ApoTome.2

Optical Sections in Fluorescence Imaging

Product Information

Interactive PDF

INTERNET-LINK

VIDEO/ANIMATION

Release 1.0

We make it visible.

Simply Brilliant:
Perfect Optical Section Thickness for All Magnifications

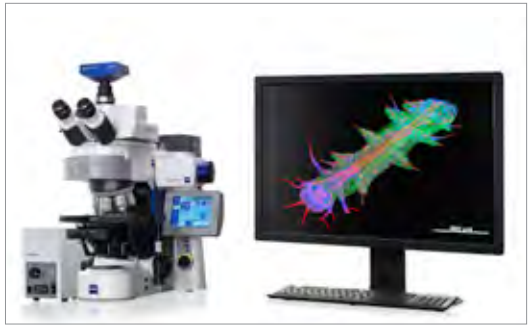
Create optical sections of your fluorescent samples – free of scattered light. With structured illumination, you know that only the focal plane appears in your image: ApoTome.2 recognizes the magnification and moves the appropriate grid into the beampath. The system then calculates your optical section from three images with different grid positions without time lag. It's a totally reliable way to prevent scattered out-of-focus light, even in your thicker specimens. Yet your system remains just as easy to operate as always. You get images with high contrast in the best possible resolution – simply brilliant optical sections.

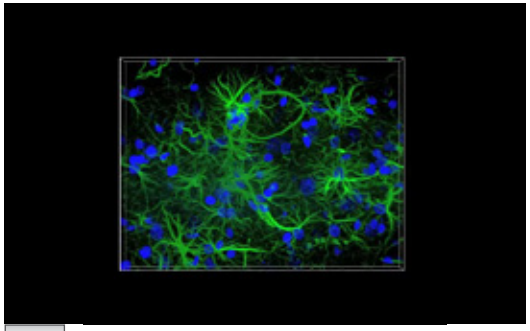
ApoTome.2: Simpler, More Intelligent, More Integrated.

Perfect Images –
with All Magnifications
Because your applications need different objectives, you need a system that gives you the best resolution for each one. ApoTome.2 automatically uses the right grid for your objective, selecting from three grids with different frequencies. With a defined optical section thickness in the region of a Rayleigh unit, the image is simply brilliant.

Optimum Results –
Free Choice of Light Source and Dyes
From conventional HBO illumination to adjustment-free metal-halide lamp HXP 120 C to Colibri.2, the LED illumination source that is gentle on your samples: with ApoTome.2 you use exactly the light you need. ApoTome.2 also gives you the choice of fluorophores. Whether you work with DAPI, FITC, Rhodamin, Cy5 or with vital dyes such as GFP or mRFP, it's your decision, not the technology's. Just change the filter and your system automatically moves the grid to the correct position. From DAPI to Cy5, you get perfect optical sections for multi-channel imaging.

Brilliant Images –
Even with Thick Specimens
Your optical section thickness is close to one Rayleigh unit, a value that stands for high axial resolution with a good signal-to-noise ratio. ApoTome.2 increases the resolution in Z direction compared to conventional fluorescence microscopy: you obtain brilliant optical sections that allow 3D-rendering , even from thick specimens.

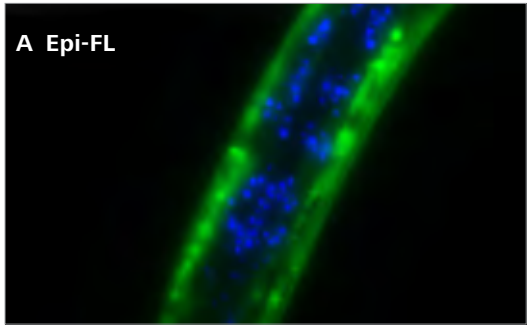




Rat, hippocampus, triple fluorescence, maximum-projection of 3D image-stack
Objective: Plan-APOCHROMAT 63x/1.4
E. Fuchs & S. Bauch, DPZ Göttingen, Germany

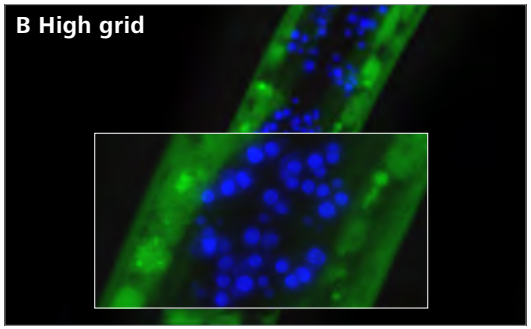
Three Grids Deliver Optimal Optical Section Thickness

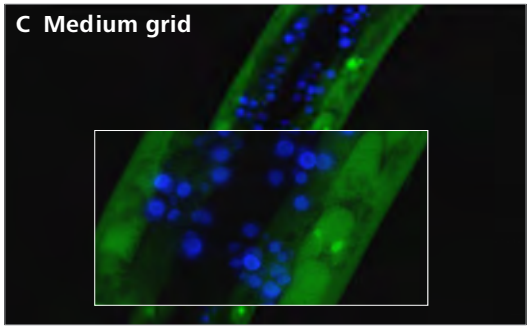
Figure A:
Acquisition with conventional epifluorescence illumination
Emission light from areas outside of the focal plane is detected. Contrast and resolution are reduced, depending on thickness of specimen.

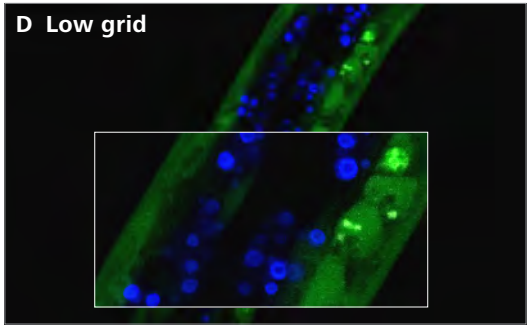


C. elegans, whole mount, green: GFP, blue: DAPI
Objective: Plan-APOCHROMAT 20x/0.8
Prof. Schnabel, TU Braunschweig, Germany

Figures B–D:
Optical sections with different thickness
No matter which magnification you are using - ApoTome.2 automatically places the right grid in the beampath of your microscope.
Reduction of unwanted background fluorescence increases with the grid frequency and the optical sections become thinner.
Structures from outside of the focal plane are suppressed (Fig. B, C and D). This improves contrast and resolution of the optical section.
"Low grid" delivers the optimal section thickness in our example (Fig. D). Images of this type are particularly suitable for 3D analyses and the processing of your image data with rendering software.



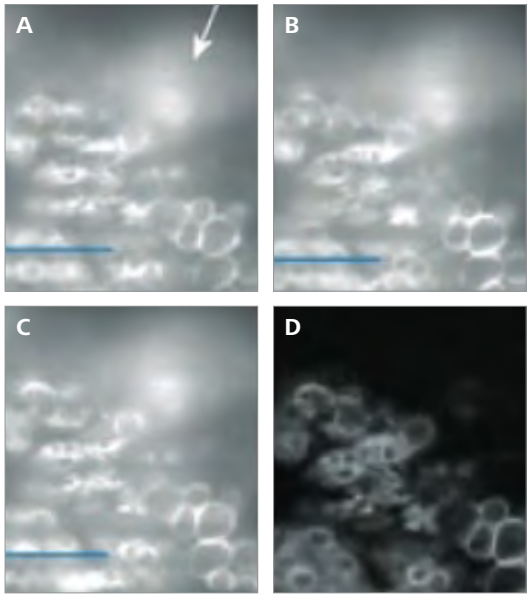




Your Insight into the Technology Behind It

ApoTome.2 Brings You Structured Illumination

ApoTome.2 projects a grid structure into the focal plane of your specimen, then moves it into three positions using a scanning mechanism. At each grid position, ApoTome.2 automatically acquires a digital image. The system processes the three images into one optical section with improved contrast and increased resolution using a patented algorythm. The image that emerges is free from grid structures.



Schematic illustration of the grid projection.
A-C: raw images with different positions of grid
D: optical section through sample

Animation from www.zeiss.com/campus, © Mike Davidson, FSU, Tallahassee

ApoTome.2 Grid in the Beampath

Fluorescence excitation light passes through two glass plates in the ApoTome.2 slider. When a grid structure is applied to the first glass plate, the grid pattern is “imprinted” in the excitation light. A scanning mechanism tilts the second glass plate and the image of the grid is laterally shifted in the focal plane of the specimen.

www.zeiss.com/campus

Tailored Precisely to Your Applications

ApoTome.2 is the cost-effective solution for creating optical sections with high contrast. Use this to your advantage in a wide range of applications from cell culture preparations via tissue sections to whole embryos.

Typical applications, typical specimens	Task	ApoTome.2 provides
Cell culture	2D imaging	2D single images possible
	Fast imaging of a 2D image	Optical section available online on the monitor
	Reliable detection of the marker even with strong background fluorescence	Automatic grid selection ensures optimum contrast with each objective
	Combination of multiple contrast techniques	Any combination of fluorescence channels, brightfield, DIC and phase contrast. Each fluorescence channel can be individually configured as an optical section or widefield image
Live cell imaging	Reduction of phototoxicity	Particularly low in combination with LED illumination and EMCCD cameras
	Time-lapse images	Depending on the exposure time, up to three images per second. Doubling of the frame rate with “burst mode”
Vibratome sections, histological samples	3D imaging	Automatic selection of the optimum grid for each objective
	Modification of the optical section thickness	Grid freely selectable depending on the specimen
	Penetration depth	Depending on the optical density of the tissue
	3D reconstruction	Rendering of the image stack via integrated software function. Automatic transfer of the parameters of the individual fluorescence channels
	Quantitative analysis	Automatic calibration of the system: reproducible size measurements
Whole mounts	3D imaging	Multi channel, Z-Stack and Time Lapse, Deconvolution, images in raw data mode, 3D Rendering
	Large image areas	Automatic acquisition of large sections using Tiles & Positions

ApoTome.2 At Work

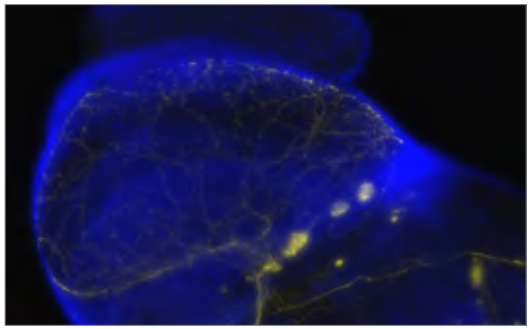


Figure A: Conventional fluorescence

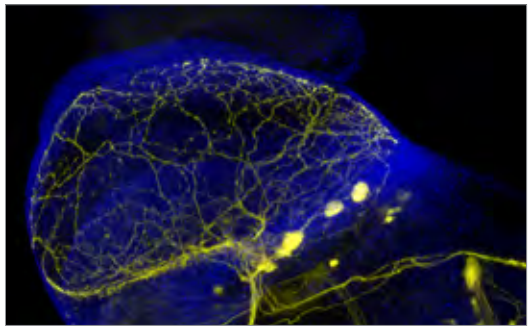


Figure B: Optical section

Drosophila neurons, blue: DAPI, green: GFP. Objective: Plan-APOCHROMAT 20 x/0.8.
Marta Koch, Molecular and Developmental Genetics, University of Leuven, Belgium

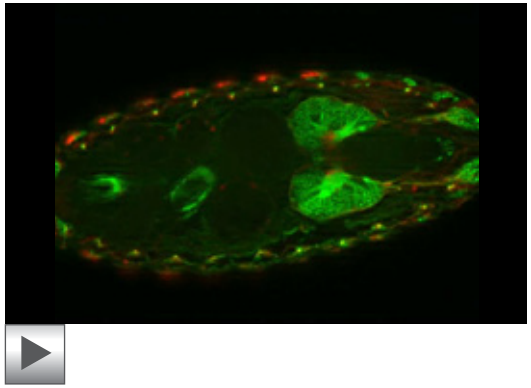


Figure C: Drosophila embryo, green: HRP, red: glia marker,
100 µm Z-stack C. Klämbt, Inst. for Neurobiology,
University of Münster, Germany

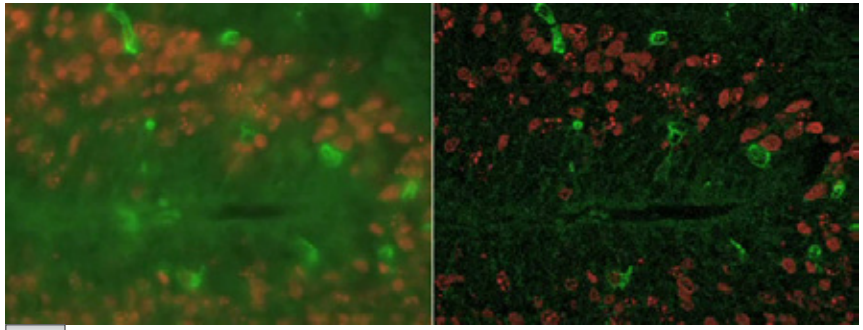


Figure C: Mouse embryo, tissue section, green: GFP, red: Cy3
Objective: Plan APOCHROMAT 40 x/1.3 Oil
N. Büttner, T. Vogel, Centre for Anatomy, University of Göttingen, Germany

ApoTome.2 Imaging System: A Flexible Choice of Components

1 Microscope
- Axio Observer, Axiovert 200 (inverted research microscope)
- Axio Imager.2, Axio Imager.Z1, Axio Imager.D1 (upright research microscope)
- Axio Zoom.V16 (Zoom microscope)
- Simple upgrading of existing systems

2 Objectives
Recommended objective classes with the highest level of image quality:
- C-APOCHROMAT
- Plan-APOCHROMAT
- EC Plan-NEOFLUAR

3 Illumination
- Colibri (LED)
- HXP 120 C (metal halide)
- HBO (mercury vapor lamp)
- XBO (xenon)

4 Cameras
- Recommended cameras with high dynamic range (thick samples: at least 1 : 2000; thin samples at least 1 : 1000; digitalization at least 12 bit)
- AxioCam HRm
- AxioCam MRm
- Alternatively, you can control these cameras: Photometrics CoolSnap HQ, Hamamatsu Orca ER2 (cameras with pixel size providing a sampling rate of < 5. This allows a pixel size of approx. 6.5 µm (Imaging in Neuroscience and Development 2005; Chapter 101; pp. 805–813)

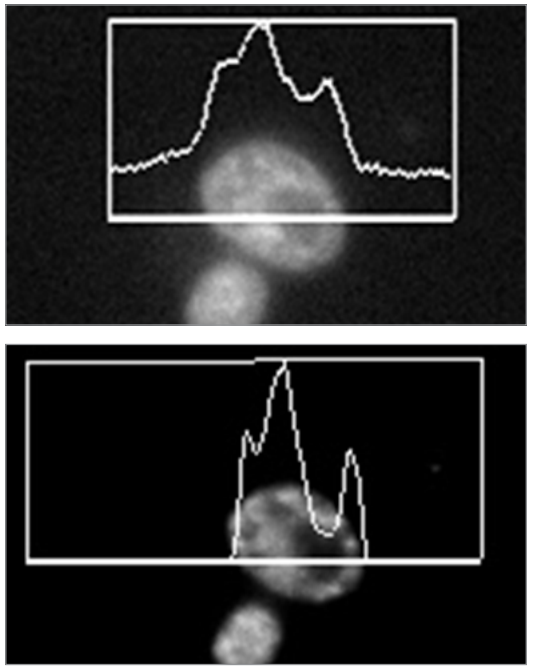
5 Software
Recommended ZEN modules:
- Multi Channel, Z Stack, Time Lapse (imaging)
- Tiles & Positions (imaging with scanning table)
- 3D VisArt (rendering multidimensional image stacks)
- Image analysis modules such as Image Analysis, Colocalization

Expand Your Possibilities

Deconvolution

Improve the image stacks you create with ApoTome.2 even more with deconvolution, using a patented algorithm for structured illumination:

- Acquire image stacks in raw data format – individual images are saved for the different grid positions.
- Switch between conventional fluorescence and optical section after image acqusition.
- Deconvolution processes the raw data with a special algorithm for structured illumination.
- Enjoy improved image quality, contrast, axial and lateral resolution.
- The efficient suppression of any existing noise improves recognition of the object structures.



Example image of yeast cells: (above) optical section, (below) result of deconvolution.

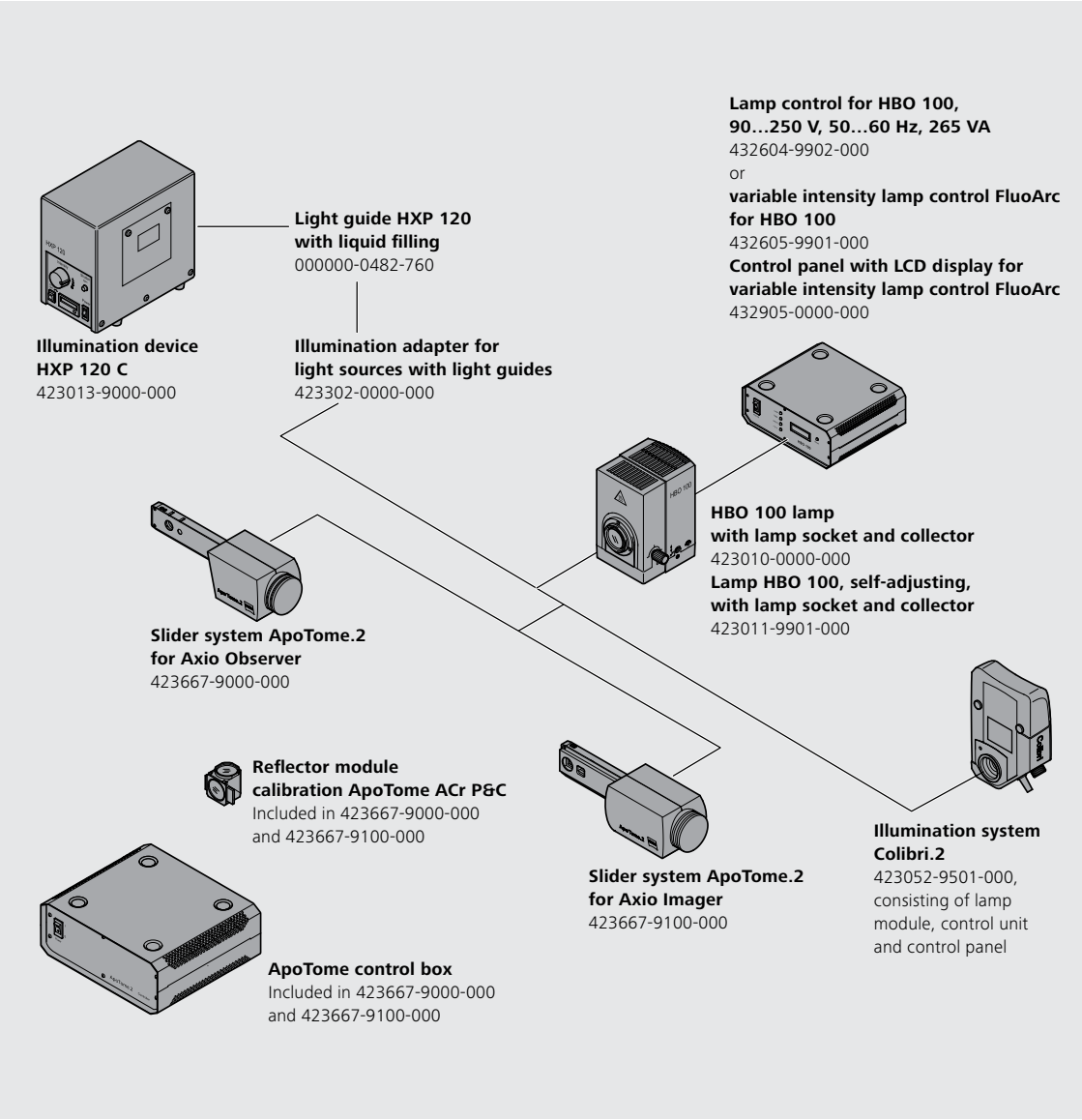
Literature:

L. H. SCHAEFER, D. SCHUSTER & J. SCHAFFER, "Structured illumination microscopy: Artefact analysis and reduction utilizing a parameter optimization approach", Journal of Microscopy, Vol. 216, Pt 2 November 2004, pp. 165–174.

ApoTome.2: System Overview

ApoTome.2 Is Compatible with These Stands from Carl Zeiss:

- Axioplan 2 imaging
  (serial numbers: from 35 11 000001;
  from 35 10 000001; from 35 02 000001)
- Axio Imager.D1 and
  Axio Imager.Z1, Axio Imager.A2
- Axio Imager.M2
- Axio Imager.D2 and Axio Imager.Z2
- Axiovert 200M, Axio Observer.A1
- Axio Observer.D1 and Axio Observer.Z1
- Axio Zoom.V16



Technical Specifications

Grid Table: ApoTome.2 generates optical sections of a defined thickness (in Rayleigh units, RU and microns, µm) depending on wavelength, microscope and objective used.

Data for the use of upright microscopes, e.g. Axio Imager

Objectives for Axio Imager	V	NA	Immersion	Grid/Section thickness @490nm [RU/µm]			DAPI with FS34	DAPI with FS49
				High grid	Medium grid	Low grid		
EC Plan-NEOFLUAR	10 x	0.3	Air	2.9/31.9	1.7/18.2	0.9/9.9	Yes	Yes
EC Plan-NEOFLUAR	20 x	0.5	Air	2.4/9.2	1.4/5.3	0.7/2.9	Yes	Yes
EC Plan-NEOFLUAR	40 x	0.75	Air	1.6/2.8	0.9/1.6	0.5/0.9	Yes	Yes
EC Plan-NEOFLUAR	40 x	1.3	Oil	2.5/2.2	1.4/1.2	0.8/0.7	Yes	Yes
EC Plan-NEOFLUAR	63 x	0.95	Air	1.0/1.1	0.6/0.7	0.4/0.4	Yes	No
EC Plan-NEOFLUAR	63 x	1.25	Oil	1.6/1.5	0.9/0.9	0.5/0.5	Yes	Yes
EC Plan-NEOFLUAR	100 x	1.3	Oil	1.0/0.9	0.6/0.5	0.4/0.3	Yes	Yes
LCI Plan-NEOFLUAR	25 x	0.8	Oil, water or glycerin	2.9/6.6	1.7/3.7	0.9/2.0	Yes	Yes
LCI Plan-NEOFLUAR	63 x	1.3	Water or glycerin	1.5/1.3	0.9/0.7	0.5/0.4	Yes	Yes
Plan-APOCHROMAT	10 x	0.45	Air	4.2/20.4	2.4/11.5	1.3/6.2	Yes	Yes
Plan-APOCHROMAT	20 x	0.8	Air	3.2/4.9	1.8/2.8	1.0/1.5	Yes	Yes
Plan-APOCHROMAT	40 x	0.95	Air	1.6/1.7	0.9/1.0	0.5/0.5	Yes	Yes
Plan-APOCHROMAT	40 x	1.3	Oil	2.5/2.2	1.4/1.2	0.8/0.7	Yes	Yes
Plan-APOCHROMAT	40 x	1.4	Oil	2.4/1.8	1.4/1.0	0.7/0.6	Yes	Yes
Plan-APOCHROMAT	63 x	1.4	Oil	1.6/1.2	0.9/0.7	0.5/0.4	Yes	Yes
Plan-APOCHROMAT	100 x	1.4	Oil	1.0/0.8	0.6/0.5	0.4/0.3	Yes	Yes
LD LCI Plan-APOCHROMAT	25 x	0.8	Oil, water or glycerin	2.9/6.6	1.7/3.7	0.9/2.0	Yes	Yes
C-APOCHROMAT	10 x	0.45	Water	4.2/20.4	2.4/11.5	1.3/6.2	Yes	Yes
C-APOCHROMAT	40 x	1.2	Water	2.2/2.0	1.2/1.1	0.7/0.6	Yes	Yes
C-APOCHROMAT	63 x	1.2	Water	1.4/1.3	0.8/0.7	0.5/0.4	Yes	Yes
LD C-APOCHROMAT	40 x	1.1	Water	2.2/2.3	1.2/1.3	0.7/0.7	Yes	Yes
Plan-APOCHROMAT	63 x	1.46	Oil	1.5/1.0	0.9/0.6	0.5/0.3	Yes	Yes
Plan-FLUAR	100 x	1.45	Oil	1.0/0.7	0.6/0.4	0.3/0.2	No	No
Plan-APOCHROMAT	100 x	1.46	Oil	1.0/0.7	0.6/0.4	0.3/0.2	Yes	No

Technical Specifications

Data for the use of inverted microscopes, e.g. Axio Observer

Objectives for Axio Imager	V	NA	Immersion	Grid/Section thickness @490nm [RU/µm]			DAPI with FS34	DAPI with FS49
				High grid	Medium grid	Low grid		
EC Plan-NEOFLUAR	10 x	0.3	Air	2.9/31.5	1.7/18.5	0.9/9.8	Yes	Yes
EC Plan-NEOFLUAR	20 x	0.5	Air	2.3/9.0	1.4/5.4	0.7/2.9	Yes	Yes
EC Plan-NEOFLUAR	40 x	0.75	Air	1.6/2.7	0.9/1.6	0.5/0.9	Yes	No
EC Plan-NEOFLUAR	40 x	1.3	Oil	2.4/2.1	1.4/1.3	0.8/0.7	Yes	Yes
EC Plan-NEOFLUAR	63 x	0.95	Air	1.0/1.1	0.6/0.7	0.4/0.4	Yes	Yes
EC Plan-NEOFLUAR	63 x	1.25	Oil	1.6/1.5	0.9/0.9	0.5/0.5	Yes	No
EC Plan-NEOFLUAR	100 x	1.3	Oil	1.0/0.9	0.6/0.6	0.4/0.3	Yes	No
LCI Plan-NEOFLUAR	25 x	0.8	Oil, water or glycerin	2.9/6.5	1.7/3.8	0.9/2.0	Yes	Yes
LCI Plan-NEOFLUAR	63 x	1.3	Water or glycerin	1.5/1.3	0.9/0.8	0.5/0.4	No	No
Plan-APOCHROMAT	10 x	0.45	Air	4.2/20.2	2.4/11.7	1.3/6.1	Yes	Yes
Plan-APOCHROMAT	20 x	0.8	Air	3.1/4.8	1.8/2.8	1.0/1.5	Yes	Yes
Plan-APOCHROMAT	40 x	0.95	Air	1.6/1.7	0.9/1.0	0.5/0.5	Yes	Yes
Plan-APOCHROMAT	40 x	1.3	Oil	2.4/2.2	1.4/1.3	0.8/0.7	Yes	Yes
Plan-APOCHROMAT	40 x	1.4	Oil	2.4/1.8	1.4/1.1	0.7/0.6	Yes	Yes
Plan-APOCHROMAT	63 x	1.4	Oil	1.5/1.2	0.9/0.7	0.5/0.4	Yes	Yes
Plan-APOCHROMAT	100 x	1.4	Oil	1.0/0.8	0.6/0.5	0.4/0.3	Yes	No
LD LCI Plan-APOCHROMAT	25 x	0.8	Oil, water or glycerin	2.9/6.5	1.7/3.8	0.9/2.0	Yes	Yes
C-APOCHROMAT	10 x	0.45	Water	4.2/20.2	2.4/11.7	1.3/6.1	Yes	Yes
C-APOCHROMAT	40 x	1.2	Water	2.1/1.9	1.3/1.1	0.7/0.6	Yes	Yes
C-APOCHROMAT	63 x	1.2	Water	1.4/1.3	0.8/0.7	0.5/0.4	Yes	Yes
LD C-APOCHROMAT	40 x	1.1	Water	2.1/2.3	1.3/1.4	0.7/0.7	Yes	Yes
Plan-APOCHROMAT	63 x	1.46	Oil	1.5/1.0	0.9/0.6	0.5/0.3	Yes	Yes
Plan-FLUAR	100 x	1.45	Oil	1.0/0.7	0.6/0.4	0.3/0.2	No	No
Plan-APOCHROMAT	100 x	1.46	Oil	1.0/0.7	0.6/0.4	0.3/0.2	Yes	No

Technical Specifications

Dimensions	(Width x Depth x Height)
ApoTome.2 slider for Axio Imager	Approx. 278 mm x 90 mm x 76 mm
ApoTome.2 slider for Axio Observer/Axiovert 200	Approx. 295 mm x 90 mm x 78 mm
Control box ApoTome.2	Approx. 255 mm x 220 mm x 96 mm

Operating data	
Protection class, protection type	I, IP 20
Electrical safety	According to DIN EN 61010-1 (IEC 61010-1) taking account of CSA and UL regulations
Overvoltage category	II
Interference suppression	In accordance with EN 55011 class B
Interference resistance	In accordance with DIN EN 61326-1
Supply voltage	100 to 240 V ±10%. No Adjustment of the supply voltage is required
Supply frequency	50 to 60 Hz
Power consumption ApoTome.2	Max. 50 VA

Fuses in accordance with IEC 127	
Control box ApoTome.2	2 A delayed-action/H/250 V, 5 x 20 mm

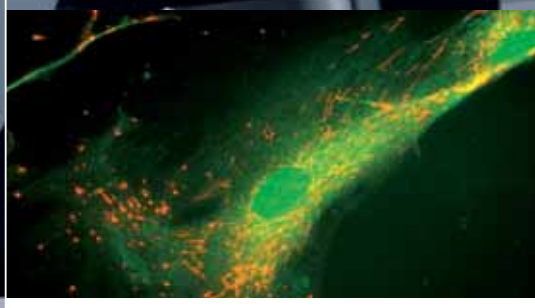
Grid frequencies	
Axio Imager slider (transmission grid high/medium/low)	5/9/17,5 lp/mm
Axio Observer/Axiovert 200 slider (transmission grid high/medium/low)	10/17.5/35 lp/mm

Installation Conditions

The grid projection method used for the ApoTome.2 is sensitive to vibration, which can have various causes (including strong draughts). Vibrations are visible as streak artefacts in the resulting image. The microscope must therefore be set up so that it is exposed to as little vibration as possible on a vibration-damped table or on a suitable microscope base.

Axio Observer

What Would You Like to Know About Life Today?



Observing. Manipulating. Analyzing.
The Inverse Research Platform for Live Cell Imaging.

ZEISS

We make it visible.

How Do You Increase Access to the Most Demanding Life Science Applications?

The human genome was decoded in 2001, which was a scientific revolution. This prompted a flurry of questions in the scientific community. Since that time, international research teams looking into processes inside and between living cells have been concerned less with the "What" and more with the "How". How do molecules or proteins, lipids, enzymes, DNA and RNA function? How do they interact? And why?

In their search for answers to these questions, researchers focus their efforts on the most sophisticated microscopic techniques for observation, manipulation and analysis. None more so than those involving fluorescence. The development of such techniques has become a mission for Carl Zeiss, and one that the company has assigned a name: FluoresScience. For many years, this initiative has been providing the leading microscope systems for applied and basic research, and helping researchers to open new pathways of discovery in science.

Now a technical innovation is moving science a step further: Axio Observer, the inverted research microscope from Carl Zeiss. It has been developed for maximum flexibility in the Live Cell techniques of today and tomorrow and realized as a fully integrated research platform for cell observation, cell manipulation and cell analysis. It can be expanded cost-effectively from a basic stand for tissue culture and fluorescence, to one for high speed, laser scanning microscopy or microdissection. Axio Observer: what better way is there to meet the high demands of Life Science projects today?

Axio Observer

The ApoTome and PlasDIC were awarded the R&D 100 Award.

Have Optics Reached Their Limits With Living Cells?

Carl Zeiss has been continuously stretching the possibilities of its research optics to their very limits. With Axio Observer we are further strengthening our technological leadership position – with new developments in contrasting methods, objectives and numerous innovative details. At the limits of visibility, these developments provide greater information content, better adjustment to versatile Live Cell applications, and even more convenient processes.

Each series in a class of its own: the objectives

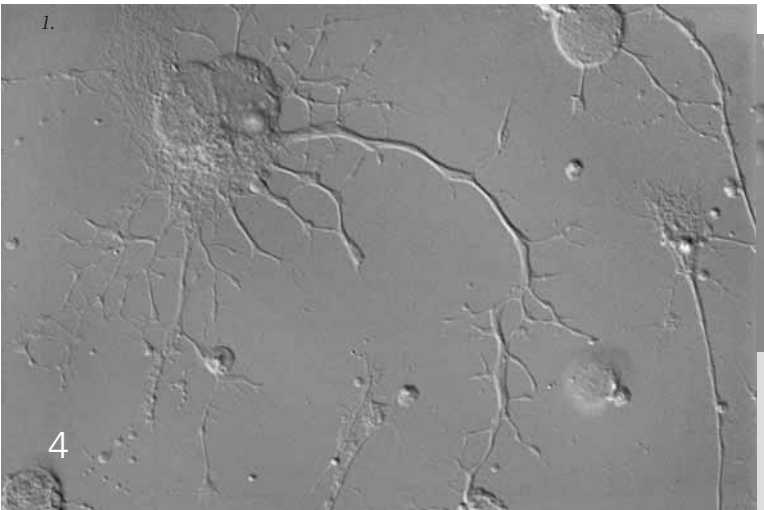
The "eyes" of the inverted Axio Observer research platform – developed to perform the different tasks in Live Cell Imaging brilliantly. Each objective series is in a class of its own:

- **LCI Objectives** LCI Plan-Neofluar 25x, 63x and LD LCI Plan-Apochromat 25x. Superb multi-immersion objectives with optimal correction options for spherical aberration, tailored to the special temperature spectrum in Life Science experiments. The LD variant makes it possible to focus even more deeply into the sample.
- **Insulated objectives** i LCI Plan-Neofluar 25x and 63x and i Plan-Apochromat 63x. Thermal insulation is the only way to ensure the perfect temperature at the specimen.
- **LD Plan-Neofluar Ph1 Ph2-Korr,** the innovation: positive and negative phase contrast combined in one objective.
- **C-Apochromat und LD C-Apochromat,** perfect for uncompromising high resolution. Ideal for LSM, ApoTome and Deconvolution.
- **Plan-Apochromat** for extremely high demands on image leveling and color correction.
- **LD Plan-Neofluar,** sophistication and versatility, useable for all cover glass specimens (0.17 mm) and plastic culture plates with a bottom thickness of up to 2 mm.
- **EC Plan-Neofluar** Neofluar for outstanding contrast and multiple image techniques.
- **LD A-Plan,** the favorable, flexible standard objectives from Carl Zeiss for inverted microscopy.

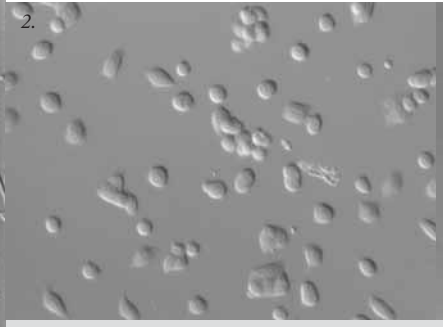
Optimal for the entire field of view: the new DIC

The new generation of **D**ifferential **I**nterference **C**ontrast provides brilliance and homogeneous illumination across the entire field of view. Image details are resolved well with highest resolution and

DIC



DIC



PlasDIC

1. Forebrain neurons (rat) cultured on poly-D-lysine/laminin coated glass coverslips. J. Perron, Columbia University, Columbia, USA
2. MDCK cells (dog) after short incubation period. R. Nitschke, Life Imaging Center, University of Freiburg, Germany

outstanding contrast across a 25 mm field of view. A further innovation is the combination of polarizer and Nomarski prism in a sandwich design. The advantage to you: there is no need to engage the polarizer manually.

Practical, economic, impressive: PlasDIC

Glass or plastic? The economic relief contrast from Carl Zeiss is insensitive to birefringent materials and is therefore just as suitable for plastic dishes as it is for glass bottom vessels. In terms of application, PlasDIC is recommended for use with thicker adherent cells or oocytes and is ideally suited to Intracytoplasmic Sperm Injection (ICSI) due to the excellent relief display. PlasDIC is easy to operate and already functions with the cost-effective LD A-Plan objectives. If your requirements grow, we recommend the LD Plan-Neofluar objectives.

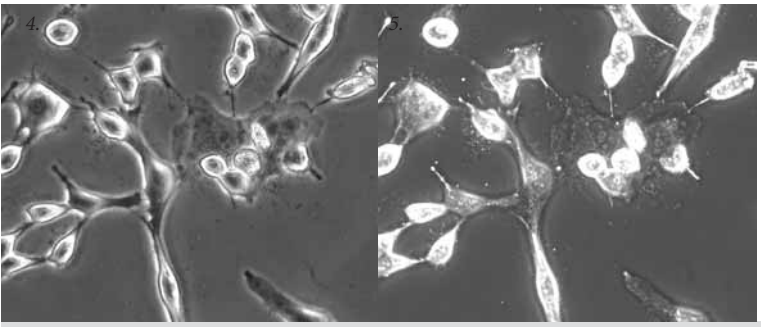
Innovation in plus and minus: the phase contrast

Familiar, yet surprisingly different: the new phase contrast in an economic 2-in-1 solution and a new area of application. The negative phase contrast works well with thick cell areas or stages of division. The combination of positive and negative phase contrast now makes it possible to contrast all the structures of your object perfectly using one objective. Switching is easy, involving a simple diaphragm change. You will appreciate the new phase contrast for normal monitoring, as well as for special morphological problems.

Automatically quicker: the new transmitted-light shutter

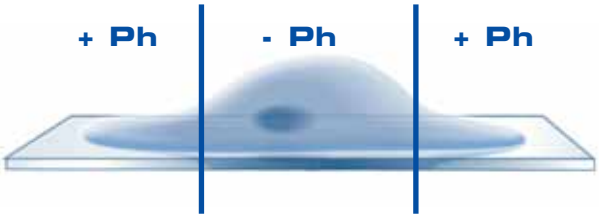
A new standard since the introduction of Axio Observer: faster switching, silent operation and low vibration. Time is saved and operation made easier thanks to a new integrated shutter concept. Automated in transmitted-light for the first time, with a short switching time making it perfect for the configuration of time lapse experiments, e.g. for the rapid switch between transmitted-light and fluorescence.

Phase + **Phase -**



4.

5.



3. Human embryos (four-cell stage).
S. Mittmann, IVF-Laboratory, Göttingen, Germany

4. and 5.: MDCK cells (dog) – thick cell areas are displayed better using negative phase contrast.
R. Nitschke, Life Imaging Center, University of Freiburg, Germany

Why Does Everything Revolve Around Optimum Fluorescence?

Highly differentiated fluorescence techniques – in research on living cells these are becoming the standard. Carl Zeiss is focusing its knowledge and innovation on further developing these techniques. So that they may be made accessable to new applications all the time. At the forefront of the development of inverted microscopes stands is the Axio Observer – with the most efficient, flexible and gentlest fluorescence, protecting your cells and leading to brilliant results.

Perfected for all wavelengths: the new fluorescence beam path

Axio Observer represents a new level of quality in fluorescence. Corrected apochromatically, it offers consistently good contrasting and homogeneous illumination right into the periphery at almost any excitation wavelength. The advantage to you: From center to edge, in Multichannel Fluorescence all wavelengths are equally balanced in intensity and signal to noise. There is also the alternative option of the beam path with an extended transmission spectrum optimized for 340 nm transmission.

Faster and more flexible: the reflector turret

Adjustment of the reflector modules to the experiment in question is quicker, saving time, which is an important consideration with the growing diversity of fluorescent proteins. The Axio Observer reflector turret has been optimized in triplicate for this purpose: six filter positions offer more flexibility. Exchanging filter sets without removing the turret bypasses an entire work step. And finally, the Axio Observer turret with position change in under 200 ms is simply faster. With ACR* the filter modules are read and identified automatically by the system – completely dispensing with the need for configuration on the microscope or in the software. Advantages: faster process and reliable documentation. A perfect solution for the multiuser environment.

* Automatic Component Recognition. Available for Axio Observer.Z1

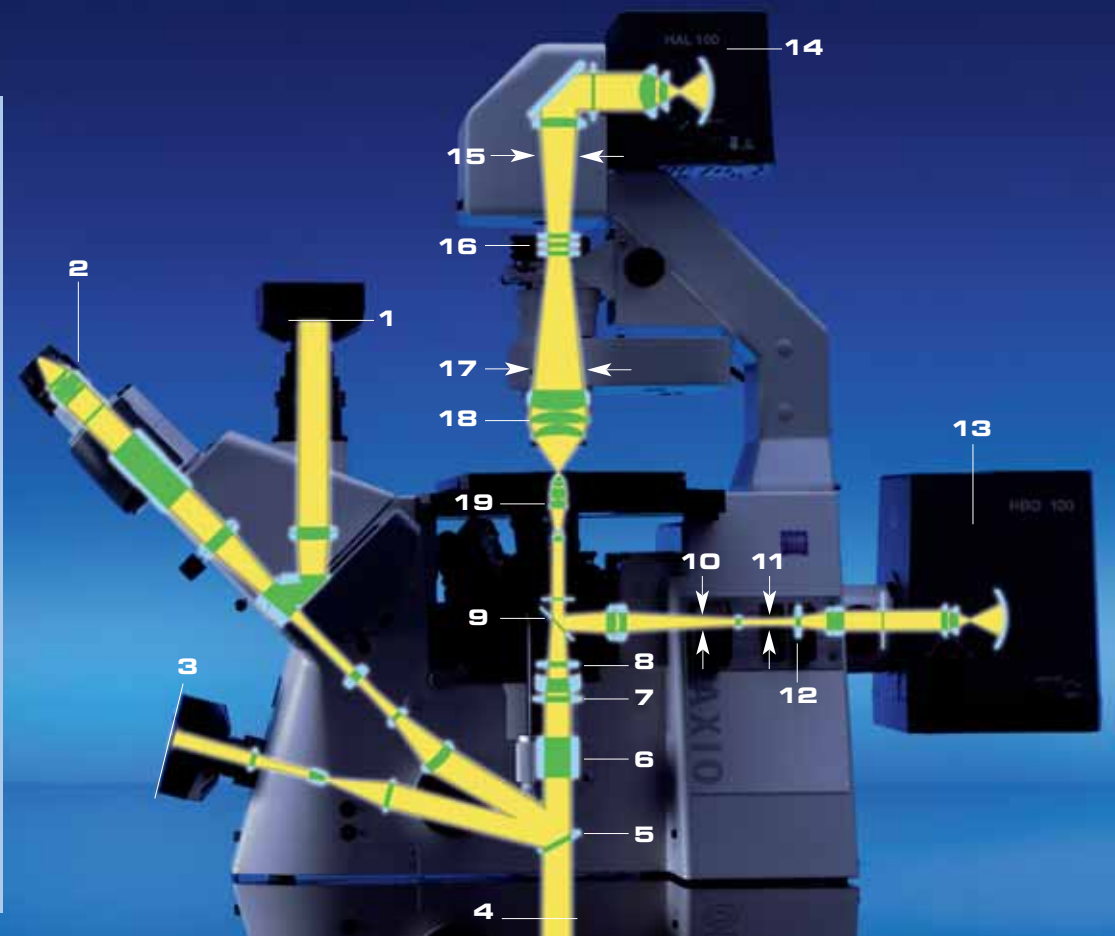
Fluorescence – the operation

Reflector turret: in a matter of seconds, filter sets are now replaced without removing the reflector turret.

Easy to access and to operate: the diaphragm slider for Axio Observer.

Beam path

1 Intermediate image plane/phototube
2 Eyepiece
3 Intermediate image plane/front port
4 Intermediate image plane/base port
5 Switching beam path between base port/front port/vis. observation
6 Side port prisms
7 Tube lens
8 Analyzer
9 Reflector cube
10 Field diaphragm
11 Aperture stop
12 Filter slider
13 HBO lamp
14 HAL lamp
15 Field diaphragm
16 Polarizer
17 Aperture stop
18 Condenser
19 Objective

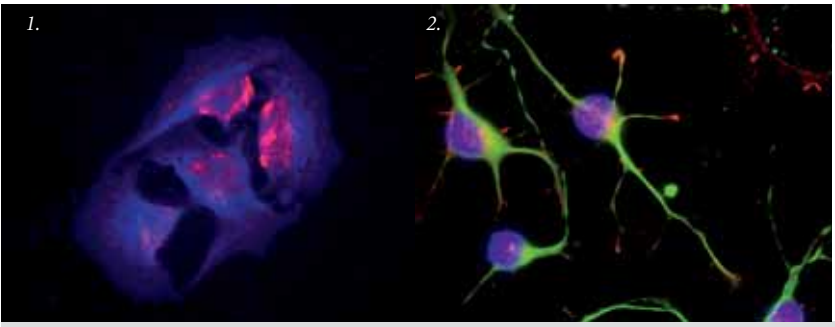


Variety for cell observation: the light sources

A whole range of powerful light sources are now available for use with Axio Observer. The self-adjusting HBO lamp, as well as various long-life metal halide lamps, are well-suited to all standard applications. For rapid excitation changes in high speed imaging, it is possible to connect the Sutter Lambda DG-4 light source based on xenon lamps. The innovative Colibri light source based on high-performance LEDs is also recommended for applications where rapid excitation changes are required. The advantage for you is that the narrow bandwidth of the Colibri LEDs delivers extremely high-contrast images while protecting your cells.

Standard or high speed: the fluorescence shutters

Two shutters are available for your fluorescence experiments. Besides the standard shutter, Axio Observer also offers an external and highly durable high-speed option rated for 5 million switching cycles. Controlled by the camera using trigger pulses, this shutter is only opened for image acquisition itself. This means that the time that the cells are exposed to light is reduced to an absolute minimum, making this shutter a key component especially for live cell experiments.



1. Cytoskeleton and nucleus labelled with quantum dots, HeLa cells.
2. Forebrain neurons (rat) cultured on poly-D-lysine/laminin coated glass coverslips. Labelled with DAPI (blue), TUJ1 anti-beta-tubulin (green) and anti-ActRII (H65) (red). J. Perron, Columbia University, Columbia, USA

With Colibri, each LED delivers a defined, narrow range of the spectrum. No unwanted light is generated, so there is no need for it to be suppressed.

Variability and reproducibility: the diaphragm sliders

Rectangular diaphragm, FL attenuator* and iris diaphragm*: the three diaphragm sliders demonstrate the versatility of Axio Observer in Live Cell Imaging. When used in combination with a motorized iris diaphragm and FL attenuator, Axio Observer reaches a high degree of motorization in the fluorescence beam path. The motorized FL attenuator automatically sets the desired fluorescence intensity, depending on the filter set and objective.

Brilliant development: the high efficiency filter sets

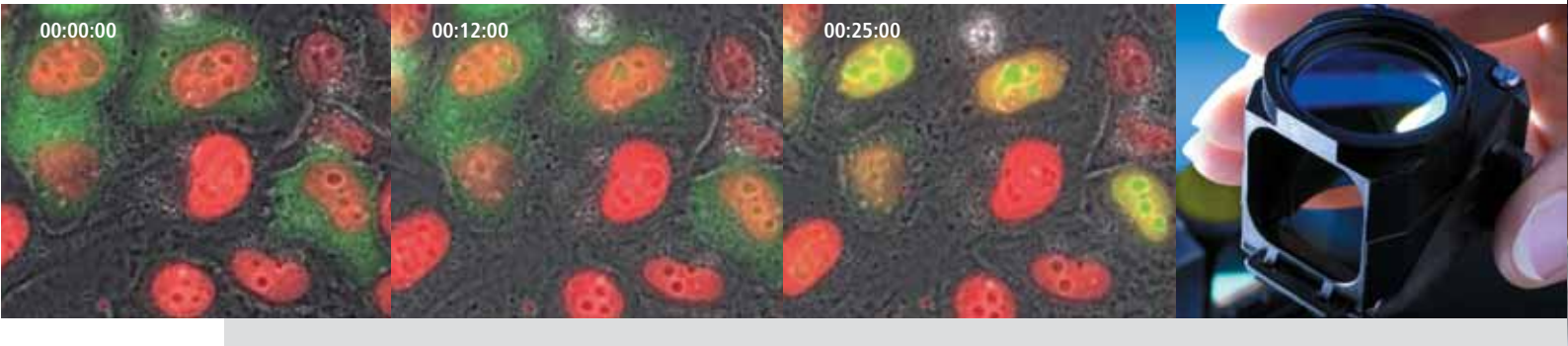
Up to 50% shorter exposure times – the high efficiency (HE) fluorescence filters offer a significantly improved signal to noise ratio and provide gentler Fluorescence Imaging of living cells. The increased transmission during excitation and emission, together with extremely steep edges, leads to a clear signal separation and optimum yield.

* Available as a mechanical or motorized option

Diaphragm sliders

Numerous options for your individual workstation: the manual or motorized diaphragm sliders.

Push&Click



HeLa cells expressing Histone-2B-DsRed (red), transfected with HIV-1-REV-YEP (green). Background: phase contrast. After treatment with Leptomycine B the Rev-protein accumulates in the nucleus. H. Wolff, GSF Institute for Molecular Virology, Neuherberg, Germany

Who Re-thinks the Workflow When Applications are Becoming Increasingly Complex?

The days when microscopes only differed in terms of optical performance are long gone. The complexity of current applications in all areas of Life Sciences makes ease of use a factor for the success of research work. The challenge for Carl Zeiss is to revise the workflow from planning to monitoring and analysis and to combine it with an intelligent operating concept. Axio Observer now defines the benchmark for ease of operation and efficiency. A must if the immense performance potential of this high-end platform is to be exploited quickly and economically.

Recognizable increase in convenience: TFT and LCD

Input and monitoring station at the same time – the touch screen TFT display for the motorized Axio Observer.Z1 stand is opening up a new dimension in automated operation. Control and monitoring have been merged radically. The result is unique: the entire microscope can be operated using an extremely short and clear menu guide, which is also valid for the incubation components that control the cultivation conditions. You are sure to be impressed by the ability to trigger activation of the contrast manager or of the full range of personal user settings on the PC with the tip of your finger. For the D1 stand, a new LCD display has been developed with comprehensive status presentation. Chosen objective, shutter position, etc.: all the settings can be viewed with one quick upward glance. The LCD is also a considerable help with system configuration.

Freedom to operate: the docking station

A space-saving and immensely practical solution if you operate the system directly from the PC. The Axio Observer docking station gives you access to the complete menu guide of the TFT as well as all the control elements for sample positioning*. The control elements are identical to the elements located on the stand – no need to switch to different types of buttons. The merging of all the control elements into one compact unit represents a significant advantage, particularly with complex system accessories.

* In conjunction with the CAN scanning stage

TFT display

Docking station

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

Zooplankton (Brachionus plicatilis) feed on phytoplankton (Heterocapsa triquetra).
A. Hagiwara, T. Oda, Faculty of Fisheries, Nagasaki University, Nagasaki, Japan

Small details with a big impact: the manual control elements

You notice the difference as soon as you touch them: the control elements of Axio Observer are well thought-out, more intelligent and simpler than anything you have ever known. The buttons in the "keyring" can be reached without taking your hand off the z-drive. They can also be freely configured* and operated without looking. You can control the entire microscope with ease – without taking your eyes off the eyepiece. The wheels for controlling the intensity of the illumination and opening the field diaphragm in transmitted-light enable very sensitive operation and therefore perfect adjustment to the specimen in question. Graphics on the stand and in the TFT display help you to reach your goal more easily and with greater speed.

* For D1 with PC only

You make the change, who configures it? ACR

Automatic **C**omponent **R**ecognition ACR stands for the innovative concept of automatic recognition of objectives and reflector modules from Carl Zeiss. This optional additional component for Axio Observer.Z1 monitors newly inserted filter sets and objectives and adopts them into the system configuration automatically. This saves you time, reduces the risk of error and provides greater convenience – both in everyday microscopy when changing filter sets and during the joint use of filter sets on several stands. A perfect solution for the multiuser environment.

Simply more efficient: the contrast combinations in transmitted-light

One objective, three techniques, more information in less time: the contrast combinations in transmitted-light have been expanded further for Axio Observer. PlasDIC & Phase & DIC or negative Phase & positive Phase & DIC with one objective are examples of how you can obtain more information and varied information about your sample, or simply gain flexibility for different applications with great efficiency.

A chip makes the crucial difference. All the filter sets and objectives are available in a version for Automatic Component Recognition ACR.

Automatic Component Recognition ACR

Automatic in the chosen contrast: the contrast manager

A perceptible plus in your workflow. You choose the contrast or contrast combination, and the stand ensures the correct setting for the necessary components, even if you change the magnification. This proves to be a pleasant and extremely time-saving feature, particularly for direct observation, since it eliminates several previously required adjustment steps.

Transmitted- and reflected-light regulated well: the light manager

The Axio Observer generation of light manager offers more than just effective protection against excessively high light intensities in transmitted-light. It correctly adjusts the light intensity during a change in magnification both in transmitted-light and in reflected-light. The fluorescence channels are also taken into account, and the intensity is adjusted accordingly. For cells, this means additional protection against high excitation intensity. This also makes direct observation more pleasant and less tiring for your eyes.

Staying relaxed for longer: the ergotube

The solution for long hours using the microscope. With 50 mm height adjustment and a fixed viewing angle of 25° (which is ergonomically ideal), the ergotube for Axio Observer satisfies the highest standards in terms of comfort; allowing you to adopt a relaxed posture, even during direct observation for several hours.

With the docking station, the familiar control elements for controlling the microscope are located right next to your PC.

LCD

Ergotube

z-drive with keyring

LCD display, ergotube or keyring: the entire Axio Observer operating concept has been designed for quick and convenient workflow.

What Benefits Come With the Quantum Leap in Cell Incubation?

Axio Observer signals the dawn of a new age in cell incubation. Allowing you precise control of factors such as temperature, CO2 and humidity, it represents a considerable leap forward in performance and features a number of pioneering innovations – not least, freely programmable temperature changes together with a wide temperature range.

Optimized incubators and flexible temperatures

Incubation for every requirement – from the stage incubator PM S1 to XL incubators with variants for TIRF and LSM or micromanipulation in a CO_2 atmosphere, a whole host of options are available to you. Compact and convenient: be-sides electric heating, stage incubation also allows you to control the temperature on the basis of a cooling/ heating liquid for maximum freedom in the management of your experiments, rapid temperature changes and an extremely wide temperature range from 4 to 45°C.

New stacking concept for control modules

Maximum efficiency in the setting of environmental parameters, genuinely space-saving and economical – you can upgrade your system with the control modules in line with your requirements, ensuring that you have a system that meets your needs at all times.

Uncompromising operation

With Axio Observer, the entire incubation process can be controlled via the TFT display or via AxioVision. This software introduces a revolutionary operating concept, where dynamic experiments are easily created and modified. It allows you to easily study temperature-sensitive processes or conduct heat shock experiments. Relevant incubation parameters are saved in AxioVision.

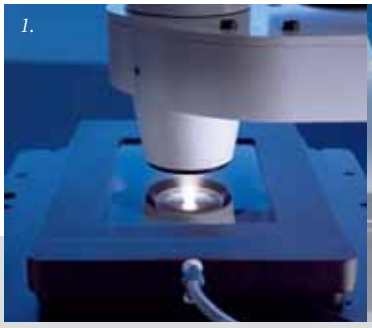
Thermally insulated objectives and control sensor T S1

Thermally insulated objectives ensure an optimal temperature at the location of the sample and are ideal for dynamic temperature experiments because they stop the temperature flow to the rear of the objective. As a result, the desired temperature is reached more quickly and with even greater precision. Another important option is the control sensor T S1. This now allows you to measure the temperature precisely at the observation location thus validating your experiment.

Everything stays dry: Aqua Stop II

Effective microscope protection with complete operating freedom: Aqua Stop II for Axio Observer is now even more reliable thanks to the total protection it offers. This makes it indispensable if you need to change Petri dishes on a frequent basis, but also for perfusion experiments in particular. Sensitive microscope components are well protected.

Incubator PM S1 **Aqua Stop II**



1. *Optimal incubation conditions, more freedom: the incubator PM S1 for Petri dishes and multiwell plates.*
2. *The Aqua Stop II – the optimized safety concept for Axio Observer.*

What Offers You More Reliability Than Definite Focus?

Developed to ensure freedom from z-drift increasing the reliability in Live Cell Imaging: Definite Focus from Carl Zeiss. Once the sample plane has been defined, it is maintained. Definite Focus is able to maintain the focus position even of samples with weak signal, as compared to software-based approaches.

The beam combiner module for Definite Focus sits in the nosepiece and, if necessary, can be quickly removed or exchanged for specific applications.

Always in focus

The infrared light of an LED probes the distance between the objective and the base of the cultivation vessel. Any change in that distance, e.g. from a change in room temperature, is corrected by Definite Focus.

Versatile to use and ready for immediate imaging

Fluorescence applications work well with Definite Focus, as the wavelength for the LED is significantly outside the range of excitation and emission spectra of common chromophores. With Definite Focus, time lapse experiments can be started immediately, without waiting for the microscopes thermal stabilization. Even dynamic experiments, where temperature changes are initiated are conducted quickly and conveniently using Definite Focus.

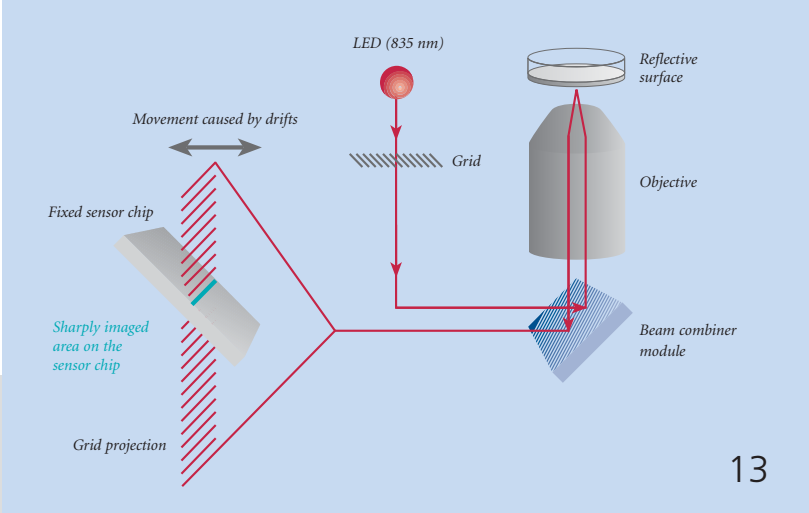
Flexible and economical

Definite Focus works with most objectives and all contrasting methods. Definite Focus works well with glass or plastic dishes, and standard filter sets for fluorescence applications. Any Axio Observer.Z1 can be upgraded to include Definite Focus.

Central and easy to operate

Definite Focus has been fully integrated into the operation of the Axio Observer. The status and monitoring is available on the TFT, AxioVision, or LSM software.

Definite Focus projects a grid onto the base of the vessel, which reflects the grid onto a sensor chip. Due to the angled position of the sensor chip, only a narrow area of the grid is imaged sharply. Drifts are balanced out by keeping this narrow area sharp using Axio Observer´s z-drive.



How Does a Cell Research Station Grow With Your Requirements?

Never before has the integration of microscope, software and external components reached such a high level of performance. And never before have systems for observing, manipulating and analyzing been so flexible. The advanced architecture of Axio Observer opens the system up to the unlimited integration of external components, turning the innovative cell research stations from Carl Zeiss into solutions that you can also use to realize any demanding applications that lie just around the corner.

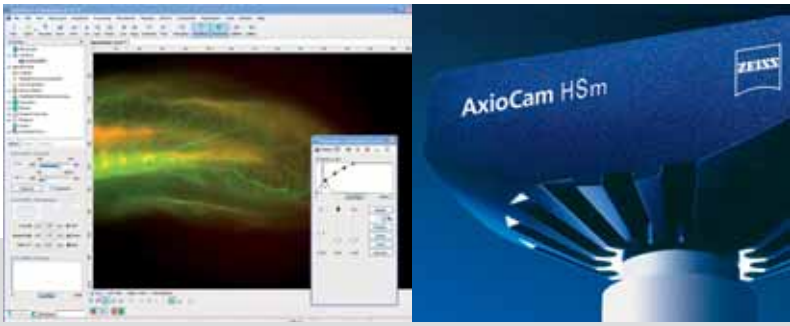
Modular intelligence: documentation with AxioVision

Developed in order to make even complex applications with living cells economical, the microscope software from Carl Zeiss is setting the standards in user guidance, individualization and range of performance. From the basic to the most sophisticated package, AxioVision literally grows as your tasks dictate. Module by module. For multidimensional image acquisition, e.g. with Multichannel, Time Lapse, Z-stack or Mark&Find. Even the basic package can handle dynamic temperature experiments.

Targeting the result more purposefully: analysis with AxioVision

The most demanding tasks simplified intelligently – the analysis modules of AxioVision offer the most technically advanced solution for almost any application. They can also be used in ongoing experiments. For example, the Physiology module undertakes the intensity comparison within the channels in defined regions (ROI) including the graphical representation. There are also numerous other modules available to you with AxioVision – for instance, standard intensity measurements or position analysis of different fluorophores (Colocalization). Even if the aim is to allocate emissions to fluorophores (Widefield Multichannel Unmixing), or for intelligent time lapse processing, including the display of moving object regions with details of speed and acceleration.

AxioCam



Integrated System

Seeing and documenting: the Carl Zeiss blues

Carl Zeiss cameras are recommended in all performance classes – particularly in monochrome for Fluorescence Imaging. There is AxioCam HRm with its extremely high-resolution, 14 bit dynamics, and optional microscanning, AxioCam MRm with its high sensitivity and diverse range of uses, and AxioCam HSm, which transfers moving images to the hard drive in real time with up to 360 images per second*. One thing that all models have in common is providing you with perfectly integrated camera technology that optimally supports your systems performance.

Everything you want for Live Cell Imaging, right through to high speed: Cell Observer®

Cell Observer® has long been the established complete solution in Live Cell Imaging. The new Cell Observer® HS (High Speed) option has been perfected for the documentation of quick processes and long-period observation in Live Cell Imaging. It is particularly useful for calcium studies, cilia movements, vesicle transport and the emergence of microtubuli – i.e. highly dynamic processes that place extreme demands on the entire system. All the elements of Cell Observer® HS are controlled directly using hardware triggers, so there is no delay. With perfect coordination, every single component – microscope, camera, light source, shutter and focusing system – is optimized for maximum speed. Often a logical addition to the high-speed system is the AxioVision Physiology module for calculating emission intensities (ratio experiments) with Dual Camera option.

Superb optical sections: ApoTome

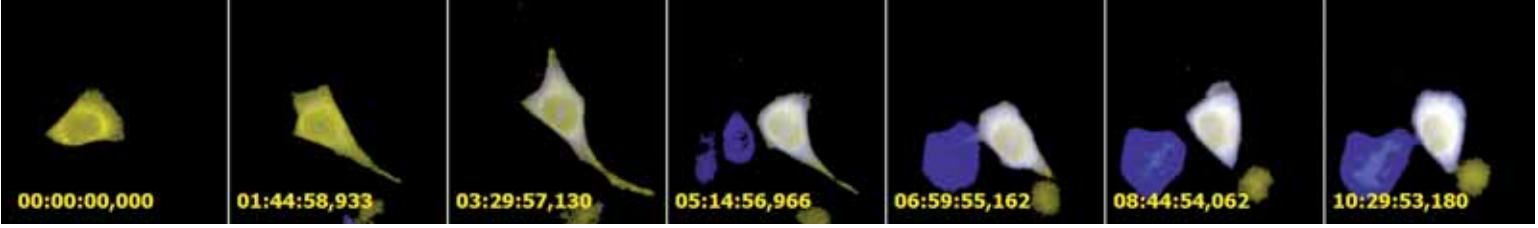
The solution for the glare-free 3D Imaging of thick samples and tissue sections. ApoTome impresses with outstanding image quality and a conceivably simple operating concept. Available to the Axio Observer D1 and Z1 stands, the microscope insert is simply installed in the plane of the field diaphragm of the reflected-light beam path. The principle of grid projection is used to create precise optical sections online, with increased contrast and greatly improved axial resolution.

* With 5x5 binning, full camera field of view

ApoTome

LSM Duo

Satisfying even the highest demands of confocal microscopy: the combination of LSM META and LSM LIVE leaves no wishes unfulfilled.



Hormone-induced gene expression in HeLa cells. The mRFP-marked protein (yellow) is hormonally induced, and in turn induces the expression of the YFP-marked reporter protein (blue).
H. Wolff, GSF Institute of Molecular Virology, Neuherberg, Germany.

At the high-end of 3D: the LSM systems

Unsurpassed in spectral resolution, temporal resolution and sensitivity: the laser scanning systems from Carl Zeiss embody high-end technology enabling you to look into the depth of your cells. LSM 510 META even records the spectral signature of every single pixel – for perfect unmixing. LSM 5 LIVE, with > 100 frames/sec., adds a new dimension to the scan speed – and with even greater sensitivity. Ideal for observing transport processes in cells and organisms, e.g. the movement of blood cells in the vascular system or the change in dendritic spines on neurons. LSM 510 NLO, with its multiphoton excitation, makes it possible to penetrate into the specimen to unprecedented depths – with several 100 µm as an ideal prerequisite.

Highly pure samples for exact results: PALM MicroBeam

Enormously versatile and 100% contact-free for the isolation of extremely small tissue samples, such as chromosomes, organelles, cells or small organisms: PALM MicroBeam is the solution for **L**aser **M**icrodissection and **P**ressure **C**atapulting (LMPC), combining laser microdissection with transport by laser light for the first time ever. This unique, patented technique enables you to cut and remove analysis material without ever touching the sample. Because the technique is contact-free, and therefore also contamination-free, you obtain the purest, clearly defined sample material for all types of downstream processes from genetic analysis to the cultivation of insulated cells. In DNA and RNA appraisal, protein analysis and research with living cells, this system offers science new possibilities and perspectives.

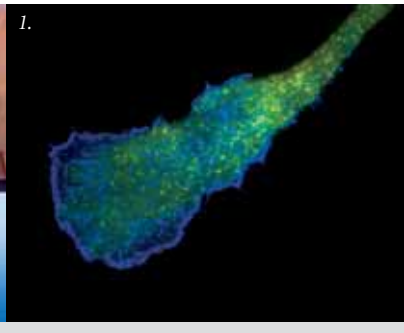
Maximum resolution in the evanescent field: Laser TIRF

Laser TIRF from Carl Zeiss represents new findings relating to transport processes near the membrane or coupled to the membrane. The focus is also on cell-free systems, for studying protein-protein interactions, for example. This compact complete solution for **T**otal **I**nternal **R**eflection **F**luorescence offers top image quality in all wavelengths – without re-adjustment of the TIRF angle. Space-saving approach: the TIRF slider is simply inserted into the field diaphragm. Perfectly conceived, right down to all typical peripherals like the special TIRF incubators with integrated laser safety.

PALM MicroBeam

Living cell after laser transport pulse

TIRF



1. B16/F1 melanoma cells (mouse) – TIRF illumination. Blue: CFP-actin. Excitation 458 nm, green: DsRed-clathrin Light Chain A. Excitation 514 nm. Alpha Plan-Fluar 100x/1.45 oil.
Oberbanscheidt, van den Boom, Bähler, Institute for General Zoology and Genetics, University of Münster, Germany.

New flexibility in fluorescence applications: the laser port

Designed specifically for demanding laser applications such as FRAP, Uncaging, or for the targeted ablation of cellular structures: the laser port for Axio Observer. A receptacle for your own coupling solution. It enables you to work simultaneously with reflected-light fluorescence, to change to TIRF applications quickly. It provides new flexibility in the application – without the need to extend the infinity beam path, and without compromising optical quality in any way.

Basis for higher success rates: Axio Observer in micromanipulation

Axio Observer is the perfect platform for stem cells or In-vitro-Fertilization (IVF). The extremely high stability and wide-ranging mounting options for manipulators is PlasDIC, the innovative relief contrast ideally designed for the implementation of Intracytoplasmic Sperm Injection (ICSI). With impressive quality and ease of operation, it is already in use in a number of IVF laboratories. If your applications require it, the optimized traditional DIC, with the highest resolution of detail, is ideal for improved success rates, e.g. in sperm assessment and embryo viability. A further important detail is the Thermo Plate glass mounting frame, which ensures homogeneous distribution of temperature on the culture plate. The entire surface of the stage is perfectly flat, making handling of the culture dishes simple and safe.

Micromanipulation – Eppendorf

Micromanipulation – Narishige

Why Is The Basis for All Cell Research Systems More Than a Microscope Stand?

The demands on a research microscope in Life Sciences are as varied as the applications. The Axio Observer expansion concept is designed to meet that. There are three stands designed for different application focal points. This concept is essential if you want to realize any system solution economically with Axio Observer.

Three options offer more freedom to make decisions: the stand types

From the economic starter in the research category to the high-end dimensions of Live Cell Imaging: the Axio Observer stand concept gives you the freedom to choose a stand that suits your requirements and budget. Whatever your decision, you will be getting a high-performance microscope for a reasonable price.

- **Axio Observer.A1:** for demanding routine tasks in Live Cell Imaging and particularly ideal for micromanipulation. The manual stand offers the same high optical quality as the other types.
- **Axio Observer.D1:** greater ease of operation, more flexibility. The D1 stand enables motorized selection of reflector turret, condenser and fluorescence beam path.
- **Axio Observer.Z1:** this stand, the height of perfection in inverse research microscopy, currently offers the very best in terms of ease of operation and flexibility for automated online experiments.

Axio Observer: three stands, three operating concepts

Axio Observer.A1

The basic solution for manual operation

Axio Observer.D1

Above standard: semi-motorized with a freely configurable "keyring", LCD display and light manager*

** With PC only*

Axio Observer.Z1

Optimum convenience: fully motorized with two freely configurable keyrings, TFT display on the stand or in the docking station, light manager and contrast manager

DIC prism I/0.35
000000-1005-821
DIC prism II/0.35
000000-1005-822
Slit-diaphragm 3.5 mm for PlasDIC
000000-1246-773

LD condenser 0.35 H/DIC, Ph0, Ph1, Ph2, Var1; 5 positions
424240-0000-000
LD condenser 0.35 H, Ph0, Ph1, Ph2, DIC, DIC; 6 positions
424241-0000-000

LD condenser 0.55 H/DIC, Ph1, Ph2, Ph3, Var1/2; 5 positions
424243-0000-000
LD condenser 0.55 H, Ph1, Ph2, Ph3, DIC, DIC; 6 positions
424242-0000-000
LD condenser 0.55 H, Ph1, Ph2, Ph3, DIC, DIC; 6 positions, mot
424244-0000-000
(for stands D1, Z1)
Interface for motorized condenser, incl. Shutter
423921-0000-000
(required for motorized condenser)

Condenser module DIC I/0.55 with polarizer
426722-0000-000
Condenser module DIC II/0.55 with polarizer
426720-0000-000
Condenser module DIC III/0.55 with polarizer
426721-0000-000
Slit-diaphragm 3.5 mm for PlasDIC
000000-1246-773

Achromatic LD condenser 0.8 H D Ph DIC
424204-0000-000

Condenser module DIC 0/0.8 with polarizer
426704-0000-000
Condenser module DIC I/0.8 with polarizer
426705-0000-000
Condenser module DIC II/0.8 with polarizer
426706-0000-000
Condenser module DIC III/0.8 with polarizer
426707-0000-000

Condenser, LD achromatic 0.8 H DIC
424206-9901-000

Achromatic-aplanatic condenser 1.4 H D Ph DIC
424208-0000-000

Condenser module DIC II/1.4 with polarizer
426708-0000-000
Condenser module DIC III/1.4 with polarizer
426709-0000-000

Carrier for 12 V 35 W transmitted-light illumination Axio Observer
451229-0000-000

Phase stop Ph0/0.2
451261-0000-000
Phase stop Ph1/0.2
451260-0000-000
Phase stop Ph0/0.4
451255-0000-000
Phase stop Ph1/0.4
451256-0000-000
Phase stop Ph2/0.4
451257-0000-000
Phase stop Ph1/0.55
451258-0000-000
Phase stop Ph2/0.55
451259-0000-000

Diaphragm Var1/0.4
451251-0000-000
Diaphragm Var1/0.55
451252-0000-000
Diaphragm Var2/0.55
451253-0000-000

Slider Ph, H, Var
451246-0000-000

Slider Ph, H, Ph
451245-0000-000

Slit-diaphragm 5 mm for PlasDIC
451262-0000-000

Slider Ph, H, PlasDIC
451248-0000-000

Condenser 0.2
451236-0000-000
Condenser 0.4
451235-0000-000
Condenser 0.55
451237-0000-000

Adapter for carrier for 12 V 35 W transmitted-light illumination
000000-1005-842

Conversion filter 3200-5500 K, d=32x2
467847-0000-000
Interference wide-band filter green, d=32x4
467803-0000-000

Polarizer D with 2-position filter changer
000000-1005-864

Polarizer D, rotatable with color glass carrier
000000-1121-813

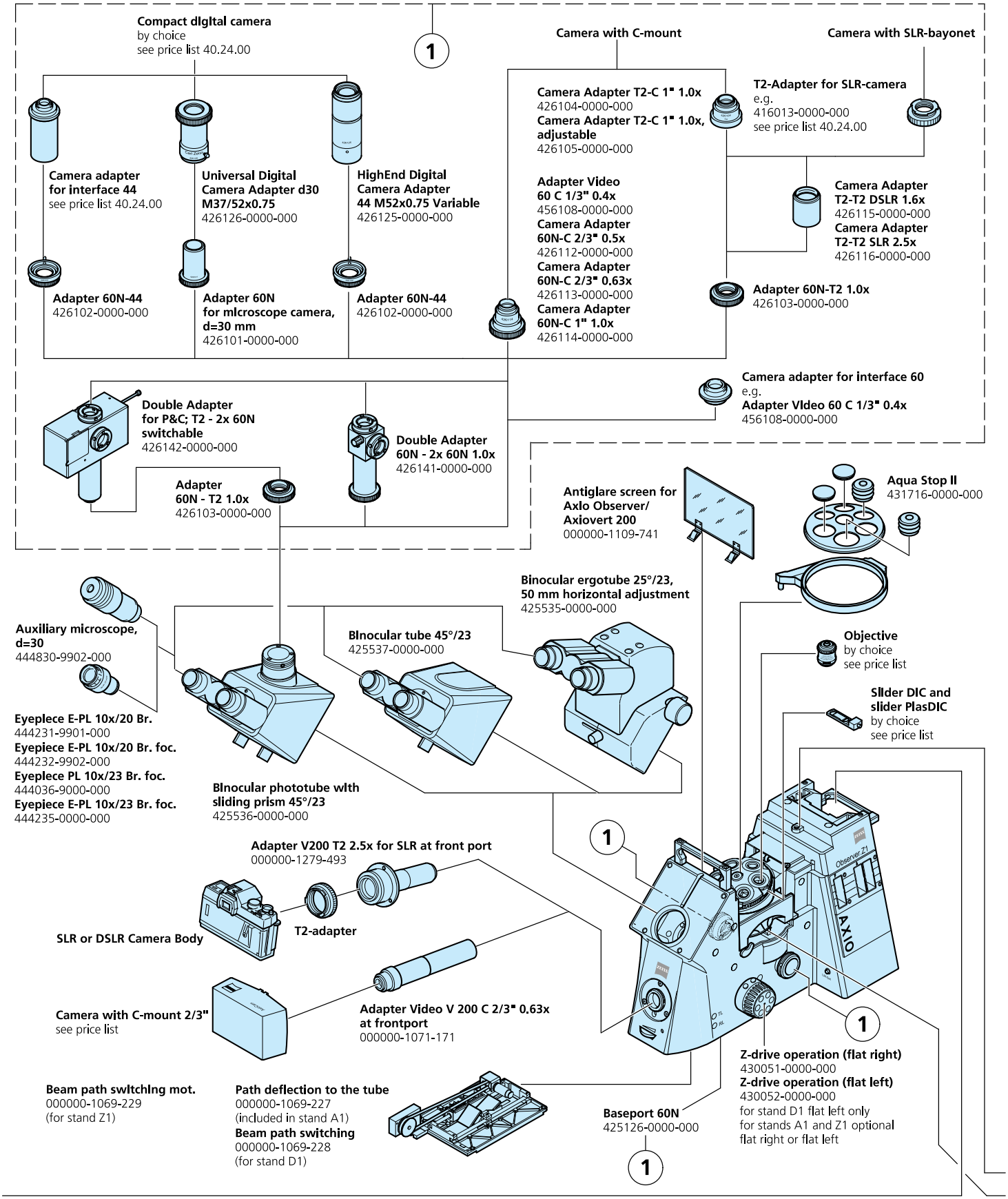
Shutter high speed, external
423627-9901-000
UNIBLITZ Shutter Controller VCM-D1
000000-1343-597
or
Stand interface cable for external UNIBLITZ Shutter
432925-0000-000

HAL 100 illuminator with collector
423000-0000-000
Halogen lamp 12 V 100 W
380079-9540-000

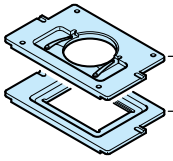
Carrier for transmitted-light illumination with LCD display and light manager
423922-0000-000
(for stand D1)

Carrier for transmitted-light illumination tiltable
423920-0000-000
(for stands A1, Z1)

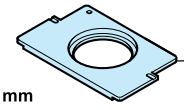
Condenser mount for Axio Imager condensers 0.8/1.4
424245-0000-000


Compact digital camera
by choice
see price list 40.24.00
1
Camera with C-mount
Camera with SLR-bayonet
Camera Adapter T2-C 1" 1.0x
426104-0000-000
Camera Adapter T2-C 1" 1.0x, adjustable
426105-0000-000
T2-Adapter for SLR-camera
e.g.
416013-0000-000
see price list 40.24.00
Camera adapter for interface 44
see price list 40.24.00
Universal Digital Camera Adapter d30 M37/52x0.75
426126-0000-000
HighEnd Digital Camera Adapter 44 M52x0.75 Variable
426125-0000-000
Adapter Video 60 C 1/3" 0.4x
456108-0000-000
Camera Adapter 60N-C 2/3" 0.5x
426112-0000-000
Camera Adapter 60N-C 2/3" 0.63x
426113-0000-000
Camera Adapter 60N-C 1" 1.0x
426114-0000-000
Camera Adapter T2-T2 DSLR 1.6x
426115-0000-000
Camera Adapter T2-T2 SLR 2.5x
426116-0000-000
Adapter 60N-44
426102-0000-000
Adapter 60N for microscope camera, d=30 mm
426101-0000-000
Adapter 60N-44
426102-0000-000
Adapter 60N-T2 1.0x
426103-0000-000
Camera adapter for interface 60
e.g.
Adapter Video 60 C 1/3" 0.4x
456108-0000-000
Double Adapter for P&C; T2 - 2x 60N switchable
426142-0000-000
Double Adapter 60N - 2x 60N 1.0x
426141-0000-000
Adapter 60N - T2 1.0x
426103-0000-000
Antiglare screen for Axio Observer/ Axiovert 200
000000-1109-741
Aqua Stop II
431716-0000-000
Binocular ergotube 25°/23, 50 mm horizontal adjustment
425535-0000-000
Auxiliary microscope, d=30
444830-9902-000
Binocular tube 45°/23
425537-0000-000
Objective
by choice
see price list
Slider DIC and slider PlasDIC
by choice
see price list
Eyepiece E-PL 10x/20 Br.
444231-9901-000
Eyepiece E-PL 10x/20 Br. foc.
444232-9902-000
Eyepiece PL 10x/23 Br. foc.
444036-9000-000
Eyepiece E-PL 10x/23 Br. foc.
444235-0000-000
Binocular phototube with sliding prism 45°/23
425536-0000-000
Adapter V200 T2 2.5x for SLR at front port
000000-1279-493
SLR or DSLR Camera Body
T2-adapter
Camera with C-mount 2/3"
see price list
Adapter Video V 200 C 2/3" 0.63x at frontport
000000-1071-171
Z-drive operation (flat right)
430051-0000-000
Z-drive operation (flat left)
430052-0000-000
for stand D1 flat left only
for stands A1 and Z1 optional
flat right or flat left
Beam path switching mot.
000000-1069-229
(for stand Z1)
Path deflection to the tube
000000-1069-227
(included in stand A1)
Beam path switching
000000-1069-228
(for stand D1)
Baseport 60N
425126-0000-000

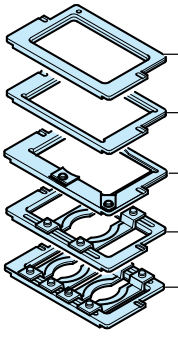
Mounting frame M for specimen slider 76x26 mm
471719-0000-000
Mounting frame M for microtest plates 60, 72 and 120 positions
471747-0000-000

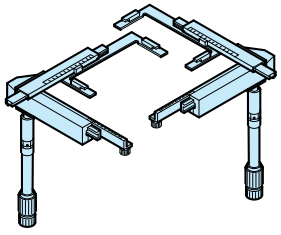


Mounting frame M for Petri dishes, dia. 36 mm
471742-0000-000
Mounting frame M for Petri dishes, dia. 54 mm
471743-0000-000
Mounting frame M for Petri dishes, dia. 65 mm
471758-0000-000
Mounting frame M for Petri dishes, dia. 88 mm
471759-0000-000



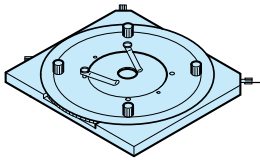
Mounting frame M for microtiter plates 96 positions with adhesive scales
471746-0000-000
Mounting frame M for multitest dishes
471744-0000-000
Universal mounting frame M-X
471717-0000-000
Universal mounting frame M
471718-0000-000
Universal mounting frame M-Duo for object guide
000000-1116-077



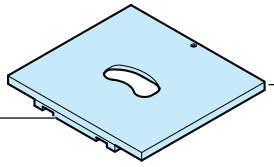


Object guide 130x85 mm right
000000-1005-833

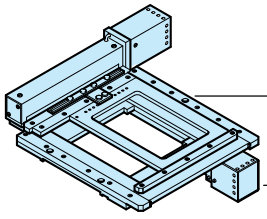
Object guide 130x85 mm left
000000-1110-991



Gliding stage Z with stage inserts d=24 and 48mm
471722-0000-000

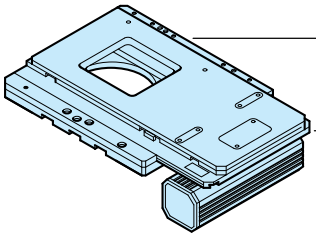


Specimen stage 250x230 mm
432017-9901-000

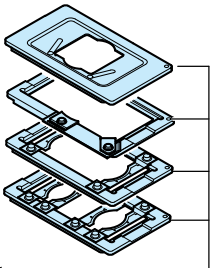


Scanning stage 130x100 STEP
432029-9901-000
with
Ludl MAC5000 XY Stage Controller Stepper Incl. Joystick
000000-0431-478
Ludl Stepper Motor Cable with Right Angled Plug
(2x)
000000-0445-551

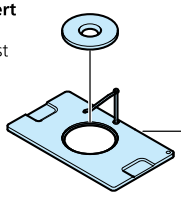
Scanning stage 130x85 mot; CAN
432031-9901-000
Electronic Coaxial Drive; CAN
432904-9901-000
for stand A1:
Converter CAN - USB
432909-0000-000
PC
by choice, see price list



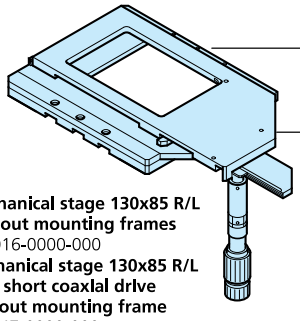
Mounting Frame K for specimen slider 76x26 mm
451341-0000-000
Universal mounting frame K-X
451353-0000-000
Universal mounting frame K
451352-0000-000
Universal mounting frame K-Duo
000000-1116-078



Stage insert
by choice
see price list



Mounting frame K for reflected light, d=72mm
451344-0000-000
Mounting frame K; low profile, for reflected light, d=72 mm
432334-9000-000



Mechanical stage 130x85 R/L without mounting frames
432016-0000-000
Mechanical stage 130x85 R/L with short coaxial drive without mounting frame
432047-0000-000

Coverglass cap D = 0.17 - 0.6 mm
422902-9901-000

Objectives W 0,8
by choice
see price list

ACR rings
by choice
(for stand Z1)

Objectives M27
by choice
see price list

DIC/PlasDIC slider
by choice
see price list

Adapter M27x0.75 / W 0.8 H "0"
000000-1095-168

included in stand A1:
6-position objective nosepiece, H DIC M27 man.
(3 DIC positions)

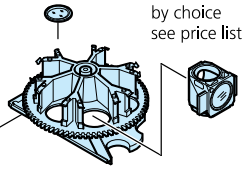
for stand D1:
6-position objective nosepiece, H DIC M27 cod.
424526-0000-000

for stand Z1:
6-position objective noseplece, H DIC M27 mot.
424527-0000-000

6-position objective noseplece, H DIC M27 mot. ACR
424528-0000-000

Definite Focus Incl. Objective nosepiece mot. ACR
424533-9000-000
Beam combiner module UV/VIS for Definite Focus
424533-9020-000
Compensation module Definite Focus
424533-9040-000

Protection filter for reflector turret
000000-1068-113



Reflector modules P&C
by choice
see price list

6-position reflector turret man. for P&C modules
424945-0000-000

for stands D1, Z1:
6-position reflector turret cod. for P&C modules
424946-0000-000
6-position reflector turret mot. for P&C modules
424947-0000-000
6-position reflector turret mot. ACR for P&C modules
424948-0000-000

System Overview

Dust cover
459330-0000-000

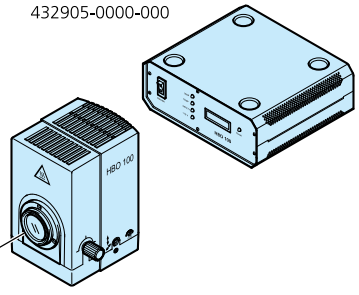
Shutter FL, internal
423625-0000-000
(for stands D1, Z1)
Shutter FL, internal
423628-0000-000
(for stand A1)

Adjusting aid for HBO/XBO
452369-0000-000

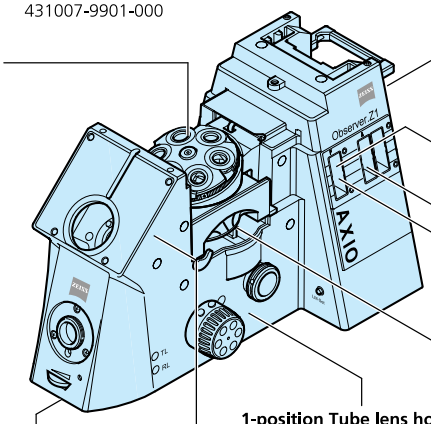
Shutter high speed, external
423627-9901-000
UNIBLITZ Shutter Controller VCM-D1
000000-1343-597
or
Stand interface cable for external UNIBLITZ Shutter
432925-0000-000

Switching mirror for 2 illuminators
447230-9902-000
Switching mirror mot.; CAN
447229-0000-000
(for stands D1, Z1)

Power supply unit for HBO 100, 90...250 V, 50...60 Hz, 265 VA
432604-9901-000
FluoArc variable intensity lamp control for HBO 100
432605-9901-000
Control panel with LCD display for FluoArc
432905-0000-000



Axio Observer.A1 basic stand
431004-0000-000
(with tube lens 1.0, fixed sideport left only)
Axio Observer.D1 basic stand
431006-0000-000
Axio Observer.Z1 basic stand
431007-9901-000



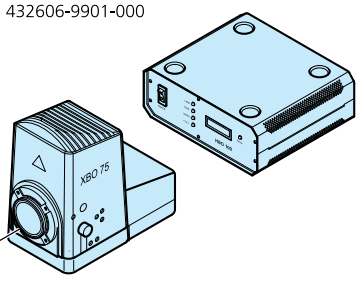
Reflected-light illuminator FL HD UV
423605-0000-000
Reflected-light illuminator FL HD
423606-0000-000
Reflected-light illuminator FL HD mot.
423607-0000-000
(for stands D1, Z1)

Excitation filter wheel (8 positions) mot. for 25 mm filters; CAN
452356-0000-000
(for stands D1, Z1)

HBO 100 illuminator with lamp mount and collector
423010-0000-000
HBO 100 illuminator, self-adjusting with lamp mount and collector
423011-9901-000

Mounting adapter for laserport
423636-0000-000

Power supply unit for lamp mount N XBO 75, 100 ... 240 V, 50 ... 60 Hz, 130 VA
432606-9901-000



TFT-Display
(for stand Z1)

1-position Tube lens holder, fixed
431010-0000-000
(included in stand A1)
3-position Optovar turret cod.
431012-0000-000
(for stand D1)
3-position Optovar turret mot.
431013-0000-000
(for stand Z1)

Iris stop slider for incident-light equipment
000000-1062-360
Iris stop slider mot. for incident-light equipment
423646-0000-000
(for stands D1, Z1)
FL attenuator, discrete
423647-0000-000
FL attenuator, discrete mot.
423648-0000-000
(for stands D1, Z1)

Illuminator N XBO 75
000000-1007-981
Collector N HBO 103/XBO 75
000000-1007-976

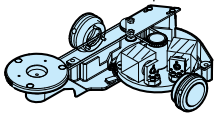
Dockingstation for TFT-Display
432907-0000-000
(for stand Z1)

Optovar 1.25x
000000-1145-667
Optovar 1.6x
000000-1268-705
Optovar 2.5x
000000-1005-856

Iris stop slider for incident-light equipment
000000-1062-360
Iris stop slider mot. for Incident-light equipment
423646-0000-000
(for stands D1, Z1)
Slider with variable rectangular diaphragm
000000-1140-737

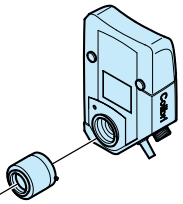
HXP 120
(see price list 40.19.01)

Slider system ApoTome
000000-1189-776
(for stands D1, Z1)



Sideport 60N L, 2 switching positions
425150-0000-000
Sideport 60N L 100, 2 switching positions
425151-0000-000
Sideport 60N L, 3 switching positions
425152-0000-000
Sideport 60N R, 3 switching positions
425153-0000-000
Sideport 60N L/R, 3 switching positions
425154-0000-000
Sideport 60N L/R 100, 3 switching positions
425155-0000-000
Sideport 60N L 80/R 100, 3 switching positions
425165-0000-000

for stand A1 sideport left only
2 switching positions for A1, D1 only

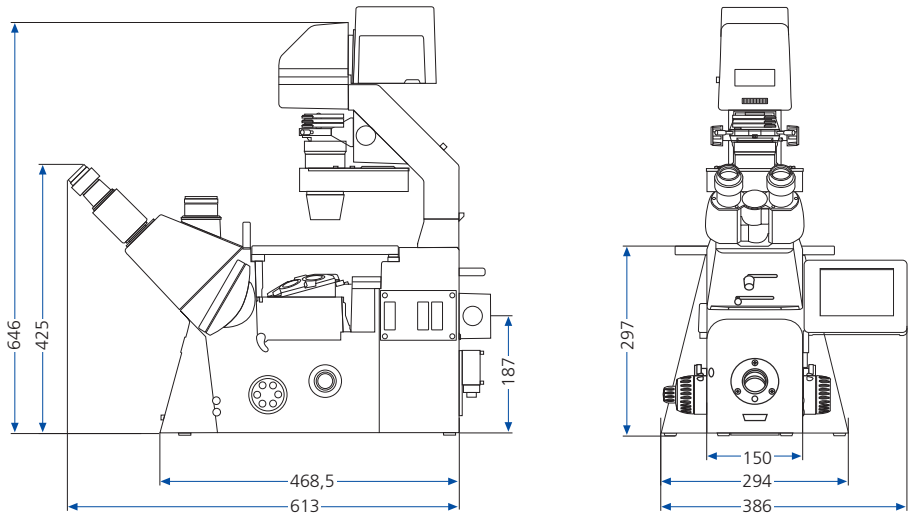


Illumination system Colibri
(see price list 40.19.01)

Analyzer slider, fixed
000000-1005-862

Analyzer slider +/- 30° for DIC
000000-1005-863

High Speed Wavelength switcher Lambda DG-4
(see price list 40.17.02)



Axio Observer

Component	Option	A1	D1	Z1
Stand	manual	+	+	-
	motorized	-	o*	+
Coding	readoutable from the stand	-	+	+
Tube lense mount	1x	+	o	o
Optovar nosepiece	3x cod	-	o	-
	3x mot	-	-	o
Objective nosepiece	3x H/3x H DIC man	+	-	-
	6x H DIC cod	-	•	-
	6x H DIC mot	-	-	o
	6x H DIC ACR mot	-	-	o
Reflector turret	6x man	o	o	-
	6x cod	-	o	o
	6x mot	-	o	o
	6x mot ACR	-	o	o
Condenser	N.A. 0.35 man	o	o	o
	N.A. 0.55 man	o	o	o
	N.A. 0.55 mot	-	o	o
	N.A. 0.8 man	o	o	o
	N.A. 1.4 man	o	o	o
Reflected-light beam path	apochromatic man	o	o	o
	apochromatic mot	-	o	o
	UV optimized man	o	o	o
Shutter	fast Uniblitz shutter TL	-	o	o
	standard shutter RL	o	o	o
	fast Uniblitz shutter RL	-	o	o
Diaphragm slider or FL attenuator	man	o	o	o
	mot	-	o	o
Documentation	side port (left)	o	o	o
	side port (right)	-	o	o
	phototube	o	o	o
	base port/front port	-	o	o
z-focus	man	+	+	-
	mot	-	-	+
Display	LCD display	-	+	-
	TFT display	-	-	+
	docking station for TFT	-	-	o
Laser port		-	+	+
Switching mirror for 2 illuminators	man	o	o	o
	mot	-	o	o
Excitation filter wheel		-	o	o
Aqua Stop II		o	o	o
Laser safety facility TIRF/LSM		-	o	o
Imaging	AxioCam/AxioVision	o	o	o
	ApoTome	-	o	o
	Cell Observer®	-	o	o
	TIRF	-	o	o
Confocal	LSM 510	-	-	o
	LSM Exciter	-	-	o
	ConfoCor 2	-	-	o

- = not possible
+ = included with stand
o = optional
• = necessary
* = optional: reflector turret, condenser and fluorescence beam path

Win-Win Situation

The microscope
- New flexibility in the inverse research category
- Developed for the observation, manipulation and analysis of living cells

The optics
- High-performance objectives for the different tasks involved in Live Cell Imaging, with special LCI and thermally-insulated objectives leading the way
- Optimized Differential Interference Contrast for homogeneous illumination across the entire field of view
- Innovative and open to new areas of applications: the combination of positive and negative phase contrast in one objective

The fluorescence
- Absolute brilliance right into the periphery provided by the newly designed fluorescence beam path
- Apochromatic correction for optimum imaging of all wavelengths
- Up to 70% higher excitation intensity due to high-performance filter sets
- Up to 50% shorter exposure times due to HE filter sets
- 6x reflector turret, faster at changing position (< 200 ms) with a new quick change concept for the filter sets
- Versatile illumination spectrum from the self-adjusting HBO to the high-speed light source

The workflow
- Ease of operation with new dimensions for control and monitoring via TFT display
- Flexible system control via stand, TFT, docking station or PC
- Perceptibly more intelligent in manual operation
- Automatic Component Recognition ACR for objectives and reflector modules
- Simply more efficient due to greater contrast combinations in transmitted-light
- Optimally regulated by means of contrast and light management
- Working more relaxed for longer periods of time with the ergotube
- Automated to save time, and greater ease of operation provided by the new shutter concept

The safety
- Unshakable: the reliable pyramid design
- Effective microscope protection with absolute freedom to operate provided by Aqua Stop II

The cell research station
- Unique flexibility for any level of application, from routine to high-end
- Superb integration at all system levels
- A new level of performance in cell incubation
- Open system architecture for easy integration of external components

The system
- Options: Cell Observer® or Cell Observer® HS
- AxioVision imaging software
- TIRF, LSM, Microdissection, laser port for FRAP and Uncaging
- Unique solutions for incubation

The expansion concept
- Optimum performance economically feasible: the variable expansion concept in three stands
- Designed for different requirements and application focal points
- Growth platform for now and for the future

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

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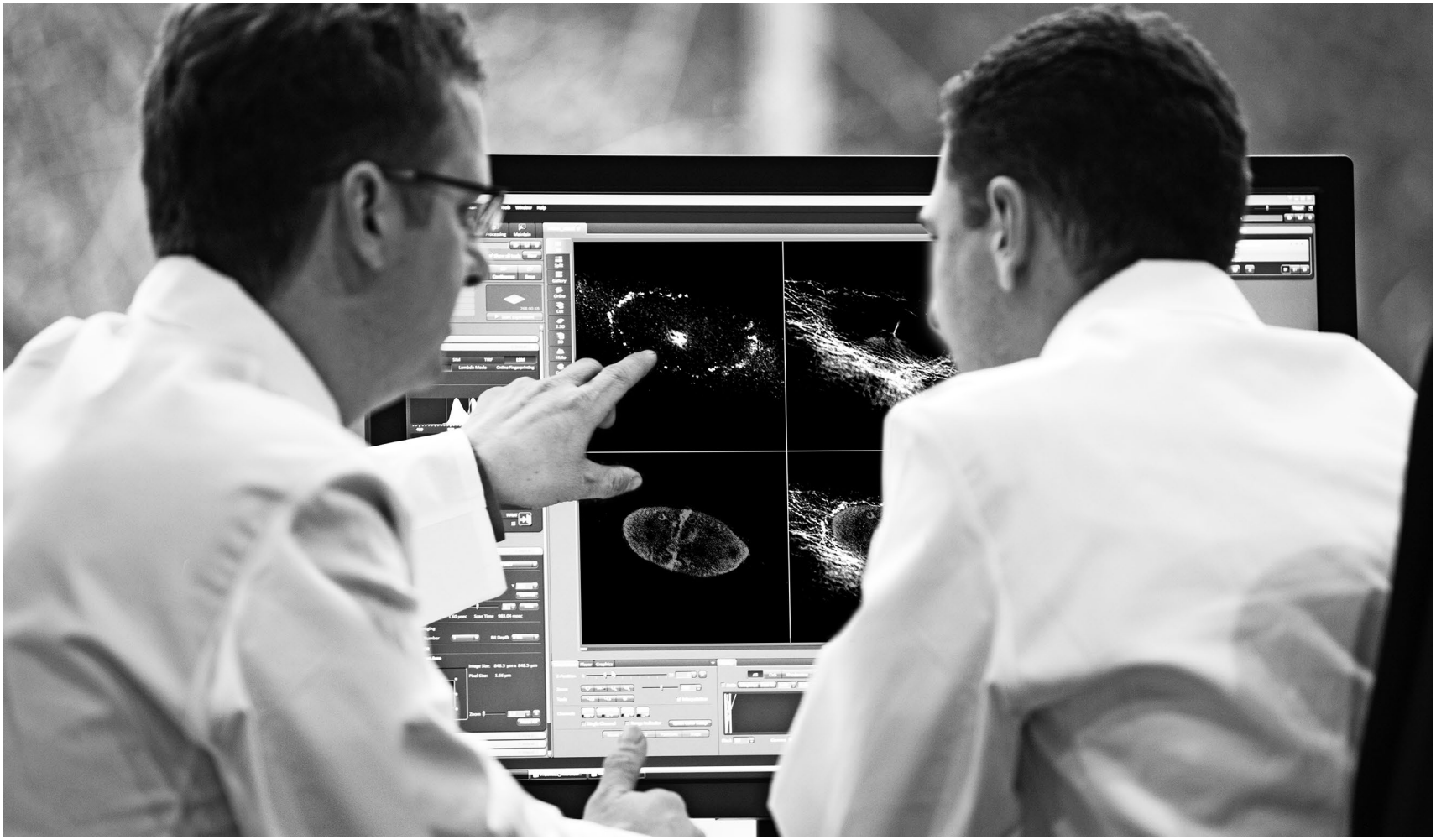
bleached without chlorine.
60-2-0015/e – printed 08.08



Product Information
Version 2.0

ZEN Imaging Software

Faster. Easier to Use. More Universal.
The Software for All Systems.

We make it visible.

ZEN Shortens the Path to Your Goal

ZEN – ZEISS Efficient Navigation – is the single user interface you will see on all imaging systems from ZEISS. ZEN software leads you simply and quickly to the result. At all times you see which options the system is making available to you and which step is appropriate to take next. ZEN makes it easy to operate every imaging system from ZEISS correctly and intuitively. As a result you save time, reduce training and support costs, and get faster answers to your questions.

ZEN: Simpler. More Intelligent. More Integrated.

ZEN: The Essentials Count – Focus on What You Need

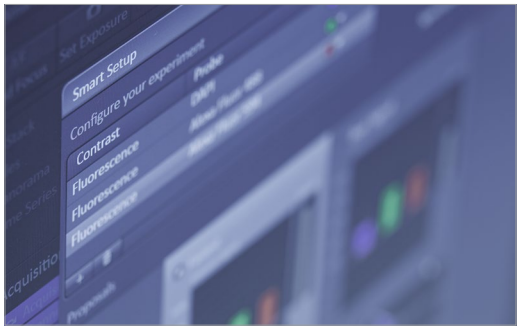
ZEN controls all imaging systems from ZEISS, letting you operate all of your devices with the same convenient interface. ZEN arranges operating elements in a way that follows your workflow. Functions you use only rarely are hidden away, out of sight – but always there with a single click.

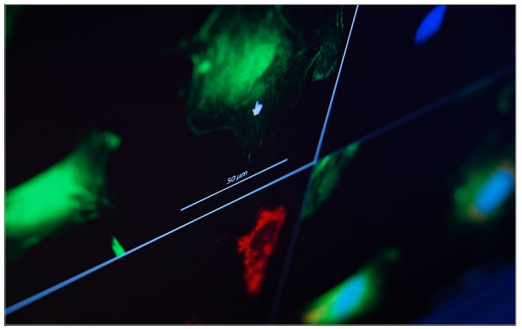
Smart Setup: Select Fluorophore. Acquire. Done.

Smart Setup is the core of ZEN – your intelligent control centre. Select the dye for your sample from the database with more than 500 dyes and ZEN automatically applies all necessary settings for your imaging system. The innovative "Motifs" feature helps you to further optimize your imaging with a single click.

A Secure Format for Important Data

The security of your data gets top priority as ZEN stores each of your experiments with all its metadata. Using the data format .czi from ZEISS you can even process the huge amount of data you acquire with our fast 3D imaging systems. Alternatively, store your images as OME-TIFF, the image format specification of the Open Microscopy Environment including metadata, to facilitate cross-plattform image data exchange.

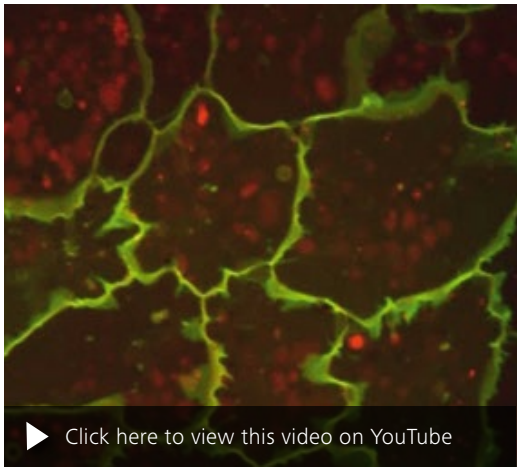




ZEN at Work

- Image subcellular trafficking in 3D over time with maximum acquisition speed
- Visualize cytoskeletal dynamics with highest sensitivity
- Carry out photobleaching experiments
- Perform functional imaging of cellular signal transduction with high temporal resolution
- Perform confocal live cell imaging with highest sensitivity

Zebrafish blood



Xenopus explant

Drosophila embryo

Tobacco cells

ZEN: Your Flexible Choice of Components

ZEN features the following module packages:

ZEN lite	Is the free basic version of the high-performance microscopy software ZEN. You do not need a license for ZEN lite, unless you want to extend this version with specific modules for your applications
ZEN desk	Supports you in your offline analyses. Extend this version with modules for image processing and analysis
ZEN pro	Controls all imaging systems except laser-based 3D systems
ZEN system	Is the software package for all imaging systems, including laser-based 3D imaging systems (LSM 780, LSM 710, Cell Observer SD, Laser TIRF 3)

Basic functionality	ZEN desk	ZEN pro	ZEN system
User Interface and files	Graphical user interface switchable light or dark design to adapt to ambient brightness*		
	User interface with stepless scaling and zooming		
	All functional elements can be displayed either in basic or advanced mode		
	Configuration options for the graphical user interface: creation of menu bars and customized buttons, saving of workspace configurations, definition of properties of standard graphic elements and application of functions to TFT soft keys		
	Image import (LSM, ZVI, BMP, TIF, JPG, GIF, PNG) and function to convert images (TIF, JPG, BMP) into CZI format		
	Export to OME-TIFF - image format specification of the Open Microscopy Environment, including metadata, to facilitate cross-platform image data exchange		
	Export into ZVI, BMP, GIF, JPG, PNG, TIFF, HDP image and AVI and WMF video formats		
	Batch Export of images and videos		
Hardware Control		Full integration of ZEISS microscopes, cameras and accessories	
		Interactive and automatic control of the motorized microscope components	
		Transfer of information from encoded components into the software	
		Reproducible acquisition with millisecond precision – Control of trigger board (analog/digital I/O card) for hardware control	

* ZEN (blue edition) only

ZEN: Your Flexible Choice of Components

ZEN features the following module packages:

Basic functionality	ZEN desk	ZEN pro	ZEN system
Image Acquisition		Smart Setup function for fully automatic creation of experiments to acquire multichannel fluorescence and transmitted light images. "Motif" feature available to further optimize acquisition experiments for quality or speed	
		Acquisition experiments can be configured, saved and reloaded. Re-Use function from images automatically restores acquisition parameters	
		Movie Recorder enables fast and simple acquisition of movie clips through use of Start and Stop	
		Sequence of acquisition dimensions can be selected (depending on active dimensions)	
		Interactive graphical representation of the microscope light path	
		Fully automatic assignment of geometric scalings for image acquisition. Manually created scaling supported for even higher accuracy	
		Recording and saving of acquisition history as metadata in CZI image format. This format has been developed to be as close as possible to the OME specification, Copyright 2002-2012 OME (Open Microscopy Environment)	
		Automatic saving of acquired images in CZI (including metadata) to prevent image data loss	
Analysis, Processing and Views	Navigator window		
	Interactive measurement, Scale Bars and Text Annotations		
	Management, visualization and printing of metadata and images		
	Post-Processing of images: standard operations for image optimization: contrast, brightness, gamma, colors, smoothing, sharpening, geometric corrections		
	Image file browser		
	Up to three independent image containers, image comparison view		
	Gallery view		
	View for histogram measurement		
	View for profile measurement		
	2.5D (pseudo-3D) view		
	Info view for metadata, partially editable		
	Functions for working with data tables: filtering and sorting of tables		
	Diagram view to display data in the form of histograms, line plots, bar and pie charts or x/y scatter plots		

ZEN: Your Flexible Choice of Components

ZEN features the following module packages:

Task	Module	ZEN provides:
Basic	ZEN	Detector Control, AxioCams and PMTs from ZEISS included, third party devices optionally available
		Laser-/Lasermodule-Control
		Microscope Control
	Macro Recorder and Editor	Use a programming language to generate macros ZEN (black edition): VBA, ZEN 2012 (blue edition): Python
	Visual Macro Editor, VME	Use symbols to generate macros for complex acquisition strategies
	Visual Basic Macro, VBA	Use a macro recorder or freely program VBA code
Acquisition	Multi Channel	Record different fluorescence and transmitted light images in independent channels
	Time Lapse	Record images over time
	Z Stack	Record Z-stacks with the help of a motorized focus drive
	Manual Extended Focus	Acquire images manually and calculate a 2D image out of a Z-stack
	Autofocus	Determine the focus position of your specimen
	Tiles & Positions	Record exact, highly resolved images by automatically scanning pre-defined specimen areas Produce images with the help of position lists. Configure tile regions and individual positions
	Panorama	Manually acquire highly resolved overview images from individual 2D images
	Experiment Designer	Configure non-homogeneous imaging experiments
	ROI-HDR	Acquire and display HDR image data with extended dynamic range, incl. illumination blanking

ZEN: Your Flexible Choice of Components

Select your modules according to your requirements

Task	Module	ZEN provides:
Processing	Extended Focus	Calculate a 2D image out of a 3D Z-stack
	Deconvolution	Improve Z-stacks with 3D deconvolution algorithms
	3D VisArt	Visualize and render 3D image stacks
	Spectral Unmixing	Perform spectral unmixing of lambda stacks or multichannel images, via reference spectra or component analysis
	Colocalisation	Analyze colocalisation between two fluorescence channels quantitatively
Analysis	Measurement	Use extended interactive measurement tools
	Image Analysis	Use an assistant to create an automatic measurement program
	Advanced Processing & Analysis	Add Acquisition-feedback capability and hierarchical measurements to your Image Analysis
	FRAP Efficiency Analysis	Analyze acquired FRAP/FLAP or similar time series with bleach events, including mean ROI measurements
	FRET plus	Analyze FRET data with either sensitized emission or acceptor photobleaching method, including mean ROI measurement
	3D Analysis	Evaluate and display 3D image data stacks with various measuring tools
	ASSAYbuilder	Carry out “high content” analyses (HCA) of .zvi images
	Physiology	Analyze physiological time series data
	FCS for GaAsP and APD	Analyze single molecules with GaAsP and APD detectors, FCS, spectral FCS and FCCS with LSM 780, LSM BiG and ConfoCor 3
	Enhanced FCS	Perform interactive and global fitting using extended and self defined fit models
	Photon Counting Histogram	Histogram of the photon counting populations for all FCS systems
	Image Correl. Spectro. RICS	Analyze single molecules with Raster Image Correlation Spectroscopy for LSM 710 with PMT or GaAsP detectors
	Topo	Analyze surface data and visualize measurement results

ZEN: Your Flexible Choice of Components

ZEN fits all your needs: depending on your microscope hardware the following ZEN packages are available.

Product | **Modules**

● Included in ZEN (blue edition)
◎ Optional in ZEN (blue edition)
● Included in ZEN (black edition)
◎ Optional in ZEN (black edition)

ZEN system
Laser based **3D Imaging Systems**

Laser Control → Microscope Control → Detector Control* → **ZEN system**

Measurement ●●	Image Analysis ●●	3D Analysis ◎	ASSAY builder ◎	Advanced Processing & Analysis ◎	Shuttle & Find ◎◎	Visual Basic Macro ◎	
Deconvolution ◎	Colocalisation ●●	3D VisArt ◎◎	Topo ◎	Spectral Unmixing ●	Physiology ◎◎	FRAP Efficiency Analysis ◎	FRET plus ◎
Experiment Designer ◎◎	Visual Macro Editor, VME ◎	Macro Recorder and Editor ◎◎	ROI-HDR ◎	Enhanced FCS ◎	FCS for GaAsP and APD ◎	Photon Count. Histogram ◎	Image Correl. Spectro. RICS ◎
Multi Channel ●●	Z Stack ●●	Time Lapse ●●	Tiles & Positions ◎◎	Panorama ◎	Autofocus ●●	Extended Focus ●●	Man. Ext. Focus ◎

ZEN desk
Offline tasks only

ZEN desk

Measurement ●●	Image Analysis ●●	3D Analysis ◎	ASSAY builder ◎	Topo ◎	Advanced Processing & Analysis*** ◎	
Deconvolution ◎	Colocalisation ◎●	3D VisArt ◎◎	Spectral Unmixing ●	Physiology ◎◎	FRAP Efficiency Analysis ◎	FRET plus ◎
Visual Macro Editor, VME ◎	Macro Recorder and Editor ◎◎	ROI-HDR ◎	Enhanced FCS ◎	FCS for GaAsP and APD ◎	Photon Count. Histogram ◎	Image Correl. Spectro. RICS ◎
Tiles & Positions** ◎	Extended Focus ●●	Visual Basic Macro ◎				

* Detectors from ZEISS (AxioCams, PMTs, etc.) included, 3rd party device control optionally available
** Only stitching and processing of existing data
*** Requires "Image Analysis" to allow creation of Measurement Programs

ZEN: Your Flexible Choice of Components

ZEN fits all your needs: depending on your microscope hardware the following ZEN packages are available.

Product | **Modules**

● Included in ZEN (blue edition)
◎ Optional in ZEN (blue edition)

ZEN pro

Imaging Systems and **Microscopes with Camera**

Microscope Control | Camera Control* | **ZEN pro**

Measurement ●	Image Analysis ◎	ASSAY builder ◎	Deconvolution ◎	Colocalisation ◎	3D VisArt ◎	Experiment Designer ◎	Advanced Processing & Analysis** ◎
Multi Channel ●	Z Stack ◎	Time Lapse ◎	Tiles & Positions ◎	Panorama ◎	Autofocus ◎	Extended Focus ◎	Man. Ext. Focus ◎
Macro Recorder and Editor ◎	Physiology ◎						

ZEN lite

AxioCam Control | **ZEN lite**

Measurement ◎	Image Analysis ◎		
Multi Channel ◎	Time Lapse ◎	Panorama ◎	Man. Ext. Focus ◎

* AxioCams included, other cameras optionally available

** Requires "Image Analysis" for creation of Measurement Programs

Technical Specifications

● Included in ZEN (blue edition)
⊙ Optional in ZEN (blue edition)
● Included in ZEN (black edition)
⊙ Optional in ZEN (black edition)

Product/Option		ZEN lite	ZEN desk	ZEN pro	ZEN system	ZEN desk	ZEN system
Basis	ZEN	●	●	●	●	●	●
Tools	Control of AxioCams	●		●	●		●
	PMT Control						●
	Other Cameras			⊙	⊙		
	Laser- / Lasermodule-Control				●		●
	Microscope Control			●	●		●
	Visual Macro Editor, VME					⊙	⊙
	Macro Recorder and Editor		⊙	⊙	⊙	⊙	⊙
Acquisition	Multi Channel	⊙		●	●		●
	Time Lapse	⊙		⊙	●		●
	Z Stack			⊙	●		●
	Manual Extended Focus	⊙		⊙	⊙		
	Autofocus			⊙	●		●
	Tiles & Positions			⊙	⊙	⊙*	⊙
	Panorama	⊙		⊙	⊙		
	Experiment Designer			⊙	⊙	⊙	⊙
	ROI-HDR					⊙	⊙
	Shuttle & Find			⊙	⊙		⊙
Processing	Extended Focus		●	⊙	●	●	●
	Deconvolution		⊙	⊙	⊙		
	3D VisArt		⊙	⊙	⊙	⊙	⊙
	Spectral Unmixing					●	●
	Colocalisation		⊙	⊙	●	●	●

* Only stitching and processing of existing data

Technical Specifications

● Included in ZEN (blue edition)
○ Optional in ZEN (blue edition)

● Included in ZEN (black edition)
○ Optional in ZEN (black edition)

Product/Option		ZEN lite	ZEN desk	ZEN pro	ZEN system	ZEN desk	ZEN system
Analysis	Measurement	○	●	●	●	●	●
	Image Analysis	○	●	○	●	●	●
	Advanced Processing & Analysis		○	○	○		
	FRAP Efficiency Analysis					○	○
	FRET plus					○	○
	3D Analysis					○	○
	ASSAYbuilder		○	○	○		
	Physiology		○	○	○	○	○
	Enhanced FCS					○	○
	FCS for GaAsP and APD					○	○
	Photon Counting Histogram					○	○
	Image Correl. Spectro. RICS					○	○
	Topo					○	○

Technical Specifications

System requirements

ZEN lite	ZEN pro / ZEN desk	ZEN system
Intel® Core 2 Duo E8400 3.0 GHz	Intel® Core 2 Duo E8400 3.0 GHz	Intel® Xeon X5650 6-Core 2.66 GHz
Intel® iQ45 chipset	Intel® iQ45 chipset	Intel® 5520 (Dual) chipset
4 GB DDR3-RAM	4 GB DDR3-RAM	6 GB DDR3-RAM
	Graphics interface PCIe x16	Graphics interface PCIe x16
	Graphics adapter 1920 x 1200 resolution, 32-bit true color, 128 MB RAM, DirectX 8.0 or higher	Graphics adapter ATI FirePro 2560 x 1600 resolution, 32-bit true color, 512 MB RAM, DirectX 8.0 or higher
	Monitor 20" TFT 1600 x 1200	Monitor 20" TFT 1600 x 1200
	Hard disk 160 GB SATA2, DVD-ROM drive	Hard disk 1x 250 GB SATA2 (configured as 250 GB hard drive) and 4x 1 TB SATA2 (configured as 2 TB RAID 10 hard drive), DVD-ROM drive
	1x free PCI slot 5 V, 32-bit (PCI specification 2.1) non shared interrupt, to insert camera interfaces	1x free PCI slot 5 V, 32-bit (PCI specification 2.1) non shared interrupt, to insert camera interfaces
		1x free PCI Express Generation 2.0 x16 full height slot
		Trigger board and Signal Distribution Box
1x FireWire IEEE 1394a interface	2x FireWire IEEE 1394a interface	2x Firewire IEEE 1394a interface
	2x serial interfaces (COM1 and COM2)	4x serial interfaces (COM1 – COM4)
2x USB interfaces	2x USB interfaces	4x USB interfaces
Microsoft® Windows® 7 64-bit Ultimate (Multilanguage), no special customer adapted versions	Microsoft® Windows® 7 64-bit Ultimate (Multilanguage), no special customer adapted versions	Microsoft® Windows® 7 64-bit Ultimate (Multilanguage), no special customer adapted versions