



Product Information
Version 2.0

ZEISS Cell Observer SD

Fast and Sensitive Confocal Imaging



We make it visible.

Clearer Images. Clearly Faster. Combine the Best Technologies.

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

With Cell Observer SD, you have it all: The image quality of Axio Observer and Axio Examiner. Spinning disk technology from Yokogawa CSU-X1. The dual camera technology of ZEN software. This symbiosis of optics, hardware and software in one system makes your confocal live cell imaging uniquely accurate: you control your Cell Observer SD precisely in the millisecond range. By streaming image data, you will acquire your images in breathtakingly short times. You can also document two fluorescence channels of your sensitive samples simultaneously and get even more valuable data.



Simpler. More Intelligent. More Integrated.

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Excellent Optics.

Image Quality Without Compromises.

A tube lens developed by ZEISS especially for Cell Observer SD gives even better color correction and higher contrast. LCI objectives also work with a correction ring that makes the best image quality possible under your demanding conditions. Consequently, DirectFRAP – our solution for laser manipulation – is coupled into the illumination beam path. This leaves the imaging beam path free of additional components, delivering uncompromised image quality.

Two Channels Simultaneously.

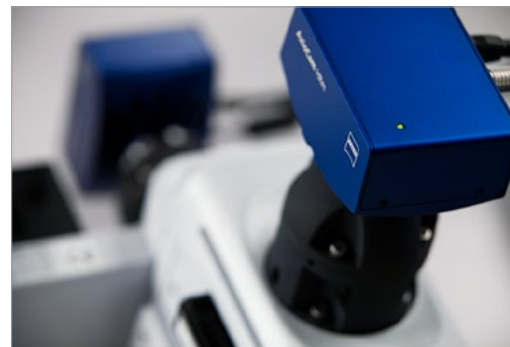
A True Cell Observer.

Document and quantify dynamic processes in living samples with the proven Cell Observer HS technology. Your system reads two hardware-triggered, highly sensitive cameras simultaneously to give you the benefit of the highest precision in timing. Observe dynamic cell processes with high frame rates, thanks to streaming technology.

A Universe of Options.

Combine Freely to Your Requirements.

Combine Cell Observer SD according to your needs with motorized scanning stages, Z-Piezo inserts, stage-top incubation and DirectFRAP. All components are seamlessly integrated and managed with millisecond accuracy. You control environmental conditions when acquiring living cells with completely software-run incubation.



Your Insight into the Technology Behind It

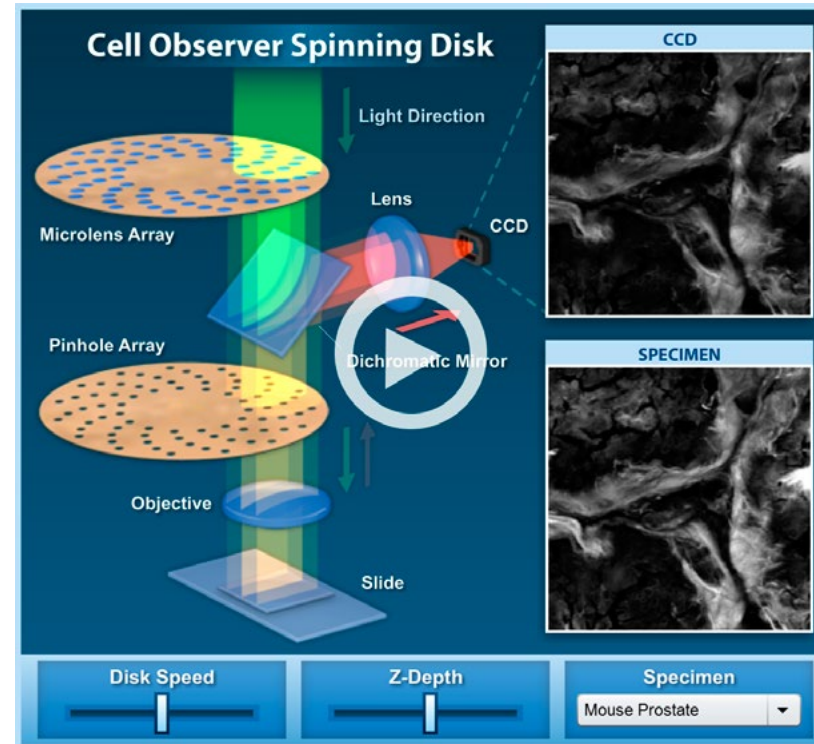
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ZEISS Cell Observer SD Captures Hundreds of Image Points Simultaneously

Use Cell Observer SD to project and capture excitation light simultaneously through hundreds of circular apertures arranged in a spiral shape on the rotating disk of Yokogawa CSU-X1. With a rotation by 30 degrees, the disk covers the complete field of view of your camera and blocks out-of-focus emission light almost completely.

Yokogawa CSU-X1 is equipped with a tandem disk system: the rotating disk with circular apertures has a second disk in front of it. Microlenses located on this disk focus the excitation light through the circular apertures and thus use it efficiently.

As a result, frame rates are clearly higher than with traditional single point scanners and you can detect fluorescence using EMCCD cameras with high quantum efficiency. Illumination intensity and phototoxicity are reduced to a minimum.



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

>> <http://zeiss-campus.magnet.fsu.edu/articles/spinningdisk/index.html>

Tailored Precisely to Your Applications

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Typical applications, typical samples	Task	ZEISS Cell Observer SD provides
Life Cell Imaging of cultivated cells	Examination of cellular and biophysical regulations-, growth- and signal mechanisms	<p>Time lapse, two cameras simultaneously</p> <p>Frame rates up to 55 images per second and camera (Photometrics Evolve™ 512 Delta, full frame)</p> <p>Depending on selected camera support of Overlap Read Out and exposure times under 30ms; no reducing of image rate of camera</p> <p>Flexible selection of up to six laser lines and up to 3 laser fiber outputs to combine different observation and manipulation techniques</p> <p>Fast manipulation of biophysical processes with DirectFRAP laser manipulation module</p> <p>Stabilization of focus position below axial resolution limit, no influence on image quality (Definite Focus)</p>
	Research of cell-cell communication or signal mechanisms, which involve several cell organelles	<p>Fast 3D image stacks with piezo focussed objectives or sstage insert</p> <p>Optical sectioning increases axial resolution (z resolution) to 0.3 µm</p> <p>Support of vast range of CCD and EMCCD cameras, matching resolution and image field of chosen objectives</p> <p>Long Distance and LCI objectives with correction collar to compensate spherical aberrations, caused by specimen preparation or temperature gradients</p> <p>Precise synchronization of external devices within milliseconds, using trigger signals</p>
<i>In situ</i> Imaging of organotypic tissue cultures and tissue sections	Observation of intra- and intercellular processes in physiological conditions	<p>Plan-APOCHROMAT objectives for highest contrast and resolution</p> <p>Acquisition of IR-DIC and IR-Dodt contrast images in transmitted light</p> <p>Integrated and flexible incubation solutions from stage-top to large incubators</p>

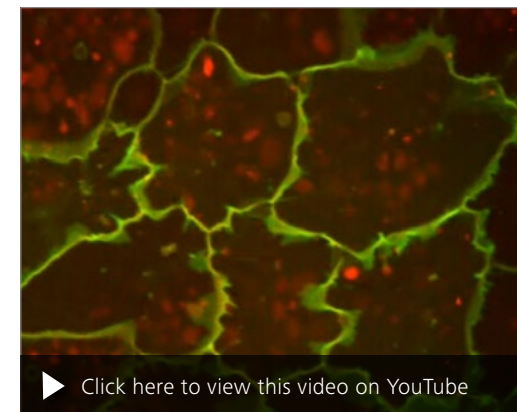
ZEISS Cell Observer SD at Work

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



Zebrafish blood



Xenopus explant



Drosophila embryo



Tobacco cells

Your Flexible Choice of Components

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1 Microscope

- Inverted: Axio Observer.Z1
- Upright: Axio Examiner.Z1, Axio Examiner.D1
- Micro-lens enhanced confocal spinning disk unit
- Single camera, manual system:
CSU-X1M 1800
CSU-X1M 5000
- Dual camera, manual system:
CSU-X1M 1800 dual cam
CSU-X1M 5000 dual cam
- Motorized configuration:
CSU-X1A 5000
- Scalable and laser-safe incubation modules

2 Objectives

- Plan-APOCHROMAT
- LCI Plan-NEOFLUAR
- LCI Plan-APOCHROMAT
- W Plan-APOCHROMAT
- W N-ACHROPLAN

3 Illumination

- Choose up to six laser lines:
405/445/488/515/561/638
(see technical specifications for power)
- Fast emission filter wheel
- DirectFRAP laser manipulation
for photoactivation and photobleaching
- TIRF laser illumination

4 Cameras

- Dual Camera acquisition with CCD and EMCCD cameras for best detection sensitivity
- AxioCam HRm, AxioCam MRm
 - QImaging Rolera EM-C2, Hamamatsu ImageEM,
 - Photometrics Evolve™, Evolve™ 512 Delta and QuantEM, Andor iXON3 (DU-897/DU-885)

5 Software

- Recommended modules for ZEN system:
- Tiles & Positions, Physiology, Extended Focus (Acquisition)
 - Deconvolution, 3D VisArt, Colocalization (Processing)
 - Image Analysis, Measurement (Analysis)

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Microscope	ZEISS Axio Observer.Z1	ZEISS Axio Examiner.Z1	ZEISS Axio Examiner.D1
Stand	inverted, motorized	upright, motorized	upright, motorized lower microscope body
Dimensions	ca. 295 × 805 × 707 mm	335 mm x 630 mm x 470 mm	335 mm x 630 mm x 470 mm
Weight	ca. 36 kg	ca. 28 kg	ca. 28 kg
Eyepieces	Field number 23 (E-PI 10x/23 br foc), Diameter: 30 mm		
Objectives			
Nosepiece turret (M27x0,75)	6x H DIC ACR mot, 6x H DIC mot	2x DIC cod., 4x DIC cod.	2x DIC cod., 4x DIC cod.
Contrast Methods			
Reflector turret	6x mot ACR, 6x mot, 6x cod.	5x man/5x mot	5x man/5x mot
Operational data			
Line voltage ranges Change of instrument voltage setting is not necessary!	VP232-2, 100 to 240 VAC (+/- 10%)	100 to 127, 200 to 240 VAC (+/- 10%)	100 to 240 VAC (+/- 10%)
Line frequency	50/60 Hz	50/60 Hz	50/60 Hz
Power consumption with internal power supply units	190 VA	260VA	260VA
Intended site	Closed spaces		
Protection class/Protection type	I, IP 20		
Electrical safety	in compliance with DIN EN 61010-1 (IEC 61010-1) under consideration of CSA and UL directives		
Safety of laser devices	in accordance with DIN EN 60825-1 (IEC 60825-1)		
Overvoltage category	II		
Radio interference suppression	in accordance with EN 55011 class B		
Noise immunity	in accordance with DIN EN 61326-1		

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Accessories		Dimensions (width x depth x height)	Weight
Spinning Disk Unit	Single camera, manual system CSU-X1M 1800 spinning disk unit: Microlense-enhanced Nipkow-disk confocal unit, fixed disk speed 1800 rpm, manual shutter control and fixed dichroic, coupling fiber	ca. 324 mm x 213 mm x 304 mm	7.5 kg
	CSU-X1M 5000 spinning disk unit: Microlense-enhanced Nipkow-disk confocal unit with control unit, disk speed adjustable 1500 - 5000 rpm, automatic shutter control and fixed dichroic, coupling fiber	ca. 324 mm x 213 mm x 304 mm	7.5 kg
	Dual camera, manual system CSU-X1M 1800 dual dam spinning disk unit: Microlense-enhanced Nipkow-disk confocal unit, fixed disk speed 1800 rpm, manual shutter control and fixed dichroic, second camera port for simultaneous dual channel acquisition, coupling fiber	ca. 324 mm x 301 mm x 175 mm	9.5 kg
	CSU-X1M 5000 dual cam spinning disk unit: Microlense-enhanced Nipkow-disk confocal unit with control unit, disk speed adjustable 1500 - 5000 rpm, automatic shutter control and fixed dichroic, second camera port for simultaneous dual channel acquisition, coupling fiber	ca. 324 mm x 301 mm x 175 mm	9.5 kg
	Motorized configuration CSU X1A 5000 spinning disk unit: Microlense-enhanced Nipkow-disk confocal unit with control unit, disk speed adjustable 1500 - 5000 rpm, automatic shutter control, three position motorized dichroic changer and 6 position high speed emission filter wheel, coupling fiber	212 mm x 438 mm x 132 mm	9.4 kg
Filter wheel		599 mm x 700 mm x 692 mm	1.9 kg

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Dimensions (width x depth x height)	
Laser Bench Tower	310 mm x 448 mm x 465 mm
Laser Bench Rack/ Laser Bench Rack 3F	600 mm x 706 mm x 558 mm
Weight	
Laser Bench Tower	25.5 kg
Laser Bench Rack	52.5 kg
Laser Bench Rack 3F	55 kg
Ambient Conditions	
Transportation (in packaging)	
Admissible ambient temperature	-20 to +55 °C
Admissible relative humidity (no condensation)	max. 75 % at 35 °C
Storage	
Admissible ambient temperature	+5 to +40 °C
Admissible relative humidity (no condensation)	max. 75 % at 35 °C
Operation	
Admissible ambient temperature	+15 °C to +35 °C
Admissible relative humidit	max. 65 % at 30 °C (non-condensing)
Atmospheric pressure	800 hPa to 1060 hPa
Operation altitude	max. 2000 m
Pollution degree	2

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Operating data	
Radio interference suppression	in compliance with EN 55011 Class A
Noise immunity	in compliance with DIN EN 61326-1
Laser Bench Rack/Rack 3F	
Intended place of application	Closed rooms
Protection class	I
Ingress protection rating	II
Line voltage range	100 V AC to 230 V AC $\pm 10\%$ Change of line voltage is not required!
Line frequency	50/60 Hz
Power consumption	max. 300 VA
Laser Bench Tower coupling module	
Intended place of application	Closed rooms
Protection class	I
Ingress protection rating	IP 20
Overvoltage category	II
Line voltage range	100 V AC to 230 V AC $\pm 10\%$
Line frequency	50/60 Hz Change of line voltage is not required!
Power consumption	max. 150 V
Fuses	2x T 4.0 A/H/250 V 1x T 1.0 A/H/250 V

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Laser Bench Tower

Intended place of application	Closed rooms
Protection class	I
Ingress protection rating	IP 20
Overvoltage category	100 V AC to 230 V AC $\pm 10\%$ Change of line voltage is not required!
Line frequency	50/60 Hz
Current consumption	4.0 to 8.0 A
Power consumption	max. 960 VA
Fuses	2x T 6.3 A/H/250 V

VP 232-2 external power supply unit for Axio Observer.Z1

Intended place of application	Closed rooms
Protection class	I
Ingress protection rating	IP 20
Overvoltage category	II
Line voltage range	100 V AC to 230 V AC $\pm 10\%$ Change of line voltage is not required!
Line frequency	50/60 Hz
Power consumption	max. 190 VA
Fuses	2x T 4.0 A/H/250 V

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Laser Bench Tower / Laser Bench Rack / Laser Bench Rack 3F		
Laser wavelength range	400 nm to 643 nm	
Laser class	3B	
Typical laser power rating	Laser 405	20 mW or 50 mW
	Laser 445 nm	25 mW or 40 mW
	Laser 488 nm	30 mW or 50 mW or 100 mW
	Laser 515 nm	20 mW or 50 mW
	Laser 561 nm	20 mW or 50 mW or 75 mW
	Laser 638 nm	75 mW
	SVB 1 (Signal distribution box)	
Dimensions	220 mm x 250 mm x 85 mm	
Line voltage	100 to 240 V ±10 % : Change of instrument voltage setting is not necessary!	
Line frequency	50/60 Hz	
Max. power consumption	20 VA	
Fuses	2x T1,0 A/H	
Intended site	closed rooms	
Protection class	I	
Protection type	IP 20	
Electrical safety	in compliance with DIN EN 61010-1 (IEC 61010-1) under consideration of CSA and UL directives	
Overvoltage category	II	
Radio interference suppression	in accordance with EN 55011 class B	
Noise immunity	in accordance with DIN EN 61326-1	

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Control Box CSU-X1	
Dimensions	112 mm x 226 mm x 100 mm
Weight	1.9 kg
Line voltage	100 to 240 V \pm 10 %: Change of instrument voltage setting is not necessary
Line frequency	50/60 Hz
Max. power consumption	max. 200 VA
Fuses	automatic circuit breaker
Intended site	closed rooms
Protection class	I
Protection type	IP 20
Electrical Safety	in compliance with DIN EN 61010-1 (IEC 61010-1)
Overvoltage category	II
HXP 120 V	
HXP 120 C	
Line voltage	100 to 240 V \pm 10 %: Change of instrument voltage setting is not necessary
Line frequency	50/60 Hz
Max. power consumption	max. 210 VA
Fuses	2x T 2,5 A/H
Intended site	closed rooms
Protection class	I
Protection type	IP 20
Electrical safety	in compliance with DIN EN 61010-1 (IEC 61010-1)
Definite Focus Controller	

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Dimensions	220 mm x 250 mm x 85 mm
Line voltage	100 to 240 V ±10 %: Change of instrument voltage setting is not necessary!
Line frequency	50/60 Hz
Max. power consumption	60 VA
Fuses	2x T 2,0 A/H
Intended site	closed rooms
Protection class	I
Protection type	IP 20
Electrical Safety	in compliance with DIN EN 61010-1 (IEC 61010-1) under consideration of CSA and UL directives
Overvoltage category	II
Radio interference suppression	in accordance with EN 55011 class B
Noise immunity	in accordance with DIN EN 61326-1
Power supply for CSU-X1 spinning disk unit	
Supply voltage	100 to 240 VAC (± 10 %); 50/60 Hz
Max. power consumption	max. 38 VA
Optical-mechanical data	
Scanning field	Standard 10 mm x 7 mm
Mechanical port for microscope	C-Mount
Environmental conditions	

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Transport (in packaging)	Permissible ambient temperature	-20 to +55 °C
	Permissible relative air humidity (no condensation)	max. 75 % at 35 °C
Storage	Permissible ambient temperature	+5 to +40 °C
	Permissible relative air humidity (no condensation)	max. 75 % at 35 °C
Operation	Permissible ambient temperature	+15 °C to +35 °C, optimum 22 °C
	Permissible relative air humidity	max. 65 % at 30° C
	Atmospheric pressure	800 hPa to 1060 hPa
	Max. altitude of installation site	max. 2000 m
	Pollution degree	2



Count on Service in the True Sense of the Word

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

Repair. Maintain. Optimize.

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

Our service on-demand also brings you distinct advantages. ZEISS service staff will analyze issues at hand and resolve it – whether using remote maintenance software or working on site.

Enhance Your Microscope System.

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

Please note that our service products are always being adjusted to meet market needs and maybe be subject to change.



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

>> www.zeiss.com/microservice

The moment your data change scientific minds.
This is the moment we work for.

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// RECOGNITION
MADE BY ZEISS



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