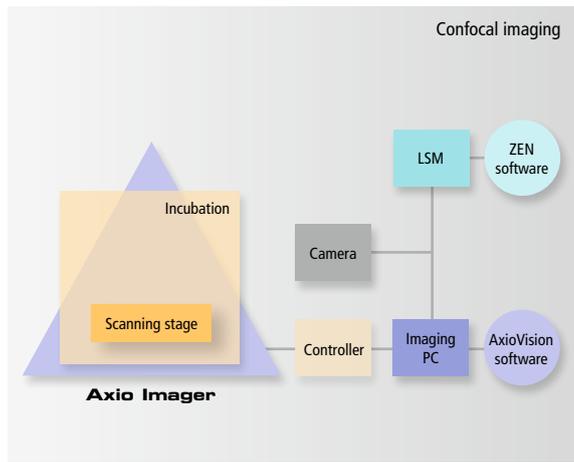
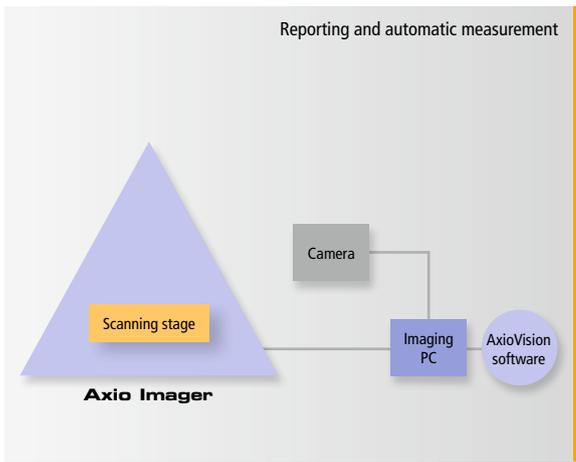
ApoTome has firmly established itself as the standard method in high-end research in the life sciences. For the first time it can be used with all the stands in the Axio Imager 2 family: The ApoTome slider is simply inserted in the luminous field diaphragm plane of the reflected light beam path. Via the principle of fringe projection, precise optical sections are created online. With elevated contrast and clearly increased axial resolution. The ideal solution for tissue sections and thicker, fixed samples.

### No stray light ever again: AxioVision 3D deconvolution

Deconvolution from Carl Zeiss calculates mathematically the stray light from outside the focal plane back to its origin. In this manner the object recorded in the 3D image stack is "unfolded". The result is a first-class image quality particularly in samples with extremely weak fluorescence where a high light yield is essential.



High-end research system with Axio Vision



### Precisely on the spot: motorized stages and z-piezo insert

They allow a precisely accurate approach to positions and the highest degree of reproducibility. Via highly sensitive piezo or step motor every desired position can be exactly set and relocated.

- Piezo stage: step size 0.2  $\mu\text{m}$ , reproducibility:  $\pm 0.6 \mu\text{m}$
- Mechanical stage: step size 0.1  $\mu\text{m}$ , reproducibility:  $\pm 0.3 \mu\text{m}$
- New stage control for stages with DC motors for direct coupling with the motorized stages (magnification-dependent traverse rate): highest reproducibility and precision in high-end applications
- z-Piezo focusing insert with 100  $\mu\text{m}$  focusing range for rapid imaging with Colibri and z stack images; resolution 5 nm, reproducibility:  $\pm 1 \text{ nm}$ , max. additional load 2 kg, for frame size 222 x 139 mm, available mounting frames for all common preparation shapes

The scanning stages are the prerequisite for all automated imaging techniques such as MosaiX or Mark&Find.

### Precision in z: the closed loop system

Axio Imager.Z2 with the focus linear sensor offers anyone who has to fulfill extremely high requirements precision of  $\pm 1 \text{ nm}$  in the z-direction. On the one hand, the application-independent movements of the microscope stage are detected and readjusted automatically. And, on the other hand, highly precise and reproducible Z-stacks are ensured with z-steps of equal size, which gives maximum control and reliability.

### New stimuli for your research: the LSM family

Confocal microscopy at the highest level: LSM 700, LSM 710 and LSM 7 MP belong to the seventh device generation of the Laser Scanning Microscope from Carl Zeiss. The use of the same first-class system components and the same software in the entire device class ensures outstanding performance and image quality without any compromises. The result: an excellent price-performance ratio. A novel beam path ensures excellent laser suppression and maximum registration of emission and results in breathtaking images. Demanding tasks such as spectral imaging, FRET, FRAP or colocalization analysis are easily managed with unprecedented image quality and high scanning speed.

LSM 710 NLO and LSM 7 MP are ideally suitable for highly sensitive deep examination of living preparations or organisms. Both systems are characterized by unrivalled sensitivity. Highly effective non-descanned detection ensures efficient depiction in deep tissue layers. These are the systems of choice for long-term developmental studies, patch-clamp- and uncaging-experiments.



LSM 710 with Axio Imager.Z2

## Ergonomy and Ease of Operation. Efficient and Relaxed Working.

Axio Imager is intelligent technology with a trendsetting control concept. Even the most demanding experiments and long working sessions at the microscope become simple and efficient. Automated procedures allow rapid, intuitive control with either manual or motorized components, depending on the individual requirements.

### Efficient, rapid, comfortable: the Touch Screen

A good thing has been made even better: The control software of Axio Imager 2 collects all of the critical functions on one touch-sensitive TFT display. All motorized components are controlled with a touch of your finger, and their status is also displayed. The integrated light and contrast managers constantly adjust the light and contrast settings optimally.

- The Contrast Manager's control and user guidance adhere to the logic and workflow of all applications.
- Motorized components can be optionally switched to automated or manual control.
- The Favorites Page allows access to frequently used functions when switching ON the microscope.

- Individual settings can be defined for up to 10 different users.

### Ergonomically well-conceived: Control buttons and exchangeable fine drive

Ease of operation redefined: the control buttons which have been ergonomically arranged around the focus drive can be easily distinguished by their tactile surfaces. The two different fine drive buttons of the focus drive are exchangeable and can be optionally used for right or left. The motorized stand has ten freely assignable control buttons. The manual stand allows the simple setting of light intensity as well as switching of the motorized shutter in reflected and transmitted light via five preconfigured buttons.



*Ergophototube for perfect convenience*



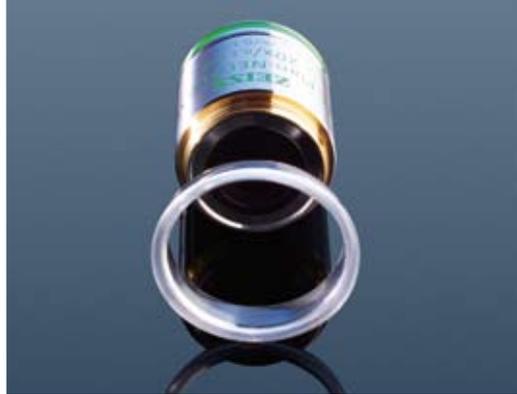
*Ergonomically distributed control buttons*



*Ideal arrangement of the diaphragm slider and filter wheel in reflected light*



ACR reflector module



ACR objective. ACR detects objectives and reflector modules automatically



Communication connections

### Provides mobility: the control panel

Axio Imager can also be remote controlled via a free positionable control panel. Among other things, this panel has a focus drive and a brightness control. Additional arbitrary functions can be programmed. The panel provides an interface for the TFT and for the x, y-control of the motorized mechanical stage.

### Error-free control with ACR

ACR (Automatic Component Recognition) stands for the innovative concept of automatic recognition of objectives and reflector modules on the Axio Imager.Z2. When changed, the replaced components are immediately registered in the system. An important advantage for ease of operation and safety: operating errors and time-consuming programming are avoided.

### Absolutely stable: the Imaging Cell

The key elements of Axio Imager such as the nosepiece, z-guidance and the stage are decoupled from the remainder of the stand as a stable cell. The entire unit has been designed to be practically vibration-free and insensitive to thermal influences. Even in the long-term it provides the highest possible stability and absolute freedom from vibration. Ideal preconditions for imaging, particularly in long-term experiments and in time lapse imaging.



Switching of illumination on the TFT



The TFT display on the stand or in the docking station provides a transparent menu guide for control and configuration



Control of the motorized stages via the Docking Station

## Stand Design. Flexibility Times 6.

Advanced technology assures that the user will select the appropriate system. The sophisticated stand design of Axio Imager 2 and well-conceived, preconfigured packages guarantee you an appropriate, configuration that meets the most demanding applications.

### Convincing technology: the stand

Progressive down to the smallest detail – even in the basic configuration, all stands have an interface to the control computer. The parameters of encoded or motorized components can be read out or controlled directly by AxioVision.

- **Axio Imager.A2 LED**

Ideally appropriate for brightfield applications in transmitted light: an LED light source ensures a constant color temperature across the entire intensity range.

- **Axio Imager.A2 and M2**

More flexibility: interfaces for sliders in the reflected light beam path allow convenient working with either aperture or field stop diaphragms or an attenuator in fluorescence. Optional on the Axio Imager.M2: motorized filter wheels and diaphragm sliders in reflected light (M2m) or in transmitted light (M2).



*Axio Imager.A2 LED*



*Axio Imager.A2*



*Axio Imager.D2*

- **Axio Imager.M2p**

Automatic parfocality compensation, a light manager, the motorized condenser and manual objective changing make routine work, e. g., in pathology comfortable and efficient.

- **Axio Imager.D2**

The manual high-end stand can be equipped with a 6x- or 10x-motorized reflector turret, which, above all, make fluorescence applications comfortable and fast.

- **Axio Imager.Z2**

The stand has been developed to meet the most stringent requirements. A high-performance focus allows constant operation with a high sample throughput. It ensures precise focusing movements over long periods and also when using large and heavy sample stages up to 9 kg.



*Axio Imager.M2*



*Axio Imager.M2p*

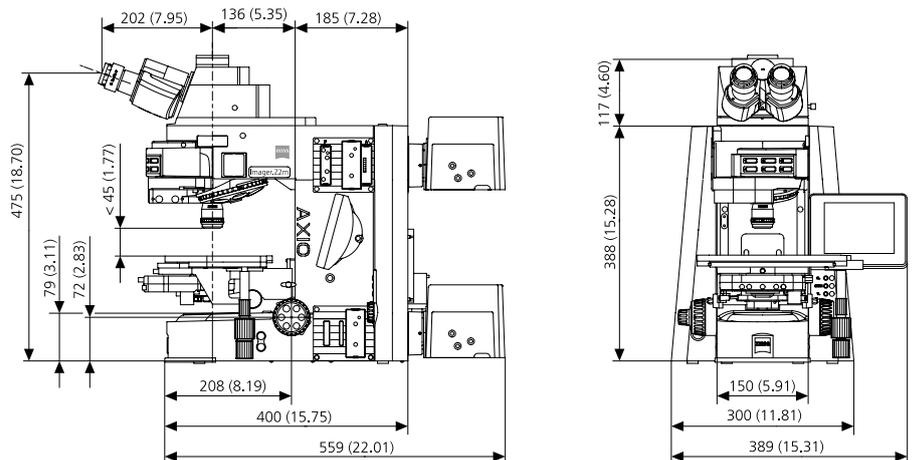


*Axio Imager.Z2*

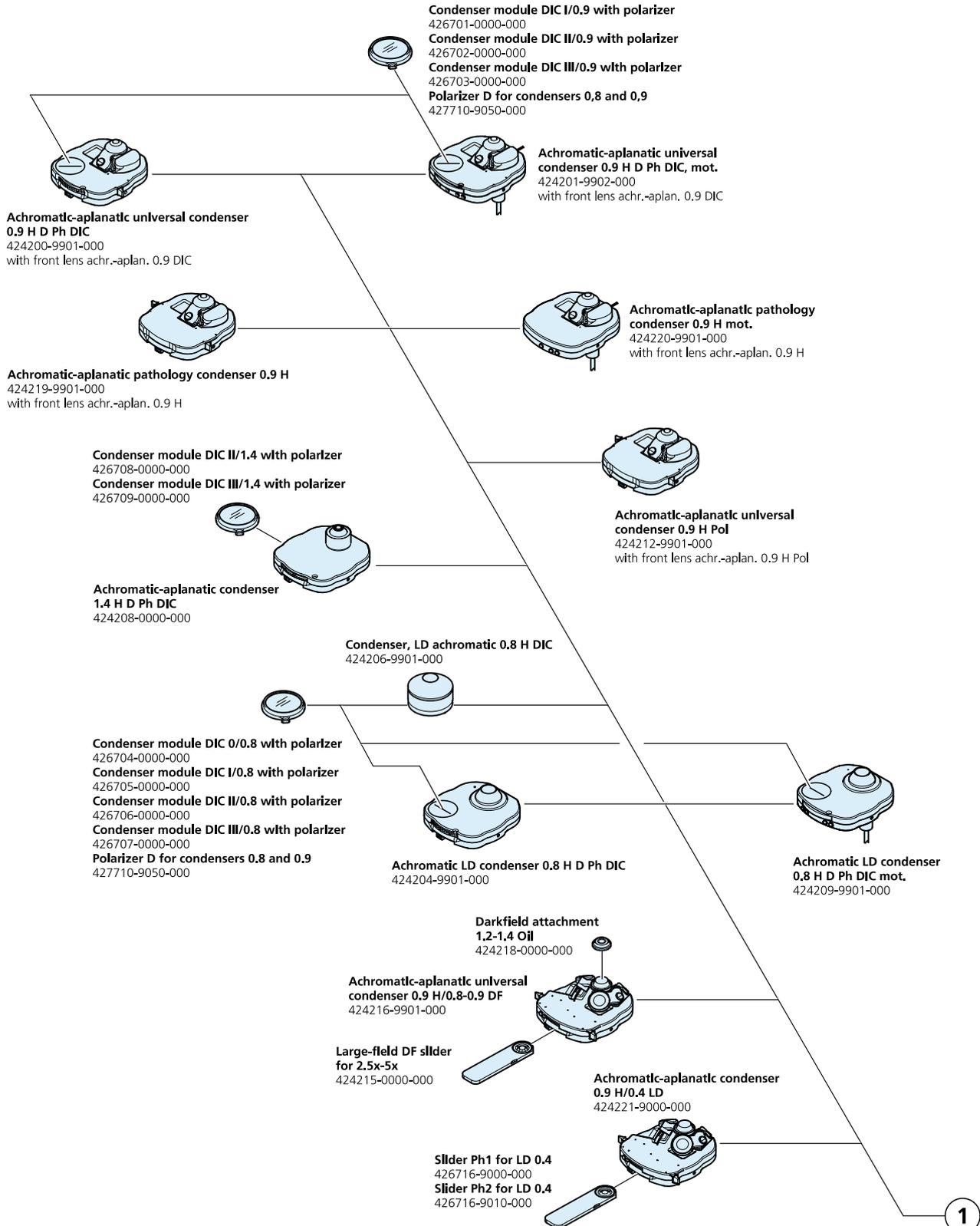
**Axio Imager 2 – Flexibility for all application areas**

Component	Option	A2 LED	A2	M2p	M2	D2	Z2	A2m	M2m	D2m	Z2m
Stand	manual	+	+	-	-	+	-	+	-	+	-
	motorized	-	-	+	+	O*	+	-	+	O*	+
Encoding	readout by computer	+	+	+	+	+	+	+	+	+	+
Tube lens turret	encoded	O	O	O	O	O	O	O	O	O	O
	motorized	-	-	O	O	-	O	-	O	-	O
Reflector turret	6x encoded	O	O	O	O	O	O	O	O	O	O
	6x motorized	-	-	O	O	O	O	-	+	O	O
	6x motorized ACR	-	-	-	-	-	O	-	-	-	O
	10x motorized ACR**	-	-	-	-	-	O	-	-	-	O
Nosepiece	6x encoded POL	O	O	-	O	O	O	O	O	O	O
	6x encoded HD DIC	O	O	-	O	O	O	O	O	O	O
	6x motorized HD DIC	-	-	-	O	-	O	-	O	-	O
	6x motorized HD DIC ACR	-	-	-	O	-	O	-	O	-	O
	7x encoded HD	O	O	+	O	O	O	O	O	O	O
Modulator turret for C-DIC/TIC	7x motorized HD	-	-	-	O	-	O	-	O	-	O
	manual	O	O	O	O	O	O	O	O	O	O
Modulator turret for DL- DIC	motorized****	-	-	-	O	-	O	-	O	-	O
	motorized*****	-	-	-	-	-	O	-	-	-	O
Stage carrier with condenser carrier, detachable	0 mm - 25 mm Sample height	+	+	+	+	+	O	O	O	O	O
Stage carrier detachable, for attachable condenser carrier	0 mm - 45 mm Sample height	O	O	O	O	O	O	O	O	O	O
Stage carrier reflected light, detachable	0 mm - 63 mm Sample height	O	O	O	O	O	O	O	O	O	O
Transmitted light beam path	manual	-	+	-	-	+	-	O	O	O	O
	motorized	-	-	-	+	-	+	-	-	-	O
LED transmitted light	-	+	O	+	O	O	O	O	O	O	O
Double filter wheel transmitted light	manual	-	+	-	O	O	O	O	O	O	O
	motorized	-	-	-	O	-	O	-	-	-	O
Reflected light beam path	manual***	O	O	O	O	O	O	+	-	+	-
	motorized***	-	-	-	-	-	O	-	+	-	+
Luminous field stop slider reflected light	manual	O	O	O	O	O	O	+	O	+	O
	motorized	-	-	-	-	-	O	-	O	-	O
Aperture stop slider reflected light	manual	O	O	O	O	O	O	O	O	O	O
	motorized	-	-	-	-	-	O	-	O	-	O
Double filter wheel reflected light	manual	O	O	O	O	O	O	O	O	O	O
	motorized	-	-	-	O	-	O	-	O	-	O
Fluorescence attenuator	manual	O	O	O	O	O	O	O	O	O	O
	motorized	-	-	-	-	-	O	-	O	-	O
Lamp switch reflected light/transmitted light	manual	+	+	-	-	+	-	+	-	+	-
	software	-	-	+	+	-	+	-	+	-	+
Mixed light with additional external power supply	manual	+	+	-	-	+	-	+	-	+	-
	software	-	-	+	+	-	+	-	+	-	+
Focus (z-Axis)	manual	+	+	-	-	+	-	+	-	+	-
	motorized 25 nm Step size	-	-	+	+	-	-	-	+	-	-
	High Performance Focus motorized 10 nm Step size	-	-	-	-	-	+	-	-	-	+
TFT-Display	-	-	-	O	+	-	+	-	+	-	+
ApoTome	-	O	O	O	O	O	O	O	O	O	O
Power supply	external	-	-	+	+	-	+	-	+	-	+
	internal	+	+	-	-	+	-	+	-	+	-
Mechanical stage CAN	motorized***	O	O	O	O	O	O	O	O	O	O
Scanning stages	Piezo	O	O	O	O	O	O	O	O	O	O
	DC / Stepper motors	O	O	O	O	O	O	O	O	O	O
Fast z-piezo insert	with manual stage	O	O	O	O	O	O	O	O	O	O
	with scanning stage	O	O	O	O	O	O	O	O	O	O
2 TV tube head motorized	-	-	-	O	O	-	O	-	O	-	O
Condenser	manual	O	O	O	O	O	O	O	O	O	O
	motorized	-	-	O	O	-	O	-	O	-	O

- + = Included in stand
- O = Optionally available
- = Not available
- \* = Motorized (6x und 10x) reflector revolver can be used
- \*\* = ACR function not possible with „Axio Imager“ D1 and D1m
- \*\*\* = A motorized shutter is included in every reflected light illumination. For fluorescence applications this can optionally be replaced by a High speed shutter
- \*\*\*\* = For the use at the „Axio Imager“ A2 LED, A2, A2m, D2 and D2m USB/CAN Converter 432909 is required
- \*\*\*\*\* = Only in combination with motorized objective nosepiece
- m = Optimized for materials applications



# Condensers





# Objective nosepieces, reflector turrets, filters, prisms

Reflector module brightfield ACR P&C for reflected light  
424928-9901-000

Reflector module C-DIC/TIC ACR P&C for reflected light  
424941-9000-000

Reflector module darkfield ACR P&C for reflected light  
424922-9901-000

Reflector module Polarizer ACR P&C for reflected light  
424923-9901-000

Reflector module Pol ACR P&C for HBO 100 for reflected light  
424924-9901-000

Reflector module C-DIC/TIC ACR P&C for reflected light  
424929-9903-000

Reflector module DIC/Pol red I ACR P&C for reflected light  
424938-0000-000

Reflector module DIC/Pol ACR P&C for reflected light  
424939-0000-000

Reflector module with analyzer ACR P&C for reflected light  
424941-9050-000

Analyzer module DIC ACR P&C shift free for transmitted light for combination with modulator turret  
424921-9010-000

Analyzer module DIC ACR P&C for transmitted light  
424921-9901-000

Analyzer module DIC ACR P&C shift free for transmitted light  
424932-9901-000

Analyzer module Pol ACR P&C for transmitted light  
424937-9901-000

Modul Optovar 2,5x P&C (only for transmitted light)  
424936-0000-000

Optovar module 1,6x P&C (only for transmitted light)  
424935-0000-000

Optovar module 1,25x P&C (only for transmitted light)  
424934-0000-000

Reflector module FL EC P&C  
424931-0000-000

Reflector module FL ACR P&C  
424933-0000-000

Filter sets for reflector modules FL on request

Reflector module C-DIC/TIC ACR P&C for reflected light  
424929-9903-000

DIC prism C I for modulator turret for EC EPN 5x-20x  
426921-0000-000

DIC prism C II for modulator turret for EC EPN 50x-100x  
426922-0000-000

TIC prism for modulator turret for EC EPN 5x-100x  
426923-9901-000

for transmitted light:  
Compensator mount 6x20  
424705-0000-000

for reflected light:  
Compensator mount 6x20 with darkfield stop  
424706-0000-000

Analyzer slider D, fixed  
433605-0000-000

Compensator lambda, 6x20  
473704-0000-000

Kompensator Lambda/4, 6x20  
473714-0000-000

Wedge compensator 0-4 Lambda, 6x20  
000000-1140-633

Compensator lambda, rotary +/-8°, 6x20  
473710-0000-000

Tilting compensator K 0-30 Lambda, 6x20  
000000-1115-698

Tilting compensator B 0-5 Lambda, 6x20  
000000-1115-700

Rotary compensator  
Brace-Köhler Lambda/10, 6x20  
000000-1115-703

Antiglare screen  
452163-0000-000

DIC slider C 6x20 for objectives EC 5x-20x  
000000-1105-192

DIC slider C 6x20 for objectives EC 50x-100x  
000000-1105-193

TIC slider 6x20  
000000-1105-190  
(to be used with C DIC reflector module  
424941-9000-000)

4-position modulator revolver for circular DIC/TIC  
424703-0000-000

4-position modulator revolver mot. for circular DIC/TIC  
424704-0000-000

4-position modulator turret mot. for transmitted-light DIC  
424707-9000-000  
for use with  
Analyzer module  
DIC ACR P&C shift free for transmitted light  
424921-9010-000  
(only with Z2 and Z2m)

6-position reflector turret man. cod. for P&C modules  
424906-0000-000

6-position reflector turret mot. ACR, for P&C modules  
424912-0000-000

6-position reflector turret mot. for P&C modules  
424907-0000-000  
(included in stands M2m)

10-position reflector turret mot. ACR, for P&C modules  
424913-0000-000

DIC prlsm 0, I and II; 5x, 10x, 20x for modulator turret  
426924-9000-000

DIC prlsm III 40x for modulator turret  
426924-9010-000

DIC prlsm III HR PA 63x/1.4 for modulator turret  
426924-9020-000

DIC prlsm III HC 63x/1.4 for modulator turret  
426924-9030-000

DIC prlsm III HR PA 100x/1.46 for modulator turret  
426924-9040-000

DIC prlsm III HC PA 100x/1.46 for modulator turret  
426924-9050-000

DIC slider on request

6-position objective nosepiece, HD DIC M27 cod.  
424504-0000-000

6-position objective nosepiece, HD DIC M27 mot.  
424505-0000-000

7-position objective nosepiece, HD M27 cod.  
424501-0000-000

7-position objective nosepiece, HD M27 mot.  
424502-0000-000

6-position objective nosepiece, Pol M27 cod.  
424503-0000-000

6-position objective nosepiece, HD DIC M27 mot. ACR  
424507-0000-000

Objective Intermediate ring ACR for cylindrical, short objective sleeve  
424508-0000-000

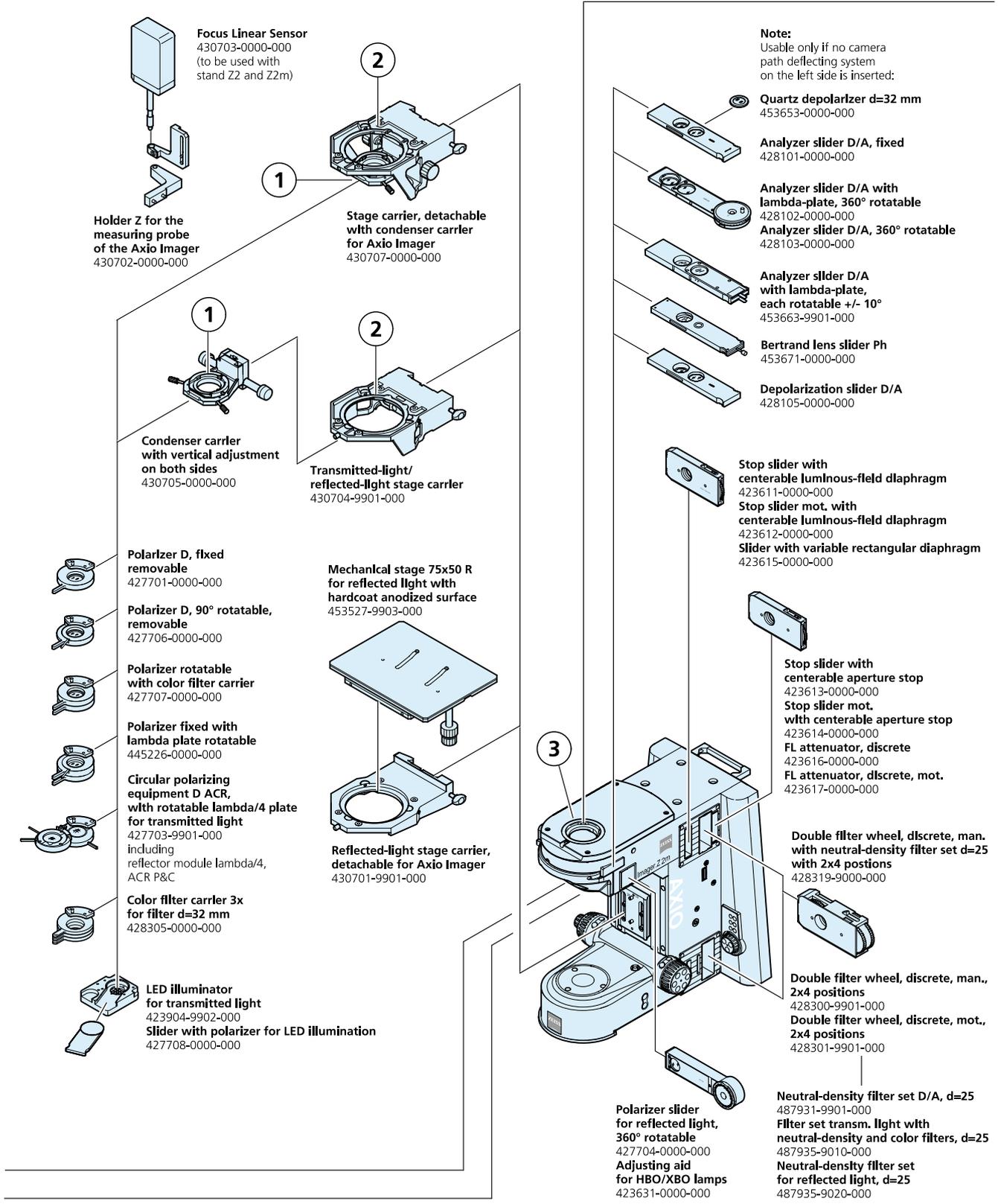
Objective intermediate ring ACR for cylindrical, long objective sleeve  
424511-0000-000

Objective intermediate ring ACR for conic, short objective sleeve  
424509-0000-000

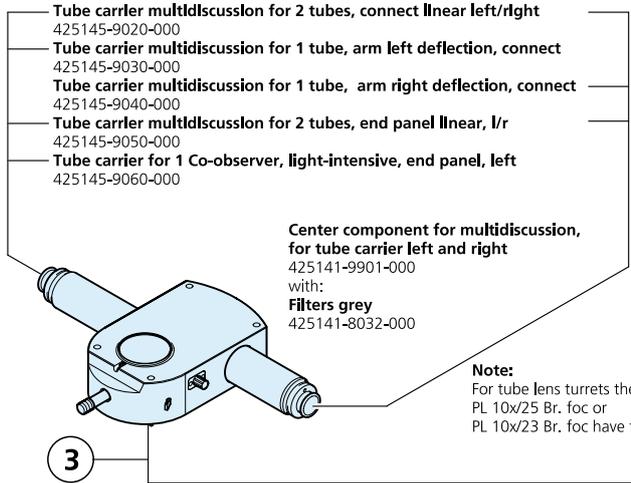
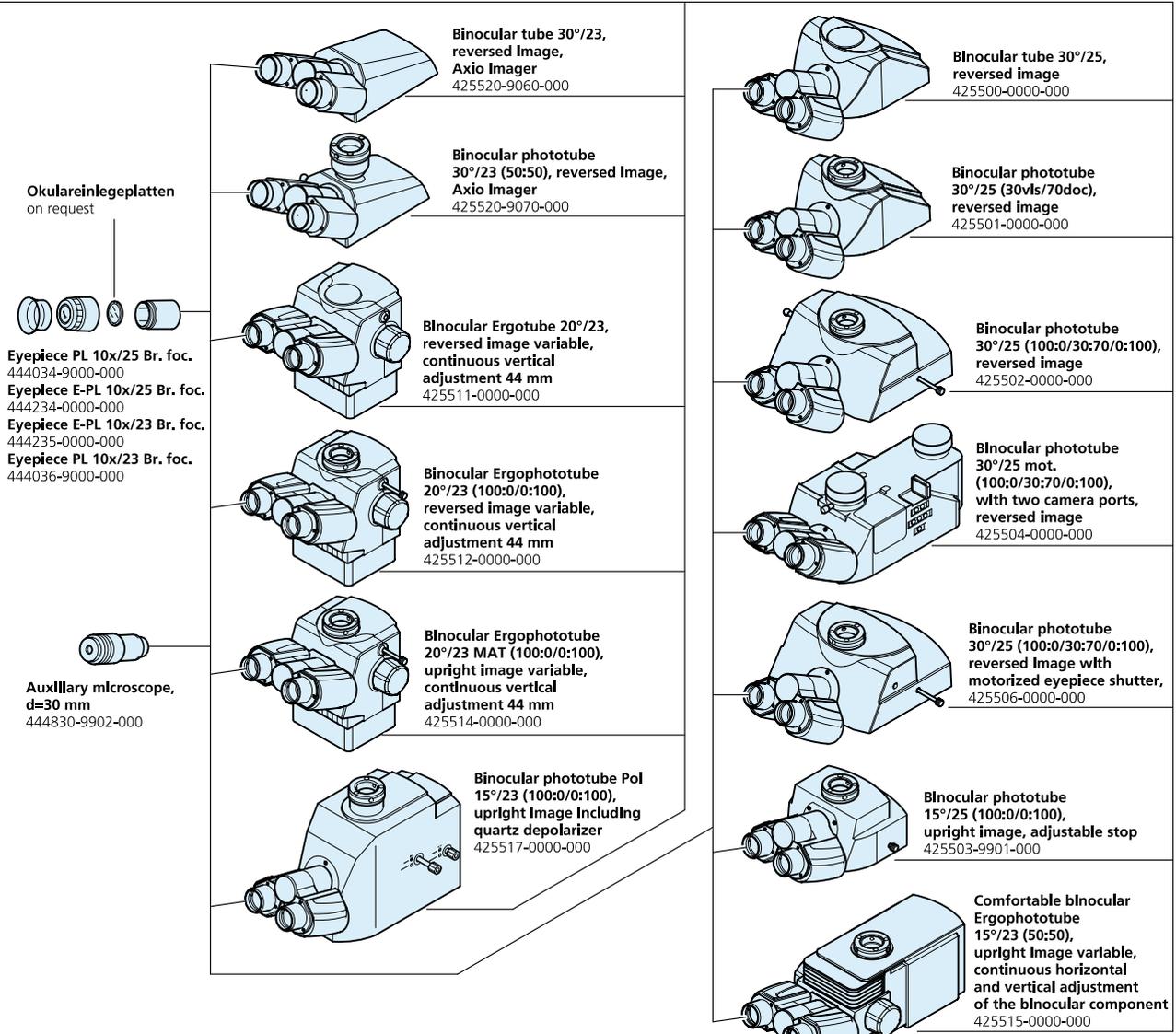
Objective Intermediate ring ACR for conic, long objective sleeve  
424510-0000-000

Objectives M 27  
ICS objectives on request

# Stand, stage carriers, polarizers, sliders



# Tubes, eyepieces, tube lens turrets, multidiscussion



- Tube lens 1.25x**  
425303-0000-000
- Tube lens 1.6x**  
425304-0000-000
- Tube lens 2.5x**  
425305-0000-000
- Tube lens 4.0x**  
425307-0000-000

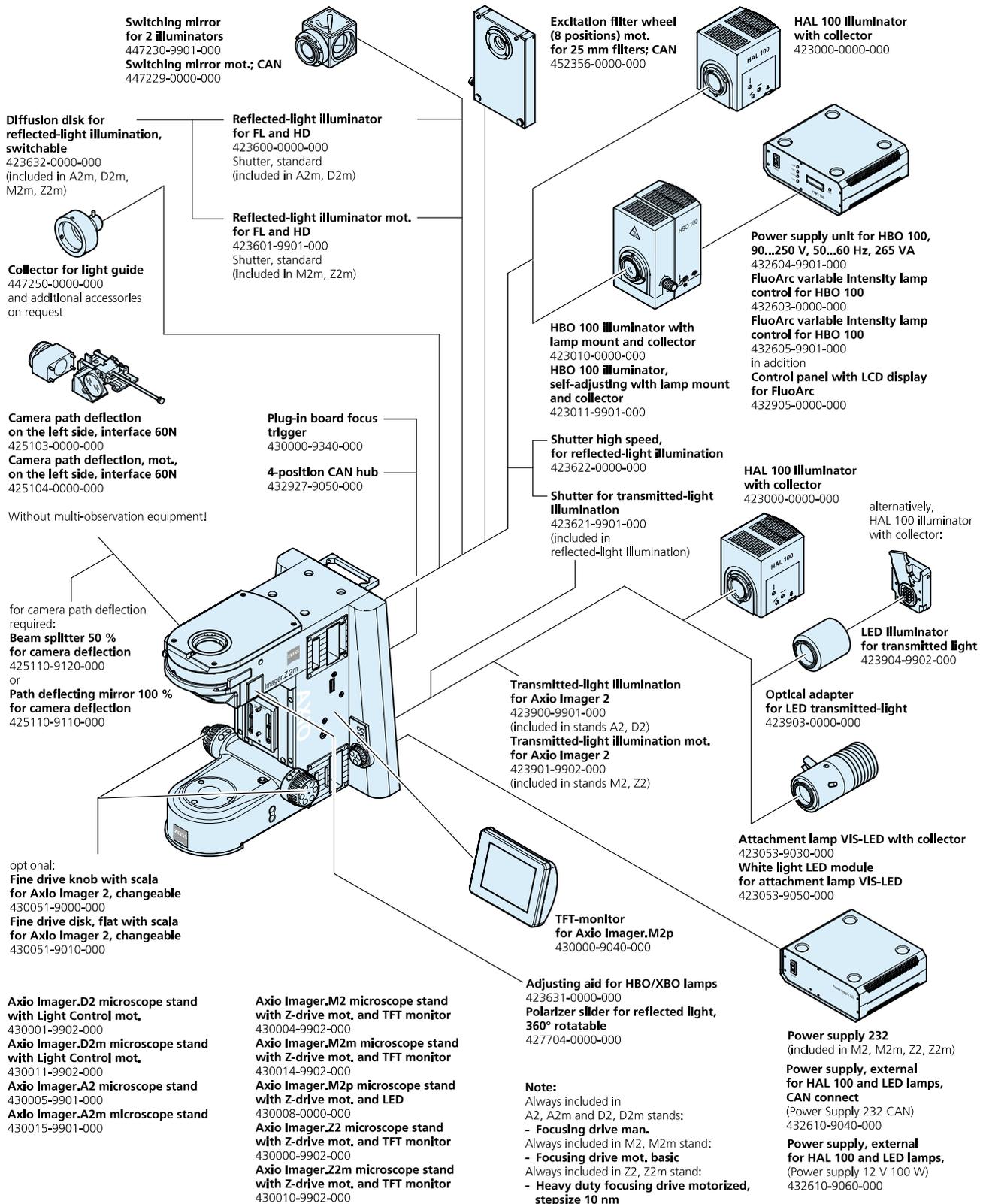


to be equipped at most with three tube lenses:  
**5-position tube lens turret, cod., with Bertrand system**  
425309-9901-000  
with tube-lens 1.0x  
**5-position tube lens turret mot., with Bertrand system**  
425302-9901-000  
with tube-lens 1.0x

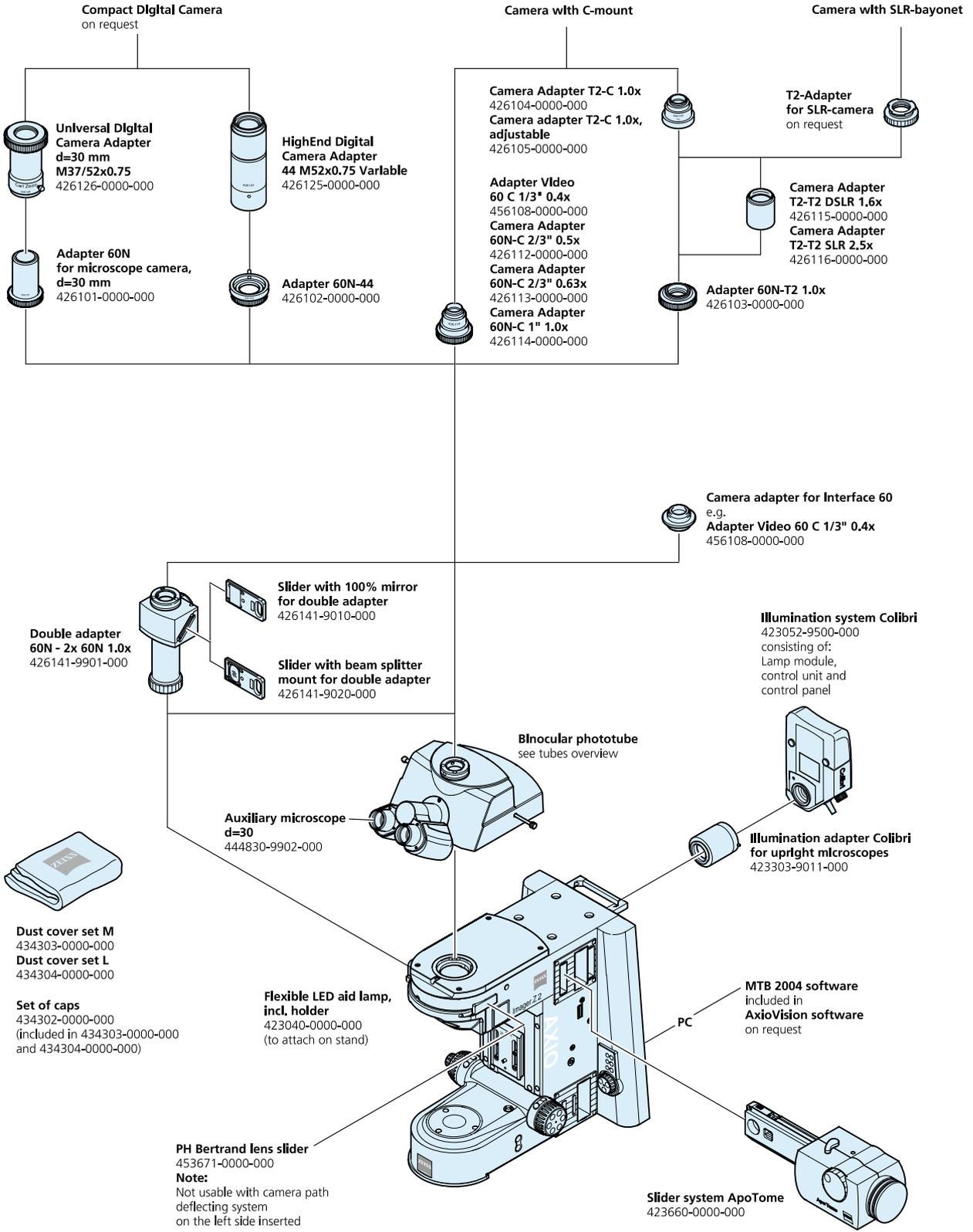
**Note:**  
The tubes 425500-0000-000  
425502-0000-000  
425503-9901-000  
425506-0000-000  
and 425515-0000-000  
can be combined with a tube lens turret or the center component for multidiscussion equipment.

3

# Stand, illumination



# Documentation





## **Axio Imager 2. Even More Highlights.**

### **The optics**

- IC<sup>2</sup>S beam path for high contrast
- Highest possible resolution through high-performance objectives

### **The fluorescence**

- Combination of DIC and fluorescence with the motorized DIC turret
- Excellent image quality due to the optimized beam path
- Triggerable LED light source
- Several light sources for uniform illumination

### **The stands**

- Preconfigured packages for the most common applications
- Coded and motorized components
- Modular and individually upgradable

### **The imaging**

- Motorized DIC turret: Combination of fluorescence and DIC for absolute artifact-free images
- Rapid image acquisition in up to 6 dimensions
- Motorized scanning stages, motorized z-focus and high-performance focus (Axio Imager.Z2) for the highest precision and positioning accuracy

Carl Zeiss Microscopy GmbH  
07745 Jena, Germany  
BioSciences  
microscopy@zeiss.com  
www.zeiss.de/axioimager



info@ctk-instruments.com  
www.ctk-instruments.com  
866-464-1005