Anexa 3, micrscop trinocular

Model:Zeiss axio Scope 5 cu camera Axiocam 212 color

Parametri solicitati	Parametri oferiti
Descriere: Microscopul este un instrument optic utilizat pentru vizualizarea obiectelor foarte mici. Domeniu de utilizare: Se utilizează în laboratoarele morfopatologice pentru vizualizarea lamelor histologice. Cerințe funcționale: De masă (benchtop); cu câmp luminos; configurație verticală (upright). Vizualizarea lamelor histologice. Oculare: Tip binocular/trinocular; Mărire minimă 10x; Număr de câmp minim 22; Cu reglaj dioptric; Protecție din cauciuc împotriva luminii laterale; Compensare ametropie +5 – -5; Distanță interpupilară reglabilă; Distanță interpupilară 45 mm – 75 mm; Unghi de înclinare al tubului de observație ≤ 35° Revolver și obiective: Număr de obiective – 5 bucăți; plan-acromatice; Obiectiv 4x; apertură numerică minimă 0,1; Obiectiv 10x; apertură numerică minimă 0,25; Obiectiv 20x; apertură numerică minimă 0,4; Obiectiv 40x; apertură numerică minimă 0,65; Obiectiv 60x; apertură numerică minimă 0,7; Număr de câmp pentru toate obiectivele minim 22. Mecanism de focalizare: Mod de focalizare rapidă și fină; Pas minim de reglaj pentru focalizarea fină maximum 1 µm. Platina: Suport pentru lamă și sistem de deplasare pe axele XY; Bară de ghidaj pe partea dreaptă cu manșon din cauciuc; Suport pentru lamă cu un braț mobil. Sursa de lumină și condensator: Tip LED; Redare naturală a culorilor; Putere luminoasă echivalentă cu lampă halogen de 100 W; Durată de viață minim 50.000 ore; Iluminare prin transmisie; Reglaj continuu al intensității luminii; Funcție de memorare a luminozității pentru fiecare mărire.	Descriere: Microscopul este un instrument optic utilizat pentru vizualizarea obiectelor foarte mici. Domeniu de utilizare: Se utilizează în laboratoarele morfopatologice pentru vizualizarea lamelor histologice. Cerințe funcționale: De masă (benchtop); cu câmp luminos; configurație verticală (upright). Vizualizarea lamelor histologice. Oculare: Tip binocular/trinocular; Mărire minimă 10x; Număr de câmp 23; Cu reglaj dioptric; Protecție din cauciuc împotriva luminii laterale; Compensare ametropie +5 – -5; Distanță interpupilară reglabilă; Distanță interpupilară 50 mm – 75 mm(Nota: Intervalul normal interpupilar pentru adulti este între 54 mm și 74 mm); Unghi de înclinare al tubului de observație 30° Revolver și obiective: Număr de obiective – 6 bucăți; plan-acromatice; Obiectiv 2,5x; apertură numerică minimă 0,07 Obiectiv 5x; apertură numerică minimă 0,15; Obiectiv 10x; apertură numerică minimă 0,25; Obiectiv 20x; apertură numerică minimă 0,45; Obiectiv 40x; apertură numerică minimă 0,65; Obiectiv 63x; apertură numerică minimă 0,85; Număr de câmp pentru toate obiectivele 23. Mecanism de focalizare: Mod de focalizare rapidă și fină; Pas minim de reglaj pentru focalizarea fină maximum 1 µm. Platina: Suport pentru lamă și sistem de deplasare pe axele XY; Bară de ghidaj pe partea dreaptă cu manșon din cauciuc; Suport pentru lamă cu un braț mobil. Sursa de lumină și condensator: Tip LED; Redare naturală a culorilor; Putere luminoasă echivalentă cu lampă halogen de 100 W; Durată de viață minim 50.000 ore; Iluminare prin transmisie; Reglaj continuu al intensității luminii; Funcție de memorare a luminozității pentru fiecare mărire.

Condensator: Tip rabatabil (swing-out); Diafragmă cu diametru reglabil; Interval reglaj diafragmă 1,25x – 100x. Sistem de captură imagine: Cameră video digitală color; Montare cameră tip C-mount sau integrată; Tehnologie CCD sau CMOS; Calitate imagine minim 4K UHD; Rată maximă cadre video minim 25 fps pentru 4K; Dimensiune maximă imagine minim 18 megapixeli; Rezoluție ADC minim 12 biți; Conectare la calculator prin USB sau Wi-Fi; Format imagine 16:9 și 4:3. Funcții speciale: Funcție pentru obținerea imaginilor fără artefacte; Funcție pentru redarea naturală a culorilor și balans automat de alb; Conectare la microscop cu obținerea imaginii din întreg câmpul vizual; Pierdere maximă a diametrului vizual ≤1%.	Condensator: Tip rabatabil (swing-out); Diafragmă cu diametru reglabil; Interval reglaj diafragmă 1,0x – 100x. Sistem de captură imagine: Cameră video digitală color; Montare cameră tip C-mount ; Tehnologie CMOS; Calitate imagine minim 4K UHD; Rată maximă cadre video 30 fps pentru 4K; Dimensiune maximă imagine 12 megapixeli, fără interpolare software, compatibilitate optică demonstrată cu microscopul ofertat.; Rezoluție ADC minim 12 biți; Conectare la calculator prin interfață digitală USB 3.0 sau superior și/sau Ethernet; Format imagine 16:9 și 4:3. Funcții speciale: Funcție pentru obținerea imaginilor fără artefacte; Funcție pentru redarea naturală a culorilor și balans automat de alb; Camera digitală va fi conectată la microscop prin adaptor C-mount recomandat de producător, astfel încât să permită captarea întregului câmp vizual disponibil al microscopului pentru configurația respectivă (entire field of view), fără vignetare semnificativă
Calculator și software: Compatibil cu microscopul și sistemul de captură imagine; Sistem de operare licențiat; Antivirus licențiat; Monitor minim 24 inch; Rezoluție monitor 4K; Limbă sistem de operare: română; Memorie minimă 500 GB. Software specializat pentru stocarea imaginilor: Compatibil cu sistemul; Posibilitate de stocare, vizualizare și procesare; Funcții de analiză geometrică, analiză de culoare, analiză și clasificare obiecte; Licență nelimitată; Export în formate jpg, bmp și generare rapoarte.	Calculator și software: Compatibil cu microscopul și sistemul de captură imagine; Sistem de operare licențiat; Antivirus licențiat; Monitor minim 24 inch; Rezoluție monitor 4K; Limbă sistem de operare: română; Memorie minimă 500 GB. Software specializat pentru stocarea imaginilor: Compatibil cu sistemul; Posibilitate de stocare, vizualizare și procesare; Funcții de analiză geometrică, analiză de culoare, analiză și clasificare obiecte; Licență nelimitată; Export în formate jpg, bmp și generare rapoarte.
Termen de garantie ≥ 36 luni	Termen de garantie 36 luni
Posibilitatea de asigurarea din partea producătorului cu piese, consumabile, altor accesorii și a reparațiilor timp de min. 10 ani de exploatare a echipamentului	Posibilitatea de asigurarea din partea producătorului cu piese, consumabile, altor accesorii și a reparațiilor timp de min. 10 ani de exploatare a echipamentului
Certificate CE, ISO 13485	Certificate CE, ISO 13485
Instalarea și testarea la destinație da	Instalarea și testarea la destinație da
Transportarea și livrarea la destinație da	Transportarea și livrarea la destinație da
Deservire în perioada de garanție și post-garanție da	Deservire în perioada de garanție și post-garanție da
Prezentarea graficului de mentenanță prevăzut de	Prezentarea graficului de mentenanță prevăzut de

producător pentru perioada de garanție 3 ani. Indicarea tuturor lucrărilor care se vor îndeplini. da Soft inclus cu parole de acces si licența nelimitata Ghid rapid Min. 1 buc, ghid rapid al utilizatorului în limba de stat (Română), laminată și atașată de dispozitiv. Manual de utilizare: În limba de stat (Română), în cazul în care nu este prezent să fie prezentat manualul în limba de stat cu ștampila biroului de traducere. Manual de service În limba de stat (Română) sau în una din limbile de circulație internațională Training pentru utilizatori Da, pregătire de lucru, mod de utilizare a dispozitivului, întreținerea zilnică Training pentru personal tehnic Ajustarea, calibrarea, înlăturarea defecțiunilor minore.	producător pentru perioada de garanție 3 ani. Indicarea tuturor lucrărilor care se vor îndeplini. da Soft inclus cu parole de acces si licența nelimitata Ghid rapid Min. 1 buc, ghid rapid al utilizatorului în limba de stat (Română), laminată și atașată de dispozitiv. Manual de utilizare: În limba de stat (Română), în cazul în care nu este prezent să fie prezentat manualul în limba de stat cu ștampila biroului de traducere. Manual de service În limba de stat (Română) sau în una din limbile de circulație internațională este disponibil doar pentru inginerii de service certificate de producator. Training pentru utilizatori Da, pregătire de lucru, mod de utilizare a dispozitivului, întreținerea zilnică Training pentru personal tehnic Ajustarea, calibrarea, înlăturarea defecțiunilor minore.

Configuratie detaliata pentru ZEISS Axio Scope 5:

#	Cod	Descriere	Cant
1	430035-9241-000	**Axioscope 5 Stand TL Module** Microscope stand Axioscope 5, TL, 6x H encoded, LED/HAL 100, Module Consisting of: - lower stand part with dovetail illumination interface - transmitted-light illumination with white LED 10W, optional for HAL 12V 100W - dovetail mount for attachable stage carriers - 24 mm focus lift, adjustable focus stop - 6-position filter wheel for dia. 36 mm filters in TL - mount for 2-position filter slider 14x40, d=36 mm - integrated 24V DC 60W power unit, stabilized 100...240V AC/ 50...60Hz - country-specific power cable - ECO mode and light management control button - Snap button supports on ZEISS Axiocam - USB 2.0 to PC - dust cover - filter holder in TL - upper stand part for transmitted light with nosepiece 6x H, M27 - dovetail mount for changeable reflector turrets and reflector slider Additionally included: - 2x Eyepiece PL 10x/23 Br. foc. - 2x Eyepiece eyecup	**1**
2	430710-9401-000	**Stage carrier, detachable Module** Stage carrier, detachable, Module Consisting of: -Stage carrier D/A; attachable and vertically adjustable for Axioscope, to accommodate screw-on stages -Condenser carrier with vertical adjustment on both sides for use with attachable Axio Scope stage carriers, adjustable height stop	**1**
3	432035-9004-000	**Mechanical stage 75x50 R f/Axioscope 5**	**1**
4	432333-9402-000	**Dual use specimen holder Module** Specimen holder for two slides 76x26mm, spring lever left, Module	**1**
5	425520-9410-000	**Binoc. Phototube 30°/23 50:50 Module** Binocular phototube 30°/23 (50:50) module Consists of: - Binocular phototube 30°/23 (50:50), reversed image camera port with interface 60N	**1**

6	424225-9460-000	**Condsr Achr Apl 0.9 BF Module** Condenser module, achromatic-aplanatic 0.9 BF Consists of: - Condenser, achromatic-aplanatic 0.9 BF with front lens which can be switched on the right and left, For objectives 1.0x-100x, WD=1.0mm	**1**
7	420920-9901-000	**N-Achroplan 2.5x/0.07 WD=9.8 M27** Objective N-Achroplan 2.5x/0.07 M27 (FWD=9.8mm)s	1
8	420930-9901-000	**N-Achroplan 5x/0.15 WD=12.0 M27** Objective N-Achroplan 5x/0.15 M27 (FWD=12.0mm)	1
9	420940-9901-000	**N-Achroplan 10x/0.25 WD=6.5 M27** Objective N-Achroplan 10x/0.25 M27 (FWD=6.5mm)	1
10	420950-9901-000	**N-Achroplan 20x/0.45 WD=0.63 M27** Objective N-Achroplan 20x/0.45 M27 (FWD=0.63mm)	1
11	420960-9901-000	**N-Achroplan 40x/0.65 WD=0.60 M27** Objective N-Achroplan 40x/0.65 M27 (FWD=0.60mm)	1
12	420980-9900-000	**N-Achroplan 63x/0.85 WD=0.20 M27** Objective N-Achroplan 63x/0.85 M27 (FWD=0.20mm), incl. Cover glasses, high performance, CG=0.17mm, box with 100 pc.	1
13	426570-9901-000	**Camera Axiocam 212 color** Microscopy Camera Axiocam 212 color Most versatile color camera for education, documentation and routine applications with standalone capability, USB 3.0 and Ethernet connectivity with 64bit driver software for: ZEN (blue and core), Labscope and TWAIN plugin. Camera package contains the following accessories: - USB 3.0 flash drive, Type-C and Type-A - USB 3.0 cable Type-C to Type-A - Power & signal cable camera to microscope stand compatible with Axiolab 5 and Axioscope 5/7/Vario - Power adapter with country-specific plug Sensor: Sony CMOS image sensor Color, Rolling Shutter Number of Pixel (max): 4032 (H) x 3044 (V) = 12.3 MP, Full Sensor Selectable Resolution: 4032 (H) x 3044 (V) = 12.3 MP, Full Sensor 3840 (H) x 2160 (V) = 8.1 MP, Ultra HD (4K) 1920 (H) x 1080 (V) = 2.1 MP, Full HD (1080p) Pixel size: 1.85 µm x 1.85 µm (resolution 4032 x 3044 and 3840 x 2160) 3.70 µm x 3.70 µm (binned, resolution 1920 x 1080) Effective Sensor Area: 4032 x 3044: 7.4 mm x 5.7 mm, equivalent to 1/1.7" (9.3 mm diagonal) 3840 x 2160: 7.2 mm x 4.0 mm, equivalent to 1/2.1" (8.2 mm diagonal) 1920 x 1080: 7.2 mm x 4.0 mm, equivalent to 1/2.1" (8.2 mm diagonal) Spectral range: approx. 400 nm - 700 nm, IR filter; RGBBayer color mask Control buttons on camera: 1x Power on/off switch 1x Camera factory reset Status-LED for camera: color coded operation status Stand-alone: Image storage format: TIFF or JPG Video stream format: mp4 Live frame rate viaHDMI: 30 fps @ 4K/1080p Live frame rate through software via Ethernet or USB 3.0 (depending on hardware and software configuration), Exp. Time 1 ms: H x V Frame rate 4032 x 3044 up to 11 fps (ZEN (blue) / ZEN core) 3840 x 2160 up to 17 fps (ZEN (blue) / ZEN core) 1920 x 1080 up to 30 fps (ZEN (blue) / ZEN core) 1920 x 1080 up to 30 fps (Labscope) Digitization: 24-bit (3 x 8-bit RGB) A/D conversion Integration time: 0.1msup to 1 s Gain: 0x - 27x Interfaces for Communication and for Power: 1x HDMI for monitor 1x USB 3.0 Type C for USB flash drive, Wi-Fi adapter or PC connection 2x USB 2.0 Type A for mouse and keyboard 1x RJ45 (Ethernet) for LAN connection 1x M8 for power and communication with dedicated stands Optical interface: C-mount Size/Weight: approx. 125 x 92 x 78mm / 700 g Housing: Blue painted aluminum and cooling fins	1

		Registration: CE, CSA, UKCA Power supply: via M8interface Power consumption: max. 36 W (24 V DC,1.5 A) Environmental conditions: +5°C to +35°C, max. 75% relative air humidity at 35°C, no condensation, free air circulation required, CATII, pollution degree 2, altitude <2000m, indoor use Supported Operating systems: for ZEN: Windows 10 / Windows 11 for Labscope: Windows 10 and 11 x64 and higher, iOS v15 and higher, Android 12 and higher Supported Application Software: ZEN 3.11 (blue edition) and higher ZEN core 3.11 and higher Labscope v4.4 and higher (Windows, iOS and Android) TWAIN plugin: Software interface to control camera by 3rd party application software The camera is network-enabled and can be used with the ZEISSiOS App, Android APP and ZEISS Labscope software. The Apps are available as a free download from the Apple® App Store, Google Play Store or ZEISS Portal. Unless otherwise stated by the distributor, iPad® and WLAN router are not supplied by ZEISS. Apple®, Apple iPad® are registered trademarks of Apple Inc.	
14	426112-0000-000	**Camera adapter 60N C-mount 0,5x** Camera Adapter 60N-C 2/3" 0.5x	1
15	410135-1001-000	**SW ZEN lite f/Module DL** ZEN lite basic software (O) ZEN lite with reduced basic functionality and user interface of ZEN pro, desk or system. Drivers for Axiocam cameras, image acquisition (SNAPs) and viewer, no microscope control. Panorama for acquisition of Tiles Images with manual stage and manual Extended Focus (EDF) capability.	1
16	410136-0155-311	**SW ZEN Module Coded Microscope DLic** ZEN Module Coded Microscope Module for reading out coded microscope components. The module enables the display of coded components such as objectives and reflector cubes. Moreover the position of a coded stage can be read out and displayed. Only available for ZEN starter and ZEN lite.	1
17	474030-9010-000	**Cover glassess 1,5 H, high-performance,** Cover glasses 1,5 H, high-performance, 100 pc	1
18	000000-0411-763	**Power Cord VII-H05VV-F3G1.0-C13/2.5m bk** Power Cord VII-H05VV-F3G1.0-C13/2.5m bk	1

ZEISS Axioscope 5

Your Smart Microscope for Biomedical Routine and Research

zeiss.com/axioscope

Seeing beyond

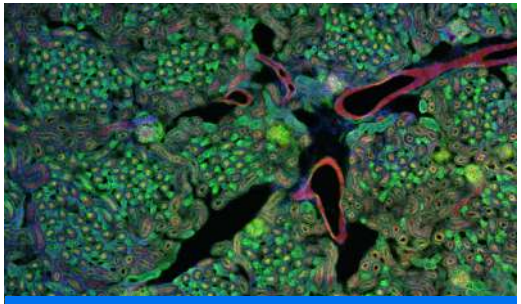
Your Smart Microscope for Biomedical Routine and Research

In your clinical lab, such as a pathology lab, smart features and ergonomic handling are particularly valuable. Adaptable accessories such as ergophototubes further enhance your comfort and reduce strain during work. While working with Axioscope 5 you don't even need to move your hands from the microscope stand anymore. All you have to do is focus and press Snap. You're done.
This allows you to fully concentrate on analyzing and documenting your samples. You'll work more efficiently, save time and produce high contrast images with best image quality. What's more: this even works without any PC involved.

Simpler. More Intelligent. More Integrated.

Capture Four Fluorescence Channels with Just One Click

Acquiring fluorescent images has never been so easy. Combine Axioscope 5 with the high performance LED light source Colibri 3 and the standalone microscope camera Axiocam 202 mono to have the perfect setup for easy multichannel fluorescence documentation. Switch effortlessly between the channels for UV, blue, green and red excitation. Just select the relevant channels and press Snap. The system then takes over and automatically adjusts the exposure time, acquires the image, switches the channel and starts again. That's it: you get your overlayed multichannel fluorescence image including scale bar – even without a PC.



Smart Microscopy Makes Your Digital Documentation Faster

Axioscope 5 makes documenting your specimens very efficient. The color impression shows up in the camera image is exactly the same as it appears through the eyepieces. The smart microscope systems make automatic adjustments for brightness and white balance to keep digital documentation easy. All you have to do is focus on your sample, press the ergonomic Snap button on the microscope, and that's it. Acquiring high quality images with high color fidelity has never been easier – and faster.

Enhance Ergonomics in Your Clinical Lab

Maintaining a healthy and relaxed working environment is crucial, especially during long work shifts. Axioscope 5 is designed with ergonomics at the forefront, ensuring comfort and efficiency. The microscopes feature an adjustable ergophototube, allowing you to modify the eyepiece height and angle to match your natural posture. All essential buttons and controls are within easy reach, reducing the risk of repetitive strain injuries. The light manager automatically adjusts the illumination to provide uniform brightness at all magnifications. You don't need to manually adjust lamp brightness, saving time and reducing eye fatigue. The transmitted white light LED provides powerful illumination with high color fidelity. Additionally, LED illumination offers stable color temperature, low energy consumption, and a long lifetime, making it both an efficient and cost-effective choice.

Expand Your Possibilities

Boost your Efficiency –
with Smart Microscopy

Efficiency and quality are key in your lab, but it can take a lot of time to acquire detail-rich, true-color images. You know the drill: place the sample, focus your region of interest, switch to the computer, adjust settings such as white balance, exposure time and gain, then acquire an image, insert a scale bar, switch back to the microscope … and so on. That's what a typical documentation workflow looks like.

Now, with Axioscope 5, you can stay focused on your sample at all times, thanks to smart microscopy. Digital documentation is inherent in the systems design. Just press the ergonomic Snap button on the microscope and you're done. The procedure integrates perfectly with your established microscopy workflow and boosts your efficiency tremendously.

Routine imaging workflow

Smart functionality for digital documentation in brightfield and fluorescence for routine applications.

Efficiency gain:
Eyes and hands stay on the microscope.

Expand Your Possibilities

This is Smart Microscopy – Digital Documentation Made Easy

Used in combination with the microscope cameras Axiocam 202 mono or Axiocam 208 color, you have the full advantage of a smart standalone microscope solution.

Camera settings such as white balance, contrast and exposure time are done automatically. Without needing additional imaging software or even a computer, you can:

- Snap images and record videos directly from your stand
- Use mouse (and optionally keyboard) to control your camera via OSD (on screen display)
- Save settings
- Store images with all metadata of the microscope and camera as well as scaling information
- Predefine the name or rename your image

Stand-alone for Basic Routine Imaging

ZEISS Axioscope 5 operates independently of a computer system.

ZEISS Labscope for Advanced Routine Imaging

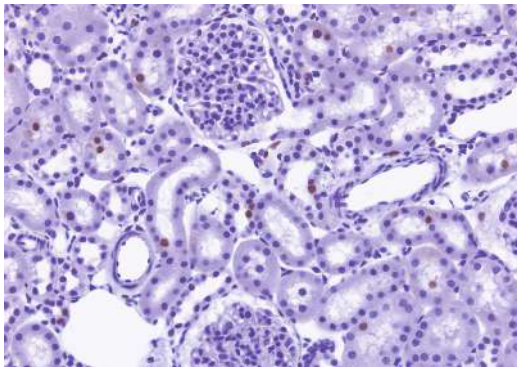
Operating ZEISS Axioscope 5 with ZEISS Labscope imaging software is ideal for connected microscopy and standard multichannel fluorescence imaging.

ZEISS ZEN for Research Applications

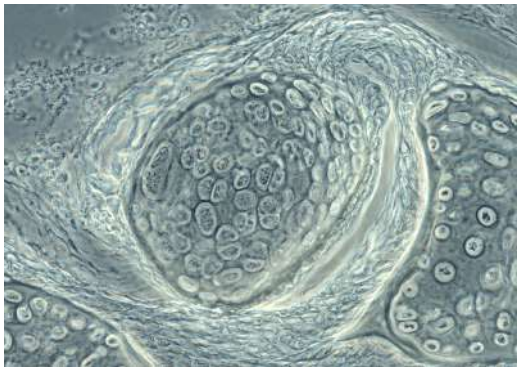
Use ZEN imaging software to perform advanced imaging tasks with ZEISS Axioscope 5.

Expand Your Possibilities

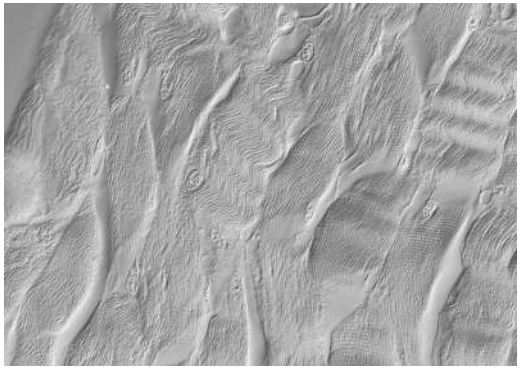
Whether unstained cells, histologically stained sections, or other samples: transmitted light techniques continue to be the standard for many examinations.
With Axioscope 5 you can use a sheer variety of contrasting techniques for your applications: the classical methods of brightfield, darkfield, phase contrast, but also Differential Interference Contrast (DIC) and polarization contrast.
Axioscope 5 can also be equipped with PlasDIC, the cost effective interference contrasting technique.



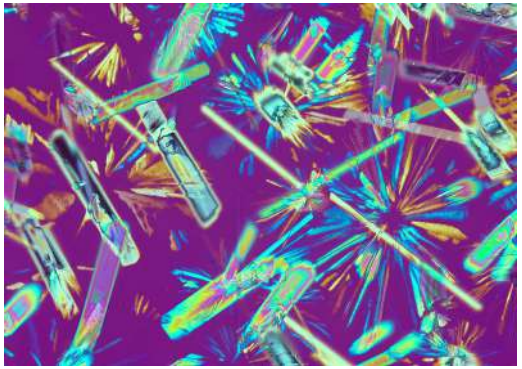
Rat kidney, acquired in transmitted light brightfield, objective: Plan-Apochromat 20×/0.8



Trout cartilage acquired in phase contrast, objective: Plan-Apochromat 63×/1.4



Rabbit muscle, acquired in DIC contrast, objective: Plan-Apochromat 63×/1.4



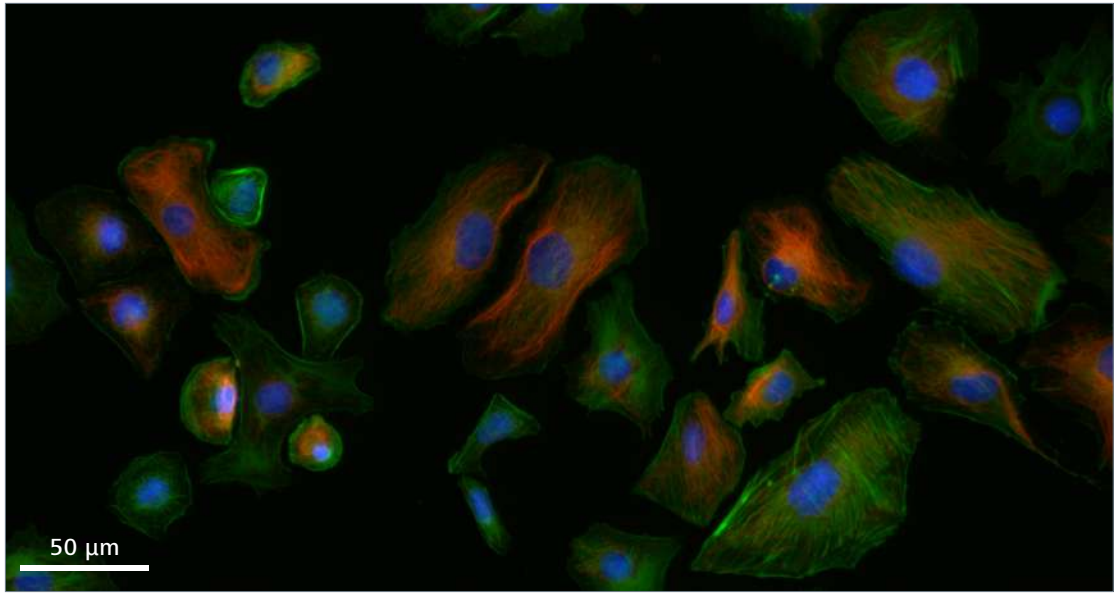
Crystal, acquired in polarization contrast, objective: Plan-Neofluar 20×/0.8

Expand Your Possibilities

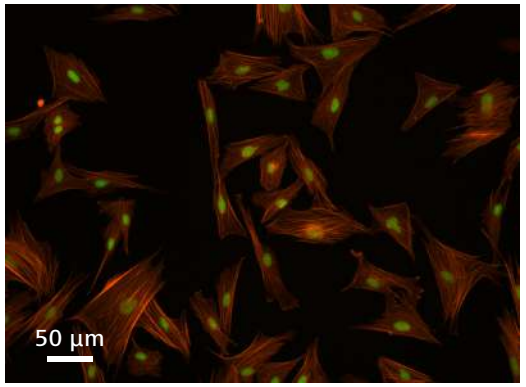
ZEISS Colibri 3 LED Illumination

Complement your Axioscope 5 with the optional fluorescence LED illumination Colibri 3, and acquire brilliant fluorescence images with ease. Colibri 3 delivers the right wavelength and intensity to excite fluorescent dyes and proteins in a gentle way.

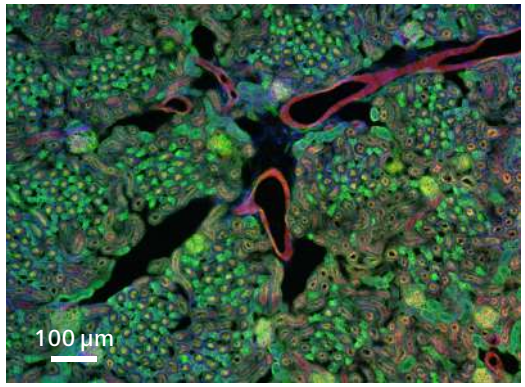
- Save time and money thanks to the long LED lifetime and adjustment-free operation.
- Choose up to four configurable wavelengths to fit your needs. Upgrade anytime you need to.
- Individually control and switch between channels for UV, blue, green and red excitation – or use selected wavelengths simultaneously.
- With direct visual status feedback, you are always sure which FL-LED is in use.
- The integrated design saves space and makes for easy and ergonomic operation.



Mink Uterus Endometrium Epithelial Cells, vimentin – red, F-actin – green, nucleus – blue; acquired with ZEISS Axioscope 5, Colibri 3 and Axiocam 202 mono in stand-alone mode, objective: Plan-Apochromat 40×/0.95



Indian muntiac, fibroblasts, F-actin – red, nucleus – green objective: Plan-Apochromat 20×/0.8



Mouse kidney in fluorescence, cryosection, AF 488 – WGA, AF 568 Phalloidin, DAPI, objective: Plan-Apochromat 20×/0.8

Expand Your Possibilities

Stay Relaxed and Protect Your Health

In your clinical or biomedical lab you quickly evaluate the status of tissue to decide on further treatment. You regularly check a huge amount of tissue slides under time pressure. Speed is essential. This work can be tiresome as you sit the whole day in front of your microscope. Therefore, a comfortable and relaxed sitting position is key. All microscope controls need to be ergonomic and comfortable. And fit perfectly to your person.

- Use adaptable ergophototubes to maintain an upright body posture.
- Adjust the height of the stage drive to let your hands rest comfortably on the table. Fine-tune the stage friction control for smoother movements with minimal.
- With ergonomically positioned snap buttons you acquire images and videos directly from the stand.
- Use ECO mode and your microscope goes to standby after being idle for 15 minutes. This saves energy and extends the lifetime of the illumination.
- The active light manager memorizes the individually set light intensity per objective. You profit from uniform brightness at all magnifications and reduced eye.
- With a field of view of 25 mm you see a >20 % larger area compared to conventional 22 mm.
- With the 10 W LED you visualize and document your samples in natural colors where even subtle color differences are clearly visible.

Choose between two Ergotubes:

Ergophototube with 23 mm FOV and a tilting range from -2 to +28°.

Ergophototube with 25 mm FOV and a tilting range from -2 to +28°. Also suitable for coobservation setups.

How to Adjust Your Microscope for Ergonomic Use

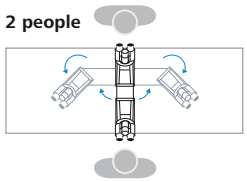
Click here to view this video

Expand Your Possibilities

Collaborate, Discuss, Share:
Co-observation Systems for Simultaneous Use by Multiple Viewers

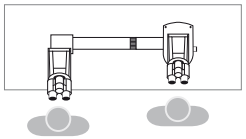
Multidiscussion or co-observation systems are indispensable tools for lab training, consultation and education. Imagine you have an interesting structure in your pathological sample, where you need a second opinion or advice. Or you educate your students on different types of blood cells where you need to see the same image simultaneously. Experience a new way of flexibility with the active two-position co-observation unit, available with your Axioscope 5. It allows you to arrange your setup in either a front-to-back or side-by-side configuration (left or right), providing a space-saving solution that adapts to your specific room or table requirements. The homogeneously illuminated field of view and the consistent image brightness for main and co-observer ensures optimal visibility and a comfortable and productive workplace environment. The system is equipped with a light pointer that allows you to highlight interesting details in the specimen. Choose from a range of colors, including white, blue, green, and red, to ensure optimum visibility under all circumstances. For larger multidiscussion solutions up to 20 co-observers, ZEISS provides various setup options tailored to your specific space requirements. All your colleagues can enjoy a consistent viewing experience, seeing images in the same orientation and brightness as you. This eliminates any potential irritation caused by rotated or mirrored images. In addition, each observation tube is equipped with its own support and height adjustment feature, which guarantees a stable and robust setup.

2 people



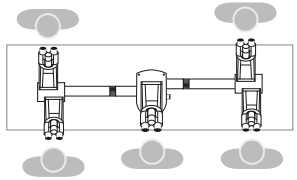
Face-to-face, left or right position with flexible orientation of eyepieces

2 people



Left position with flexible orientation of eyepieces

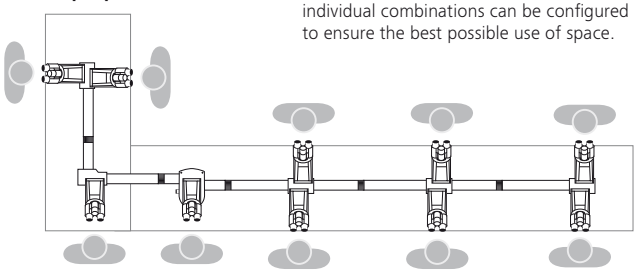
5 people



Left or right position with flexible orientation of eyepieces

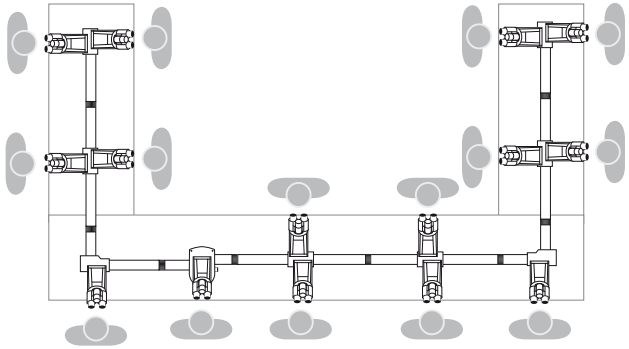
10 people

Depending on the space available, individual combinations can be configured to ensure the best possible use of space.



Flexible position with flexible orientation of eyepieces

15 people

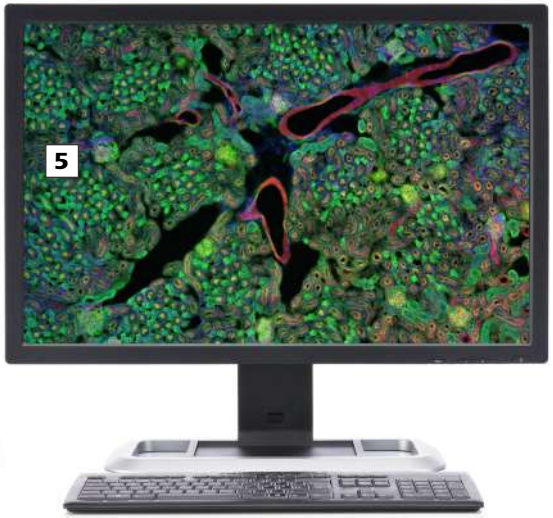


Flexible position with flexible orientation of eyepieces

Tailored Precisely to Your Applications

Field of Application	Biomedical Research	Human & Veterinary Medicine	Microbiology	Plant Sciences & Botany	Forensics
General task	Neuroscience, developmental biology, molecular biology, genetics, cell biology	Anatomy, pathology, cytology, hematology, cytogenetics, zoology	Bacteriology, mycology, parasitology, virology	Plant anatomy, plant disease, plant development, molecular genetics, epigenetics	Pathology, trace evidence, DNA laboratory
Tests performed	Documentation, answer research questions	Find medical evidence, answer research questions	Find medical evidence	Find quality-related evidence, answer research questions	Find jurisdictional evidence
Typical samples	Tissue, cells, organisms, body fluids	Histological tissue, body fluids like urine, blood, sputum	Bacteria, virus, fungi, parasites	Plant cells, algae, sections, bacteria, fungi, genetically modified crops	Tissue sections, fibers, hair, paint, vaginal swaps, sperm
Common stainings / preparations	Native, immuno-fluorescence, H&E, FISH	H&E, IHC, Papanicolaou, Giemsa, FISH	Gram stain, acidic-fast stain, methylene blue, Ziehl-Neelsen, immunofluorescence	Safranin & Alcian Blue, Safranin & Fast Green; Etzold	H&E, IHC, immuno-fluorescence such as Sperm Hy-Liter
Typical contrasting techniques	Brightfield, phase contrast, DIC, fluorescence	Brightfield, phase contrast, fluorescence, simple polarization	Brightfield, darkfield, phase contrast, DIC, fluorescence	Brightfield, phase contrast, polarization, DIC, fluorescence	Brightfield, phase contrast, polarization, fluorescence

Your Flexible Choice of Components



1 Microscope

- ZEISS Axioscope 5, transmitted light, LED
- ZEISS Axioscope 5, transmitted light, Hal 50
- ZEISS Axioscope 5, fluorescence

2 Recommended Objectives

- Plan-Apochromat
- Plan-Neofluar
- N-Achroplan

3 Illumination

Transmitted light:

- LED 10W, Hal 50, Hal 100

Reflected light, fluorescence:

- Colibri 3, HXP 120, and other

4 Recommended Microscope Cameras

- ZEISS Axiocam 202 mono
- ZEISS Axiocam 208 color

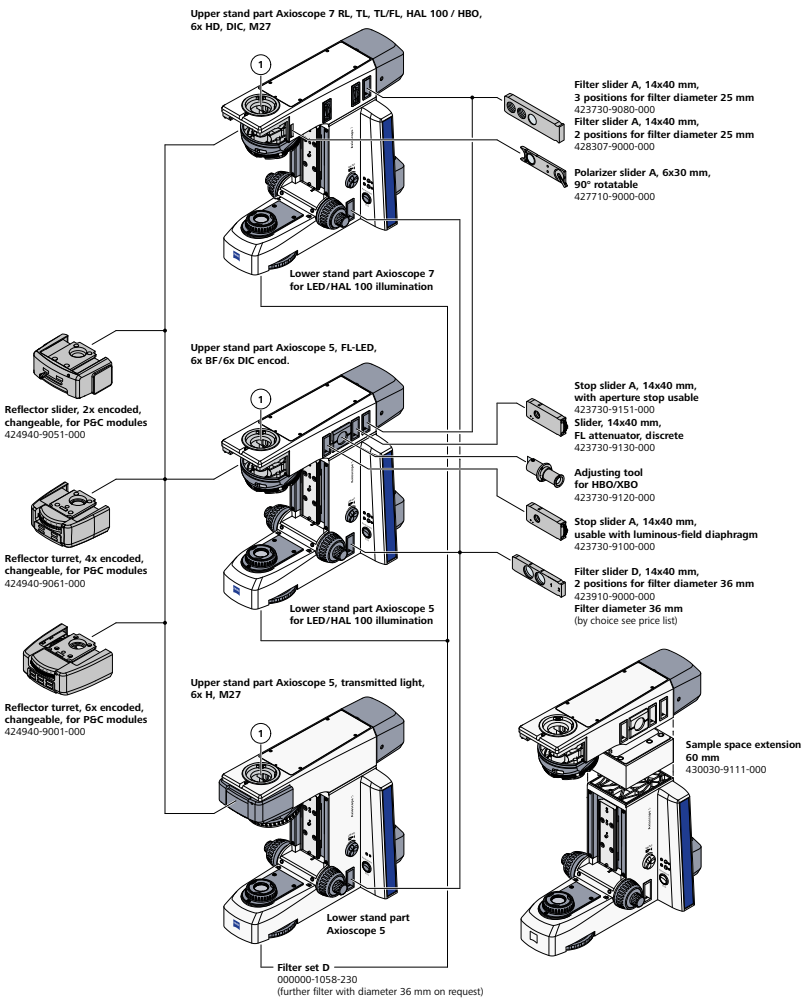
5 Software

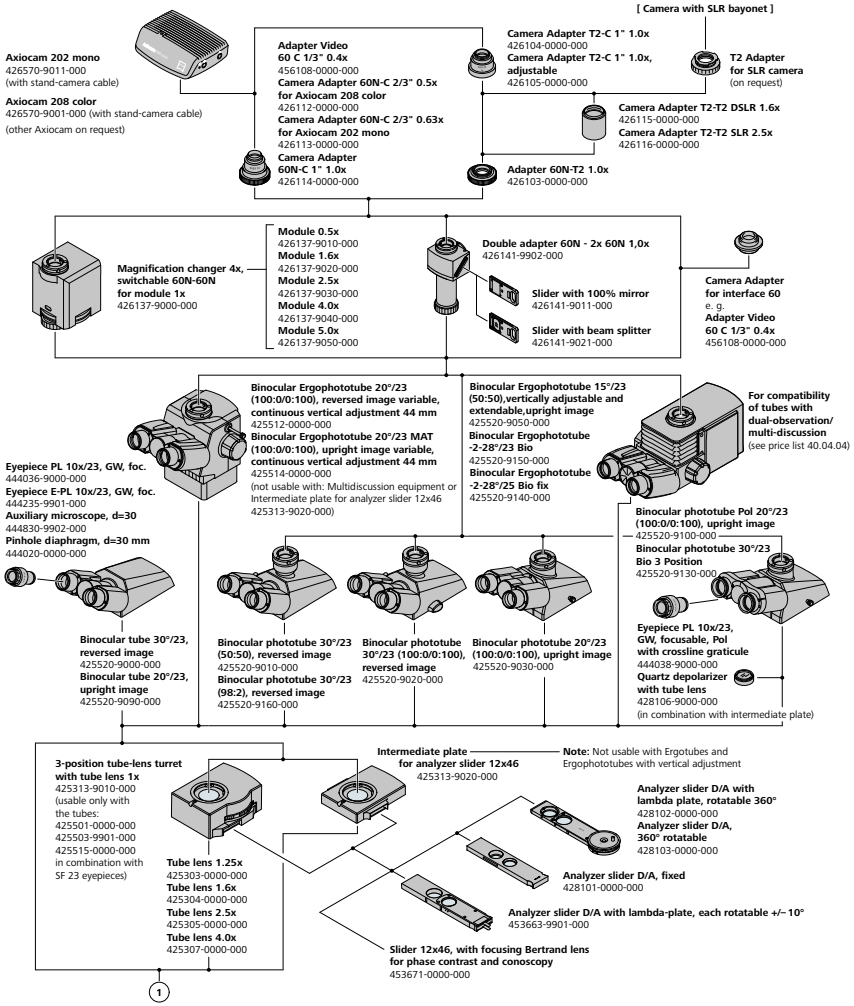
- Stand-alone
- Labscope imaging software
- ZEN imaging software

6 Accessories

- Ergophototube with 23 mm FOV
- Ergophototube with 25 mm FOV
- Dual observation and multidiscussion units

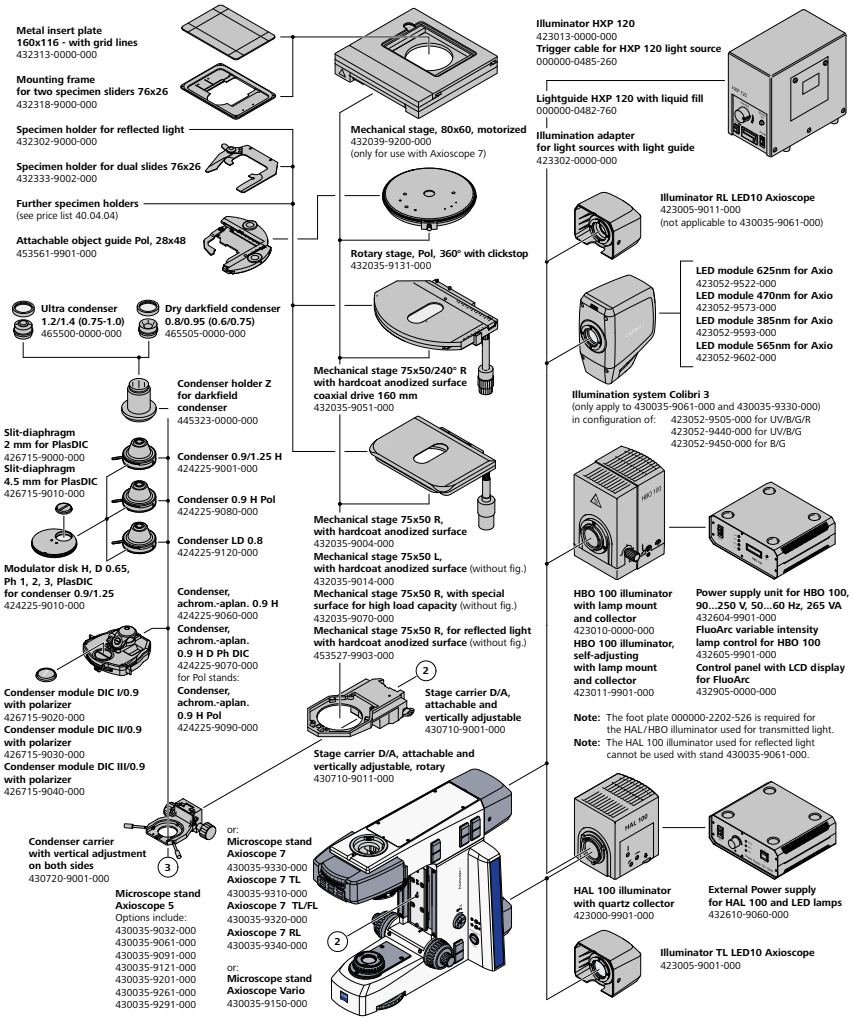
System Overview

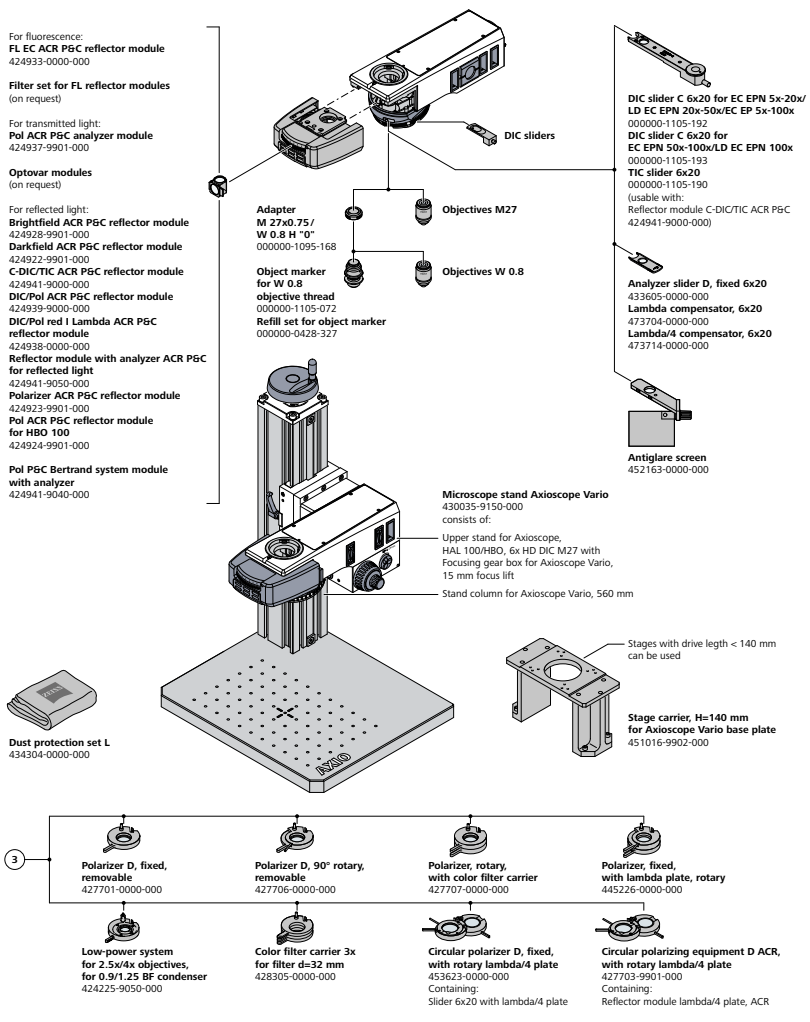




Please note: ZEISS Axioscope 7 is a non-IVD product, which may only be used for research.

System Overview





Please note: ZEISS Axioscope 7 is a non-IVD product, which may only be used for research.

Technical Specifications

	ZEISS Axioscope 5	Transmitted Light, HAL 50	Transmitted Light, LED/HAL 100	Transmitted Light and Fluorescence
Transmitted light illumination	Material Number	430035-9032-000	430035-9201-000	430035-9061-000
	TL light source	Hal 50W	LED 10W Optional Hal 100W	LED 10W Optional Hal 100W
	6-position TL filter wheel	●	●	●
Fluorescence/ reflected light illumination	FL/RL light source	NA	NA	Colibri 3 Optional HBO 100 and HXP 120 for FL or LED 10W/Hal 100W for non-fluorescence reflected light
	Status indicator of active FL-LED	NA	NA	● (for Colibri 3)
	Independent intensity control on stand of each FL-LED	NA	NA	● (for Colibri 3)
	FL-LED intensity memory function	NA	NA	● (for Colibri 3)
	Automatic mechanical shutter in TL for fluorescence imaging	NA	NA	●
	Reflector turret (or slider)	NA	NA	2, 4 or 6-position, encoded
	Mount for RL luminous-field diaphragm slider	NA	NA	●
	Mount for RL aperture stop slider or FL attenuator	NA	NA	●
	Mount for RL adjusting aid for HBO/XBO	NA	NA	●
	Mount for RL filter slider R, 14×40 mm d=36 mm	NA	NA	●

Tube specifications	Viewing angle	Adjustment	Viewing height* in mm
Binocular phototube 30° / 23 (50:50)	30°	–	449 / 485
Binocular phototube 30° / 23 (100:100)	30°	–	449 / 485
Binocular ergotube 15° / 23 (50 / 50), telescopic, height, upright image	15°	Height, telescopic	410 / 509
Binocular ergotube 20° / 23 (100 / 100), reversed image, 44 mm height	20°	Height	457 / 574
Binocular ergophototube –2° to 28° / 23 (50:50)	–2° to 28°	Inclination	356 / 507
Binocular ergophototube –2° to 28° / 25 (50:50)	–2° to 28°	Inclination	392 / 537

** Range between the lower and upper setting of the eyepieces, e.g. 442 / 481 → 442 mm to 481 mm*

Technical Specifications

	ZEISS Axioscope 5	Transmitted Light, HAL 50	Transmitted Light, LED/HAL 100	Transmitted Light and Fluorescence
Observation and documentation	Eco Mode	●	●	●
	Light Intensity Manager	●	●	●
	Snap button (to take images and videos) on stand	●	●	●
	RL/TL switch buttons	NA	NA	●
	Contrasting methods	BF, DF, Ph, simple TL Pol	BF, DF, Ph, simple TL Pol	BF, DF, Ph, PlasDIC, DIC, FL, TL/RL Pol
	Field of view	25 mm	25 mm	25 mm
	Optical system	Infinite, IC²S	Infinite, IC²S	Infinite, IC²S
	Camera tube	●	●	●
	Full Köhler	●	●	●
Stand	Nosepiece	6X H, encoded, M27	6X H, encoded, M27	6X H DIC, encoded, M27
	Stage	Mechanical stage 75×50 (rackless with hard coat anodized surface, right drive, extendable and with torque setting)	Mechanical stage 75×50 (rackless with hard coat anodized surface, right drive, extendable and with torque setting)	Mechanical stage 75×50 (rackless with hard coat anodized surface, right drive, extendable and with torque setting)
	Z Focus range	24 mm	24 mm	24 mm
	Focus	Coarse and fine focusing knobs on both left and right side; focus stop adjustment	Coarse and fine focusing knobs on both left and right side; focus stop adjustment	Coarse and fine focusing knobs on both left and right side; focus stop adjustment
	Specimen Holder	Dual slide holder for one-hand operation, spring lever left Optional: holder for single slide	Dual slide holder for one-hand operation, spring lever left Optional: holder for single slide	Dual slide holder for one-hand operation, spring lever left Optional: holder for single slide
	Ergotube	●	●	●
	Eyepiece, diopter adjustment	Up to ± 5 diopter	Up to ± 5 diopter	Up to ± 5 diopter
	Power Unit	Integrated	Integrated	Integrated

RoHS COMPLIANT

CE

ZEISS Service – Your Partner at All Times

Your microscope system from ZEISS is one of your most important tools. For over 175 years, the ZEISS brand and our experience have stood for reliable equipment with a long life in the field of microscopy. You can count on superior service and support - before and after installation. Our skilled ZEISS service team makes sure that your microscope is always ready for use.

Procurement

- Lab Planning & Construction Site Management
- Site Inspection & Environmental Analysis
- GMP-Qualification IQ/OQ
- Installation & Handover
- IT Integration Support
- Startup Training

Operation

- Predictive Service Remote Monitoring
- Inspection & Preventive Maintenance
- Software Maintenance Agreements
- Operation & Application Training
- Expert Phone & Remote Support
- Protect Service Agreements
- Metrological Calibration
- Instrument Relocation
- Consumables
- Repairs

New Investment

- Decommissioning
- Trade In

Retrofit

- Customized Engineering
- Upgrades & Modernization
- Customized Workflows via ZEISS arivis Cloud

Please note: Availability of services depends on product line and location

www.zeiss.com/microscopy/service

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

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EN_41_011_205 | Version 2.1 | CZ 11-2024 | Design, scope of delivery, and technical progress subject to change without notice.

Instruction Manual

ZEISS Axiocam 212 color / 203 mono

Microscope Camera

ZEISS Axiocam 212 color / 203 mono

Original Manual

Document Title: Instruction Manual ZEISS Axiocam 212 color / 203 mono
Order Number: 426570-7021-101
Revision: 3
Language: en-US
Effective from: 10/2025

Content

1 About this Instruction Manual

This Instruction Manual (further called "document") is considered to be part of the microscope camera, herein after referred to as the "product" or the "camera".

This document contains basic steps and safety information that must be observed during operation and maintenance. Therefore, the document must be read by the operator prior to commissioning and must always be available at the place of use of the product.

This document is an essential part of the product and, if the product is resold, the document must remain with the product or be handed over to the new owner.

1.1 Introduction

Welcome to the Axiocam 212 color and Axiocam 203 mono instruction manual.

These microscope cameras are multi-functional digital CMOS cameras for use in light microscopy applications. To make it easier for you to set up the camera, follow the instructions in these chapters step by step.

Content

Chapter	Content
About this guide	Introduction and overview of this manual.
Safety	Important information on the safe handling of the camera. **Read this chapter before unpacking and operating the camera.**
Technical data	Here you will find your camera's technical data.
Shipment	The contents of delivery and optional attachments will be described here.
Connecting the camera	In this chapter, you will find detailed instructions on connecting and using the camera.
OSD menu	This chapter lists the functions of the On Screen Display (OSD) menu.
Installing software and drivers	Here you will learn how to install the software and camera drivers.
Acquiring Images and Videos	This chapter provides the basics of image and video acquisition.
Troubleshooting	In this chapter, we have listed some solutions to various problems. If you are still unable to solve your problem, contact ZEISS support.
Maintenance	This chapter describes some measures for the maintenance and care of your camera. In case of greater damage, always contact ZEISS support.
Disposal and Recycling	Important instructions for disposal and recycling.

1.2 Safety

1.2.1 Intended Purpose

The cameras are high definition cameras for color and monochromatic imaging, respectively. They are suitable for use as accessories for educational and routine microscopy in laboratory environments and for use by trained laboratory personnel. The cameras have been designed to be used in the field of light microscopy for general observation, routine work, and simple applications in which a sufficient amount of light is available.

These cameras should only be used for training and research. The images / videos from these cameras must not be used for the direct generation of diagnostic results.

1.2.2 EMC Information

The product is intended to be used in an industrial electromagnetic environment.

CAN ICES-001 (B) / NMB-001 (B)

FCC EMC Info This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The product complies with the emission and immunity requirements as a CISPR 11 / EN 55011 / class B group 1 system according to IEC 61326-1. Emissions, which exceed the levels required by CISPR 11 / EN 55011, can occur when the product is connected to other devices.

The following EMC user notice is for Korea only:

기종별	사용자안내문
B급기기 (가정용 방송통신기자재)	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

1.2.3 Prevention of Hazards

ZEISS cameras have been manufactured and tested by ZEISS according to the regulations specified in CE and have left the manufacturer's premises in perfect working order. In order to ensure that this condition is maintained and to avoid any risks when operating the system, the user must comply with any notes and warnings contained in this manual. The manufacturer shall be exempt from statutory liability for accidents should the operator fail to observe the safety regulations.

Risk of personal injury To avoid the risk of fire or explosion, do not use the camera near inflammable liquids or gases.

Setup, expansions, re-adjustments, alterations, and repairs must be carried out only by persons who have been authorized by ZEISS.

Do not allow any cables, particularly power cords, to trail across the floor, where they can be snagged by people walking past.

Protect the cables from excessive heat (e.g. halogen lamps, microscope fluorescence illumination).

To avoid injuries due to potentially high surface temperatures, do not touch the camera's surface for a prolonged time.

Do not position the equipment in a way that makes it difficult to operate or disconnect the device.

If there were any cracks or deterioration on the power adapter, stop to use the microscope camera immediately. Contact the ZEISS partner for the service.

Several country-specific plugs are provided with the power adapter. To avoid the risk of electric shock or overheat, always use the appropriate one to your country. If in doubt, contact your ZEISS partner for help.

Always check the completeness of the device before handing it over to the students for each operation.

Risk of equipment damage

Protect the camera against mechanical impact. External damage may affect the operation of inner components.

To protect the camera's internal optical components, always screw the protective cap onto the camera's C-Mount thread when no lens and no adapter with optics is mounted to it.

Keep chemicals and fluids away from the camera.

Use the camera in a clean and dry location.

Use only the accessories supplied by ZEISS, when applicable.

Use only normal microscope cleaning material to clean the camera housing.

Contact your local ZEISS service organization if a repair is necessary. Do not disassemble the camera by yourself, otherwise the warranty will be lost.

Risk of data loss and data corruption

Make sure there is sufficient ventilation of the camera head. Avoid direct exposure to sunlight and locations near heat sources (radiators, stoves). Overheating can cause noisy images.

Attach all connectors firmly and securely.

Save all your data, such as images, measurement data, archives, reports, forms and documents, at regular intervals on an external storage medium. Otherwise it cannot be avoided that access to this data may be lost as a result of operational errors or hardware defects. ZEISS accepts no liability for consequential damage resulting from insufficient data protection.

1.2.4 Limitation of Liability

No warranty shall be assumed by ZEISS during the warranty period if the equipment is operated without observing the safety regulations. In any such case, ZEISS shall be exempt from statutory liability for accidents resulting from such operation.

1.2.5 Warranty

ZEISS shall be exempt from any warranty obligations should the user fail to observe the safety regulations. ZEISS only guarantees the safety, reliability, and performance of the system if the safety notes are closely observed.

1.2.6 Warning labels

All points that may pose special risks are additionally marked by warning labels (pictograms) on the camera. These warning labels indicate possible dangers. They are part of this instruction manual. They are to be kept in a clean and legible state. Warning labels that are damaged or no longer clearly legible must be replaced immediately. Always observe all warning labels on the camera.

1.2.6.1 Position of the Warning Labels

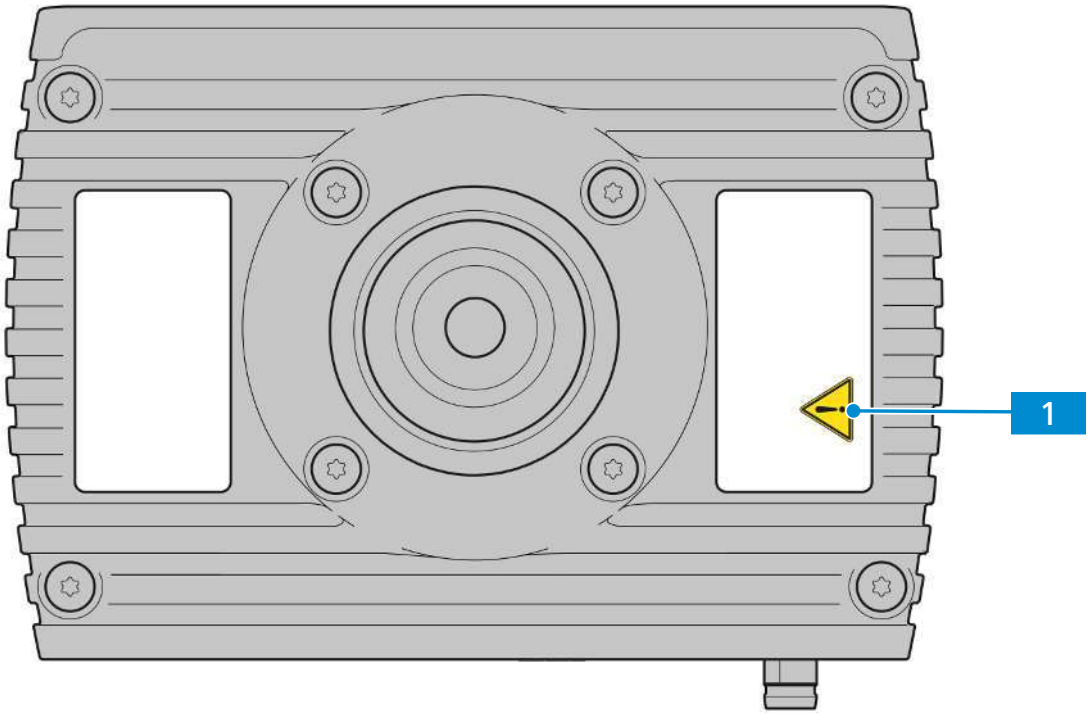


Fig. 1: Warning labels on the camera

1.2.6.2 Meaning of the Warning Labels

The meaning of each warning label is explained below.

No.	Symbol	Description
1		Follow the notes in the instruction manual and the supplied documents. For more information, see *Prevention of Hazards [▸ 6]*.

Tab. 1: List of attached Warning Labels

1.3 Explanation of Warning Messages and Additional Information

CAUTION, and NOTICE are standard signal words used to determine the levels of hazards and risks of personal injury and property damage. Not only the safety and warning messages in the **Safety** chapter are to be considered also all safety and warning messages in other chapters. Failure to comply with these instructions and warnings can result in both personal injury and property damage and involve the loss of any claims for damages.

The following warning messages indicating dangerous situations and hazards are used in this document.

⚠ CAUTION

Type and source of danger

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Type and source of danger

NOTICE indicates a potentially harmful situation which, if not avoided, may result in property damage. In addition, NOTICE warns of data loss or corrupt data as well.

Info

Provides additional information or explanations to help the user better understand the contents of this document.

1.4 Explanation of Symbols

	CE marking (Conformité Européene)
	UKCA marking (UK conformity assessed)
	CSA label: product tested by CSA to meet U.S. and Canadian standards. CSA approval master number optionally given adjacent to this symbol
	KC mark accompanied with KC code
	Manufacturer
	Country of manufacture. "CC" is the country code, e.g. "DE" for Germany, "CN" for China. Date of manufacture optionally given adjacent to this symbol
	Importer
	Serial number
	Catalogue number
	Model number
	EFUP (Environmentally Friendly Use Period) of 50 years. According to the China RoHS regulation, it refers to the period during which the hazardous substances contained in an electronic or electrical product do not leak or mutate suddenly under normal operating conditions and will not result in serious environmental pollution or cause serious damage to the user's body or their assets during normal use.
	WEEE label: Do not discard as unsorted waste. Send to separate collection facilities for recovery and recycling

1.5 Text Conventions and Link Types

Explanation	Example
Software controls and GUI elements.	Click **Start**.
Hardware controls and elements.	Press the **Standby** button.
Key on the keyboard.	Press **Enter** on the keyboard.
Press several keys on the keyboard simultaneously.	Press **Ctrl + Alt + Del**.
Follow a path in the software.	Select **Tools > Goto Control Panel > Airlock**.
Text to be entered by the user.	Enter *example.pdf* in this field.
Anything typed in literally during programming, for example macro codes and keywords.	Enter `Integer` in the console.
Link to further information within this document.	See: *Text Conventions and Link Types [▸ 10]*.
Link to a website.	https://www.zeiss.com/corporate/int/home.html

2 Technical Data and Conformity

2.1 Axiocam 212 color

2.1.1 Specifications

Features	Values
Sensor type	CMOS sensor with rolling shutter
Sensor Size / Effective sensor Area	Diagonal 9.3 mm (1/1.7"), Full Sensor Diagonal 8.2 mm (1/2.1"), Ultra HD and Full HD
Effective Sensor Pixel Count	12.3 Megapixels: 4032 (H) x 3044 (V) 8.3 Megapixels: 3840 (H) x 2160 (V) 2.1 Megapixels: 1920 (H) x 1080 (V)
Pixel size	1.85 µm x 1.85 µm (resolution 4032 x 3044 and 3840 x 2160) 3.70 µm x 3.70 µm (binned, resolution 1920 x 1080)
Spectral Sensitivity	Approx. 400 nm – 700 nm, IR filter RGB Bayer color mask
Selectable Resolution	4032 x 3044 (12.3 MP, Full Sensor) 3840 x 2160 (Ultra HD, 4K) 1920 x 1080 (Full HD, 1080p)
Gain (Signal Amplification)	1.0x – 22.4x (equivalent 0dB - 27dB) adjustable
Digitization	3 x 8 bit / pixel
Exposure Time Range (Integration time)	0.1 ms - 1 s
Image enhancement functions	Active denoising, active sharpening, auto white balance
Automatic features	Automatic exposure and gain regulation at Ultra HD resolution (4K), fast live image under low light conditions
Status-LED for camera	Color coded operation status
Interfaces	1x HDMI for monitor 1x USB 3.0 Type-C for flash drive, Wi-Fi adapter or PC connection 2x USB 2.0 Type-A for mouse and keyboard 1x RJ45 (Ethernet) for LAN connection 1x M8 for power and communication with dedicated stands
Control buttons	1x Power On/Off switch 1x Camera factory reset button

Features	Values
Wi-Fi compatibility	Via USB Wi-Fi adapter and router
Optical Interface	C-mount
Stand-alone operation: ▪ Image storage format ▪ Video stream format ▪ Live frame rate via HDMI	 ▪ tiff or jpg ▪ mp4 ▪ 30 fps
Maximum live frame rate at configuration: ▪ HDMI ▪ Ethernet ▪ USB 3.0	Full sensor (4032 x 3044) ▪ - ▪ - ▪ 15 fps
Maximum live frame rate at configuration: ▪ HDMI ▪ Ethernet ▪ USB 3.0	@ 4K (3840 x 2160) ▪ 30 fps ▪ 30 fps ▪ 20 fps
Maximum live frame rate at configuration: ▪ HDMI ▪ Ethernet ▪ USB 3.0	@ 1080p (1920 x 1080) ▪ 30 fps ▪ 30 fps ▪ 30 fps
Size/ Weight	Approx. 125 x 92 x 78 mm / 700 g
Housing	Blue painted aluminum and cooling fins
Registration	CE, CSA, UKCA
Power supply	via M8 interface
Power consumption	Max. 36 W (24V DC, 1.5A) Rating of accompanied power adapter: Input: 100 - 240Vac (±10%), 50/60Hz, 1.0A; Output: 24.0Vdc, 1.5A, 36.0W
Environmental conditions for storage and operation	+5 °C to 35 °C, max. 75% relative air humidity at 35°C, no condensation, free air circulation required, CAT II, pollution degree 2, altitude <2000m, indoor use
Environmental conditions for transport in packaging	-40 °C to +70 °C, max. 75 % relative air humidity at 35 °C
IP code	IP20
Operating systems: ▪ for ZEN ▪ for Labscope	 ▪ Windows 10 and 11 x64 and higher ▪ Windows 10 and 11 x64 and iOS v15 and higher, Android 12 and higher
Supported Application Software	ZEN blue v3.11 and higher (includes ZEN lite/ pro/system)

Features	Values
	ZEN core v3.11 and higher (includes ZEN starter/core) Labscope v4.3 (win, iOS, and Android) and higher
TWAIN plugin	Software interface to control camera by 3rd party application software
Order number	426570-9901-000

Info

Computer hardware, operating system, and software may decrease the frame rates. All specifications are subject to change without notice.

Info

The camera is network-enabled and can be used with the ZEISS iOS App, Android APP and ZEISS Labscope software. The Apps are available as a free download from the Apple® App Store, Google Play Store or ZEISS Portal. Unless otherwise stated by the distributor, iPad® and WLAN router are not supplied by ZEISS. Apple®, Apple iPad® are registered trademarks of Apple Inc.

2.1.2 Spectral Sensitivity

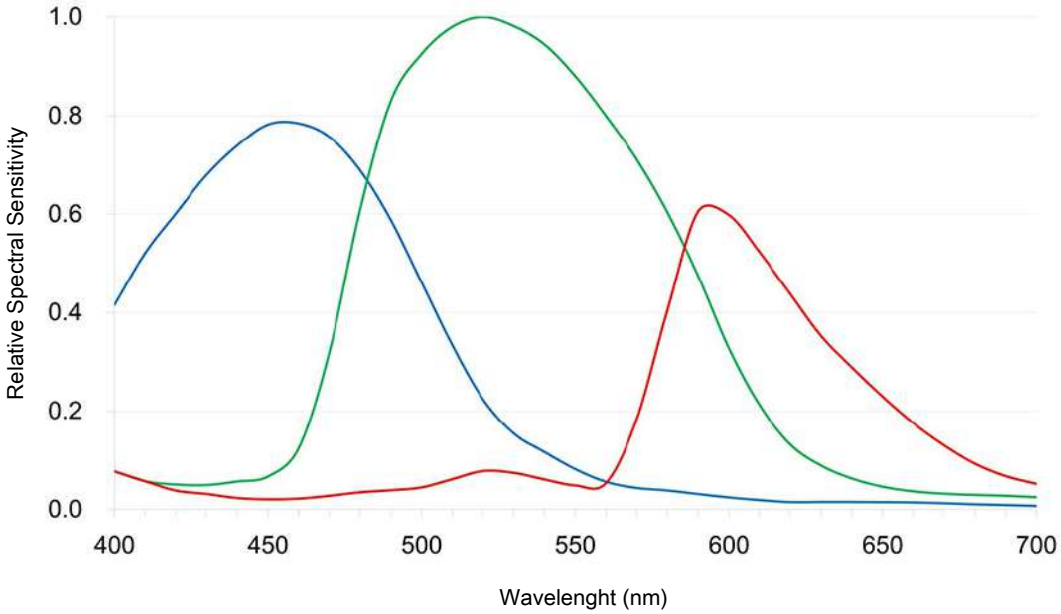


Fig. 2: Spectral Sensitivity of Axiocam 212 color (incl. IR Filter)

2.2 Axiocam 203 mono

2.2.1 Specifications

Features	Values
Sensor Type	CMOS sensor with rolling shutter
Sensor Size / Effective Sensor Area	Diagonal 9.3 mm (1/1.7"), Full Sensor Diagonal 8.2 mm (1/2.1"), Full HD
Effective Sensor Pixel Count	3.0 Megapixels: 1984 (H) x 1522 (V) 2.1 Megapixels: 1920 (H) x 1080 (V)
Pixel size	3.7 µm
Spectral Sensitivity	Approx. 350 nm – 850 nm, protection glass (coated)
Selectable Resolution	1984 x 1522 3 MP, Full Resolution 1920 x 1080 (Full HD)
Gain (Signal Amplification)	1.0x – 22.4x (equivalent 0dB - 27dB) adjustable
Digitization	12 bit or 8 bit / pixel
Cooling	Passive cooling
Exposure Time Range (Integration time)	0.1 ms - 2 s
Image enhancement functions	Active denoising, active sharpening
Automatic features	Automatic exposure and gain regulation at Full HD resolution (1080p), fast live image under low light conditions
Status-LED for camera	color coded operation status
Interfaces	1x HDMI for monitor 1x USB 3.0 Type-C for flash drive, Wi-Fi adapter or PC connection 2x USB 2.0 Type-A for mouse and keyboard 1x RJ45 (Ethernet) for LAN connection 1x M8 for power and communication with dedicated stands
Wi-Fi compatibility	Via USB Wi-Fi adapter and router
Optical Interface	C-mount
Camera control buttons	1x Power On/Off switch 1x Camera factory reset
Stand-alone operation: ▪ Image storage format ▪ Video stream format ▪ Live frame rate via HDMI	 ▪ tiff or jpg ▪ mp4 ▪ 30 fps

Features	Values
Maximum live frame rate at configuration: ▪ HDMI ▪ Ethernet ▪ USB 3.0	Full sensor (1984 x 1522) ▪ - ▪ - ▪ 30 fps
Maximum live frame rate at configuration: ▪ HDMI ▪ Ethernet ▪ USB 3.0	@ 1080p (1920 x 1080) ▪ 30 fps ▪ 30 fps ▪ 30 fps
Size/Weight	Approx. 125 x 92 x 78 mm / 700 g
Housing	Blue painted aluminum and cooling fins
Registration	CE, CSA, UKCA
Power supply	via M8 interface
Power consumption	Max. 36 W (24 V DC, 1.5 A) Rating of accompanied power adapter: Input: 100 - 240Vac (±10%), 50/60Hz, 1.0A; Output: 24.0Vdc, 1.5A, 36.0W
Environmental conditions for storage and operation	+5°C to 35°C, max. 75% relative air humidity at 35°C, no condensation, free air circulation required, CAT II, pollution degree 2, altitude <2000m, indoor use
Environmental conditions for transport in packaging	-40 °C to +70 °C, max. 75 % relative air humidity at 35 °C
IP code	IP20
Operating systems: ▪ for ZEN ▪ for Labscope	 ▪ Windows 10 and 11 x64 and higher ▪ Windows 10 and 11 x64 and iOS v15 and higher, Android 12 and higher
Supported Application Software	ZEN blue v3.11 and higher (includes ZEN lite/pro/system) ZEN core v3.11 and higher (includes ZEN starter/core) Labscope v4.3 (win, iOS, and Android) and higher
TWAIN plugin	Software interface to control camera by 3rd party application software
Order number	426570-9910-000

Info

Computer hardware, operating system, and software may decrease the frame rates. All specifications are subject to change without notice.

2.2.2 Spectral Sensitivity

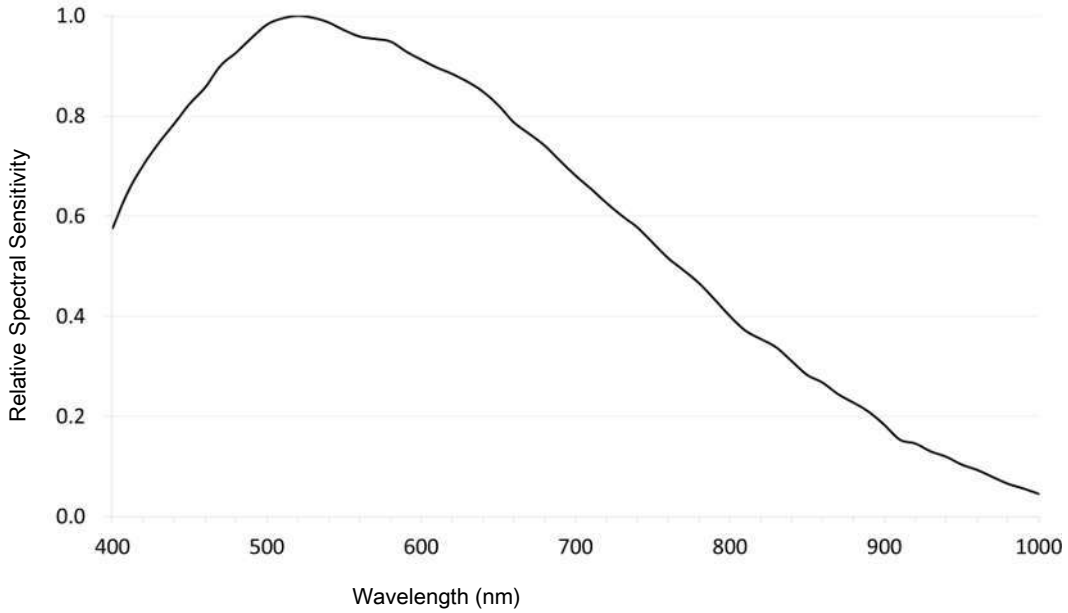


Fig. 3: Relative Spectral Sensitivity of Axiocam 203 mono

2.3 Applicable Standards and Regulations

Observe the generally applicable local and national safety and accident prevention regulations, as well as the applicable laws and regulations in your country. The camera and its accessories have been designed, manufactured and tested to comply with the guidelines and specifications as named in the following. The accordance to the relevant specification is indicated by a respective symbol on the unit.

2.3.1 Symbols on the camera

Symbol	Description
CE	Conforms to: ▪ EU Directive 2014/35/EU (LVD) ▪ 2014/30/EU (EMC) ▪ 2015/863/EU (RoHS)
C SA US 265366	CSA certificate mark, conforms to: ▪ CAN/CSA-C22.2 No. 61010-1-12 ▪ UL Std. No. 61010-1 (3rd edition)
	Complies with EU Directive 2012/19/EU (WEEE)

Tab. 2: List of attached labels concerning standards and regulations

3 Shipment

3.1 Axiocam 212 color

- 1x Axiocam 212 color
- 1x Power & Data Y-cable with power adapter (incl. country-specific plug) and interface to connect to microscope stand (compatible with Axiolab 5 and Axioscope 5/7)
- 1x USB 3.0 cable, Type-C to Type-A
- 1x USB 3.0 flash drive, Type-C and Type-A

Accessories for Stand-Alone and for Usage with Labscope

Order Number	Accessory
000000-0626-248	High-Speed-HDMI-Cable, Premium, Resolution 4K, 2m
000000-0626-246	Optical USB-Scroll Mouse
000000-0626-267	Keyboard, USB, Language US
426570-9210-000	Wi-Fi dongle package containing Wi-Fi Dongle (Dual band 2.4GHz and 5GHz) and USB adaptor Type-C to Type-A

3.2 Axiocam 203 mono

- 1x Axiocam 203 mono
- 1x Power & Data Y-cable with power adapter (incl. country-specific plug), camera to microscope stand (compatible with Axiolab 5 and Axioscope 5/7)
- 1x USB 3.0 cable, Type-C to Type-A
- 1x USB 3.0 flash drive, Type-C and Type-A

Accessories for Stand-Alone and for Usage with Labscope

Order Number	Accessory
000000-0626-248	High-Speed-HDMI-Cable, Premium, Resolution 4K, 2m
000000-0626-246	Optical USB-Scroll Mouse
000000-0626-267	Keyboard, USB, Language US
426570-9210-000	Wi-Fi dongle package containing Wi-Fi Dongle (Dual band 2.4GHz and 5GHz) and USB adaptor Type-C to Type-A

4 Connecting the Camera

4.1 Camera Layout and Accessories

4.1.1 Camera Connections

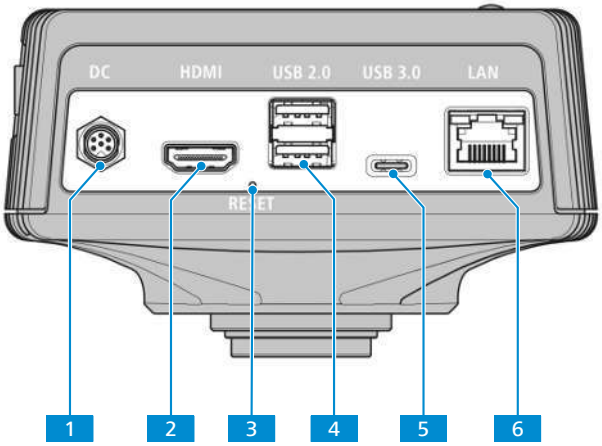


Fig. 4: Camera connector panel

1 **M8 port**

Power supply (24 V DC, 1.5 A) and communication

2 **HDMI port**

Image data transfer to a certified monitor; TV or projector

3 **Camera factory reset**

Resets the camera to the factory settings

4 **2x USB 2.0 Type-A**

OSD control mouse and keyboard

5 **1x USB 3.0 Type-C**

Camera control and image data transfer

6 **RJ45 port (Ethernet)**

Communication and image data transfer

4.1.2 Camera Controls

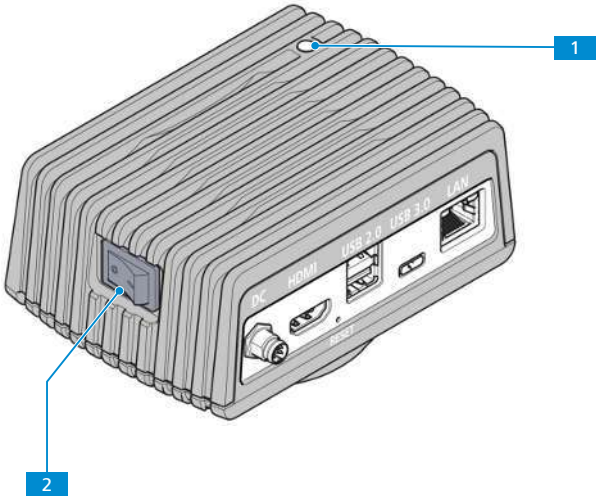


Fig. 5: Camera operator panel

1 **LED function indicator**

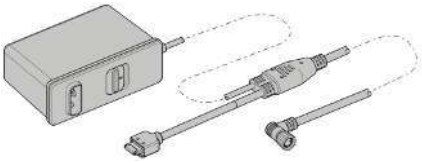
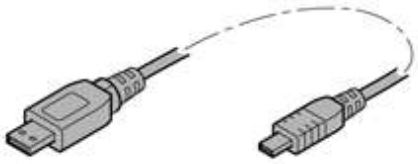
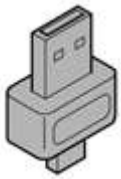
See *Function indicator signals [▸ 26]* for detail.

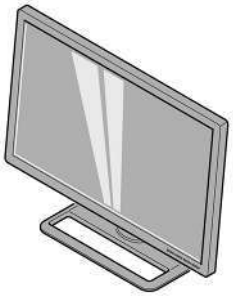
2 **Power ON / Off switch**

Turns the camera on or off.

4.1.3 Accessories

The following items are required for power supply and use of the ports:

Name	Figure	Remarks
Power supply with country specific plugs and attached Y-cable		Power supply and M8 power cable to power the camera and connection cable between camera and compatible microscopes (e.g. Axioscope 5/7 or Axiolab 5)
USB 3.0 cable, Type-C to Type-A		Connection between camera and PC
USB flash drive, Type C and Type A		Connection to camera (Type-C) or to USB hub (Type-A) for immediate image and video storage
Ethernet cable (not supplied in package)		Connection between camera and network or WLAN router

Name	Figure	Remarks
HDMI cable (not supplied in package, order separately: Order No. 000000-0626-248)		Connection between camera and monitor, TV, or projector
Mouse (not supplied in package, order separately: Order No. 000000-0626-246)		For control and navigation in the **OSD** menu
Keyboard (not supplied in package, order separately: Order No. 000000-0626-267 for US layout)		For typing in the **OSD** menu
Wi-Fi Adapter package (not supplied in package, order separately: Order No. 426570-9210-000)		Wi-Fi Adapter package consisting of Wi-Fi adapter (Dual band 2.4GHz and 5GHz) and USB adapter Type-C to Type-A for wireless transmission of camera images to PC or iPad with Labscope
Monitor TFT 32" 4K (not supplied in package, order separately: Order No. 410350-3204-000)		For display of camera image and operating the OSD menu

4.2 Mounting the Camera to the Microscope

To mount the camera to your microscope's camera port, use a C-mount camera adapter. The adapter is not included in the scope of delivery. You will find some suitable examples for adapters in the list below:

Info

Damage during storage or transportation

It is recommended to keep the original packing and store it away for later use, e.g. for stowing the microscope camera during periods of non-use or for returning it to the manufacturer for repair.

Camera	Port	Adapter	Order number
Axiocam 212 color	60N	Camera Adapter 60N-C 2/3" 0.5x	426112-0000-000
Axiocam 203 mono	60N	Camera Adapter 60N-C 2/3" 0.5x	426112-0000-000

NOTICE

Loss of warranty

The Axiocam 212 color is delivered with an integrated IR filter (infrared cut filter). The Axiocam 203 mono is delivered with a protective glass to shield the camera against dust and to reduce optical interferences.

- Do not remove the filter or the protective glass. Otherwise the warranty will be lost.

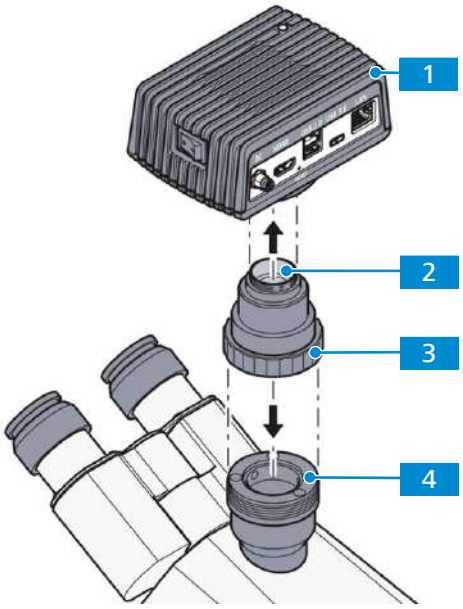


Fig. 6: Mounting the camera to the microscope

1	Camera
2	C-mount camera adapter
3	Ring nut
4	60N port at microscope stand

Procedure

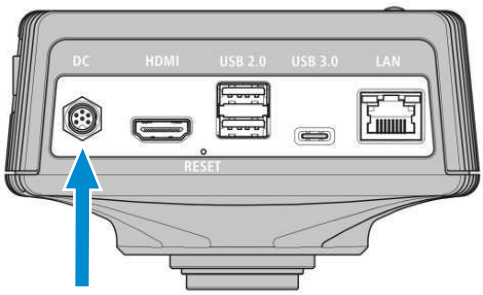
1. Remove the dust cap from the camera's C-mount port.
2. Mount the C-mount camera adapter to the camera.
3. Attach the camera with the adapter to the microscope's 60N port.
4. Orient the camera to the stand and fix its position by tightening the ring nut.

4.3 Connecting the Camera to the Power Supply

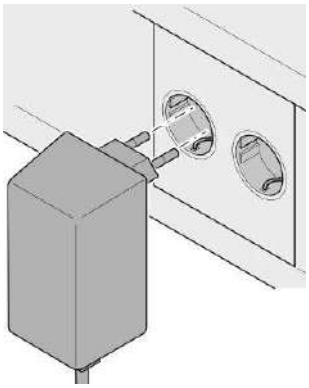
Prerequisite ✓ The power supply has been equipped with the appropriate country-specific adapter.

Procedure

1. Insert the M8 plug of the Y-cable into the M8 port of the camera.



2. Insert the power adapter into a power outlet.



3. Turn on the camera via **ON-/Off** switch.

4.4 Connecting the Camera to Axioscope 5/7 and Axiolab 5

Prerequisite

- ✓ The camera is mounted to Axioscope 5/7 or Axiolab 5.
- ✓ The M8 plug of Y-cable has been plugged into M8 port of the camera.
- ✓ The power supply has been plugged into a power outlet.

Procedure

1. Insert the remaining end of the Y-cable into the corresponding socket on your microscope.
2. Turn on the camera via **ON-/Off** switch.

> **Info**
> Refer to the instruction manual of your microscope for further information.

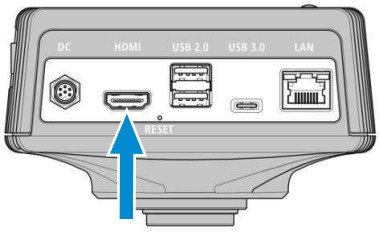
4.5 Connecting the Camera to a Display (without PC)

The camera can be connected to a certified HDMI monitor, TV, or projector for visualization of the live image data and for operating the OSD menu functions. Certain HDMI functions (e.g. audio, commands from monitor to camera) are not supported.

> **Info**
> If you connect the Axiocam 212 color / 203 mono to a monitor, these are the minimal monitor requirements:
>
> - HDMI 1.4 or HDMI 2.0 input port
> - 1920 x 1080 or higher resolution
> - 16:9 aspect ratio
> - Progressive scanning
> - HDMI cable with less than 3 m length (shorter cable enables better signal integrity)
> - The HDMI monitor is switched on
> - HDMI cable is connected to HDMI monitor
>
> Note that the maximum live image resolution of the Axiocam 203 mono is Full HD (1920 x 1080), while the Axiocam 212 color supports live image resolution of up to Ultra HD (4K).

Procedure

1. Insert the HDMI cable into the HDMI port of the camera.



2. Insert the HDMI cable's opposite connector into the corresponding socket on your display device.
3. Set the display device's aspect ratio to 16:9 or Aspect.

For further camera settings using the **OSD** a mouse is required and a keyboard is recommended.

4.6 Connecting the Camera to a Network

If you want to connect the camera to a network, you can choose between several options, of which all require network access and the ZEISS imaging software Labscope (available as windows, iOS or Android version). The camera identifies itself automatically to the network (DHCP) and is automatically recognized by Labscope, provided the device is on the same network.

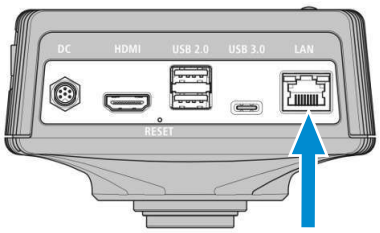
> ***NOTICE***
>
> **Display errors**
>
> In the event of an overloaded or slow WLAN, the live image of the camera may be delayed or incorrectly displayed on the iPad.
>
> - If possible, use a high-performance 802.11n WLAN.
> - Provide a sufficient contingent of free bandwith for communication.

For an overview of all ZEISS Microscopy apps and further information on individual apps, visit https://www.zeiss.com/microscopy/int/products/microscope-software/microscopy-apps.html?vaURL=www.zeiss.com/micro-apps

4.6.1 Connecting Camera via Ethernet

Prerequisite
- ✓ The camera is powered via mains supply.

Procedure
1. Insert the Ethernet cable into the camera's Ethernet port.

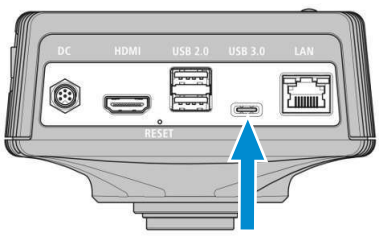


2. Insert the Ethernet cable's opposite connector into the corresponding socket on your WLAN router or the Ethernet port of a windows PC / Laptop.

4.6.2 Connecting Camera via Wi-Fi Adapter

Prerequisite
- ✓ The camera is powered via mains supply.
- ✓ An USB Wi-Fi adapter is available.
- ✓ An USB mouse is connected to the camera to operate the OSD.
- ✓ The camera is connected to a display via HDMI.

Procedure
1. Insert the USB Wi-Fi adapter into the camera's USB Type-C port using the included Type-C to Type-A adapter.



2. Open On Screen Display menu by moving the USB mouse.

3. Select **Global Settings** icon in Home Menu (see *Live View Menu [▸ 27]*) to open the **Global Settings** menu.
4. Select **Wi-Fi Options tab**.

↳ The Wi-Fi options tab offers two ways to connect the camera to a Wi-Fi device (e.g. iPad or Laptop) (see *Wi-Fi Options Tab [▸ 48]*).

See also

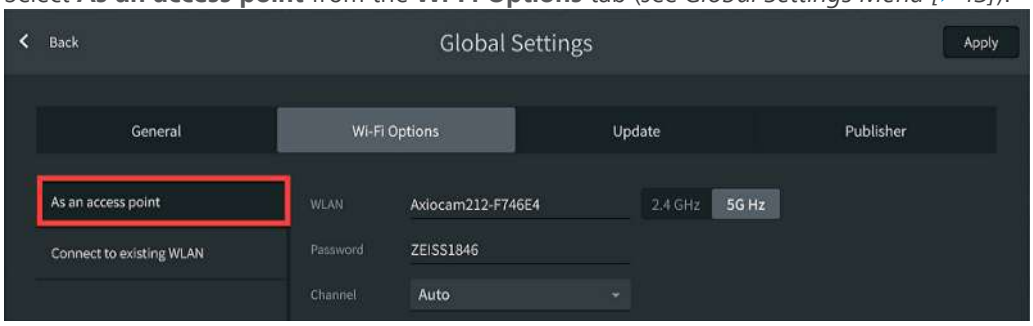
- Operating the Camera via OSD Menu [▸ 27]

4.6.2.1 Using the Camera as Access Point

Follow the subsequent instructions to directly connect your camera to the Wi-Fi device:

Procedure

1. Select **As an access point** from the **Wi-Fi Options** tab (see *Global Settings Menu [▸ 43]*).



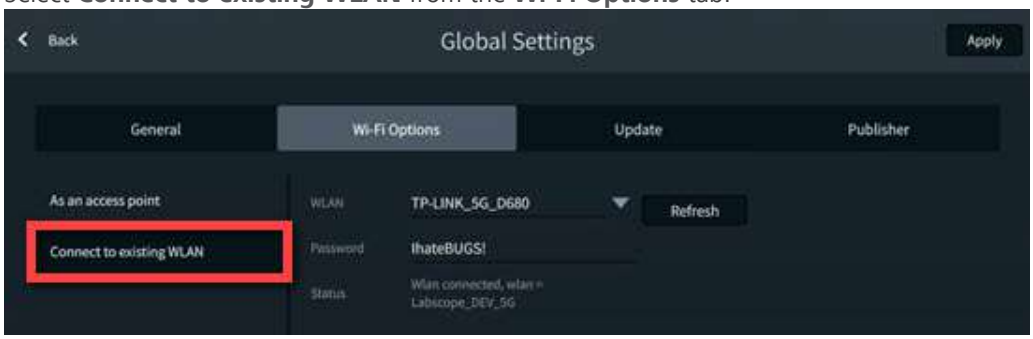
2. Type the network name and password into the respective fields, you may change either or keep the defaults (default password: **ZEISS1846**).
   → The camera can be found by other devices as access point: Other devices can connect to the camera using the specified network name and password.

4.6.2.2 Connecting to Existing WLAN

Follow the subsequent instructions to connect your camera to an existing WLAN:

Procedure

1. Select **Connect to existing WLAN** from the **Wi-Fi Options** tab.



2. Select the network name from the respective selection field.
3. Type in the password into the respective input field.
   → The camera is connected to the WLAN.
   → If the Wi-Fi device is connected to the same router, the camera appears in Labscope.

Info

If the WLAN list is empty or does not contain the one you want to connect to, wait for a few seconds and click again to refresh.

Info

No country specific special characters are supported for a password.

Allowed: A~Z a~z 0~9 @ # % * . ! , ; ? / \ & ( ) ‘’ ` - : , - + ~$ < >

The password must be 8-32 characters long.

4.7 Connecting the Camera to a Certified PC

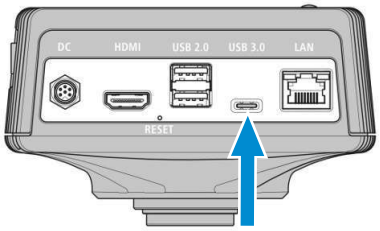
4.7.1 USB port

The USB port Type-C can also be used to connect the camera with a windows PC or Laptop to operate the camera via windows software Labscope or ZEN.

Prerequisite ✓ The camera is powered via mains supply or microscope.

Procedure

1. Insert the USB 3.0 cable's Type-C connector into the corresponding socket on the camera.



2. Insert the USB 3.0 cable's Type-A connector into the corresponding socket on the PC.

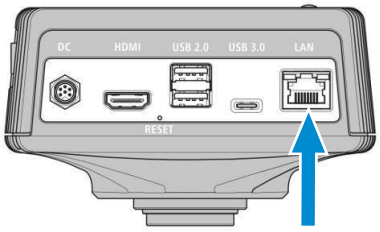
4.7.2 Ethernet

By network cable, the camera can be connected directly to a windows PC or Laptop.

Prerequisite ✓ If the camera is directly connected to a windows PC or Laptop with a network cable, the camera will have a fixed link local IPV4 address: 169.254.203.212

Procedure

1. Insert the network cable’s RJ45 Ethernet-Stecker to the RJ45 socket of the camera.



2. Insert the other end of the network cable’s RJ45 Ethernet-Stecker into the corresponding socket on the PC.

4.8 Function indicator signals

For the definitions of the LED color signals, refer to the list below:

Signal	Description
Green	Camera starting
Blue	Power supplied and camera ready
Blue flash	Snapping/recording in process, and saving data to USB flash drive
Red flash	Firmware updating/factory resetting
Pink flash	No USB flash drive or the drive is full
Off	No power supplied

5 On Screen Display (OSD)

Info

Certain functions of the OSD menu are only available with compatible microscope stands i.e. Axioscope 5/7 or Axiolab 5. For more information, refer to the relevant microscope's manual.

5.1 Operating the Camera via OSD Menu

To operate the camera via OSD, plug your USB mouse and keyboard into USB 2.0 Type-A port and USB flash drive (included in the package) into the USB 3.0 Type-C port on the rear side of the camera.

Prerequisite

- ✓ The camera is powered via mains supply.
- ✓ The camera is connected to a display via HDMI.
- ✓ The camera is connected to a USB mouse.

Procedure

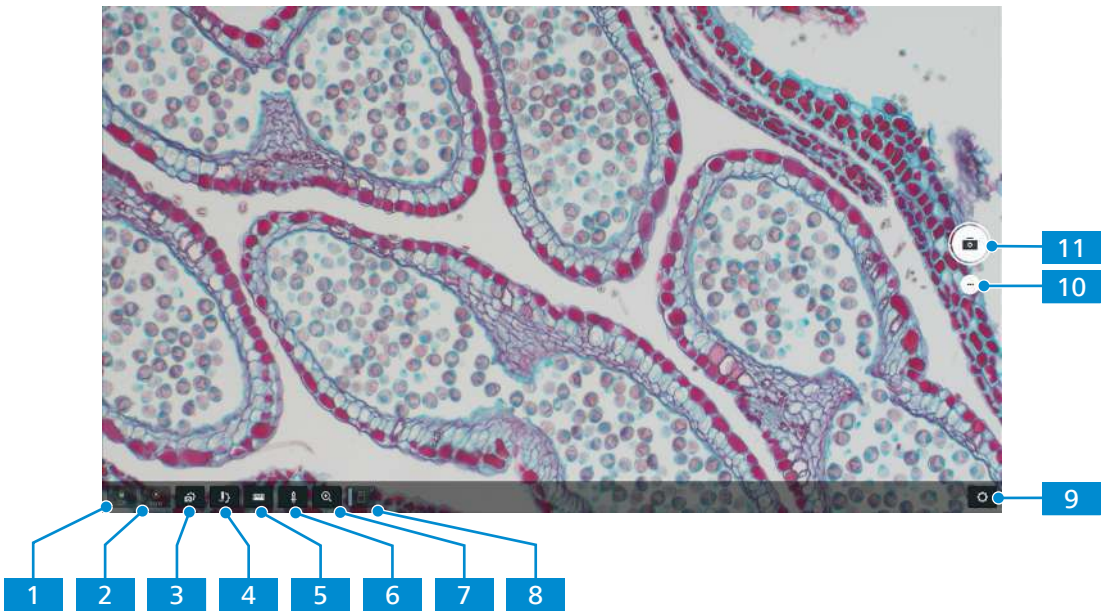
1. To open the **Live View** Menu of the OSD, move the mouse over the live image on the screen.
   → If you stop to move the mouse the OSD will close after approx. 15 sec.

Info

A USB flash drive used should be of FAT32 format and have enough free space for storing the data.

5.2 Live View Menu

The **Live View** menu gives you basic imaging controls to capture your images with minimal effort.



No.	Parameter	Description
1	**Objective** icon	The currently used objective is displayed (only for configured dedicated stands e.g. Axioscope 5/7 or Axiolab 5).
2	**Reflector** icon	The currently used reflector is displayed (only for configured dedicated stands e.g. Axioscope 5/7 or Axiolab 5).

No.	Parameter	Description
3	**Acquisition settings** icon	Opens the acquisition settings menu, see *Acquisition Settings Menu [▸ 32]*.
4	**Microscope configuration** icon	Opens the microscope configuration menu, see *Configure Microscope Menu [▸ 39]*.
5	**Scale bar** icon	Allows to add a scale bar to the image.
6	**Annotations** icon	Allows to add annotations to the image, see *Annotations Menu [▸ 37]*.
7	**Zoom window** icon	Allows to zoom in at cursor position.
8	**USB stick** icon	Indicates whether a USB stick is connected, allows access to the image browser via clicking the USB icon, displays available storage with a progress bar on the left, and provides a safe removal button, located at the bottom-right corner, to ensure data integrity.
9	**Global settings** icon	Opens the global settings menu, see *Global Settings Menu [▸ 43]*.
10	**Change acquisition mode** icon	Select the desired acquisition mode, see *Acquisition Modes [▸ 32]*.
11	**Snap** button	Snaps a single image. Depending on the selected acquisition mode different types of acquisition can be performed.

5.2.1 Acquiring a Single Image

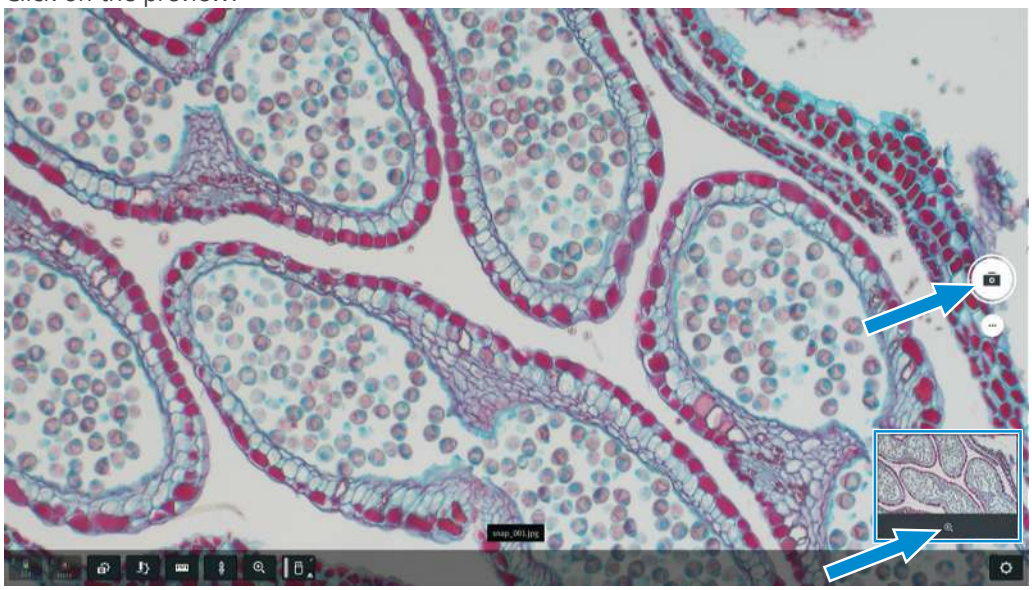
Prerequisite

✓ The microscope is operational.

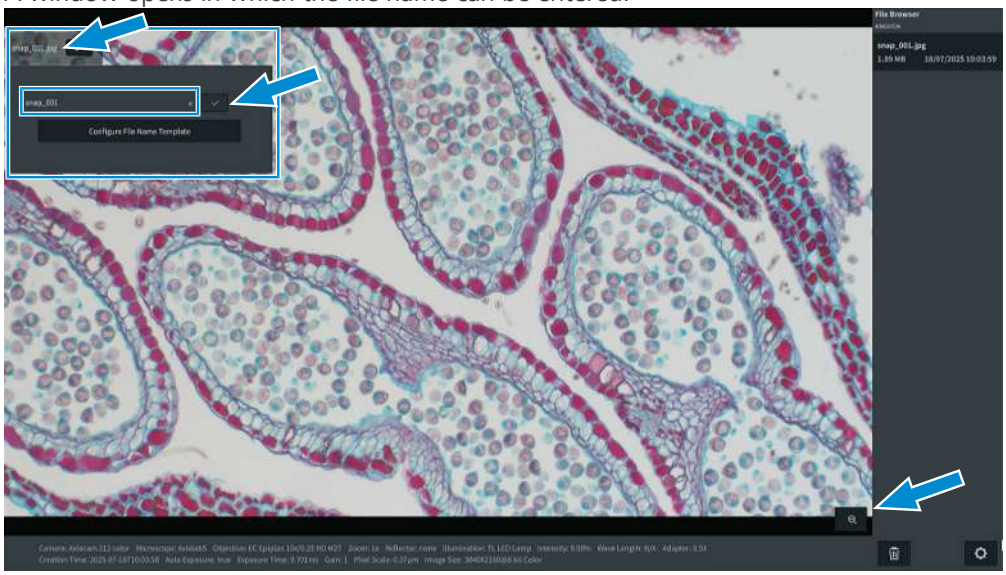
✓ The Single Image (Snap) acquisition mode is active.

Procedure

1. Click on the **Snap** button.
   → A single image is captured and a preview is displayed on the bottom right side of the screen.
2. Click on the preview.



   → The image opens and is displayed enlarged.
3. Click on the image name.
   → A window opens in which the file name can be entered.



4. Enter a new name for the image.
5. Click on the button to save the changes.
6. To close the window, click on the minus sign.

> **Info**
>
> The **Configure File Name Template button** opens another template in which presettings for naming the files can be made.

5.2.2 Recording a Video

Prerequisite

✓ The microscope is operational.

✓ The Video Recording acquisition mode is active.

Procedure

1. Click on the **Video** button.

→ The video recording starts.

→ The button changes to

2. Click on

→ The video recording stops.

→ The thumbnail of recorded video is displayed on the bottom right corner of the screen.

5.2.3 Acquiring Multi-Channel Images

Prerequisite

✓ The microscope stand is operational.

✓ The Multi-Channel acquisition mode is active. 

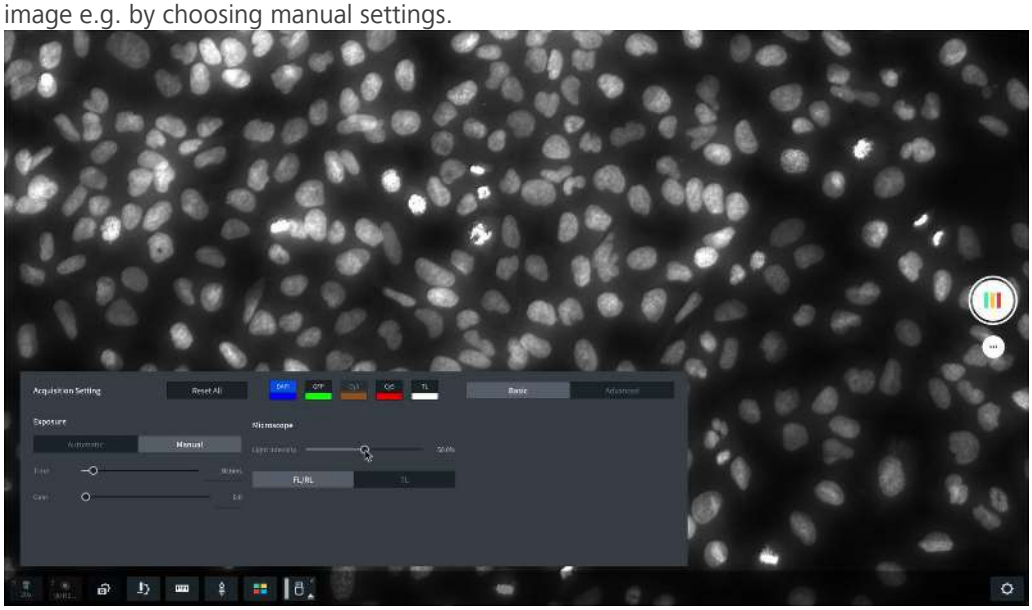
✓ The desired fluorescence channels are selected (button turns black) or deselected (button turns grey) by right mouse click on.

Procedure

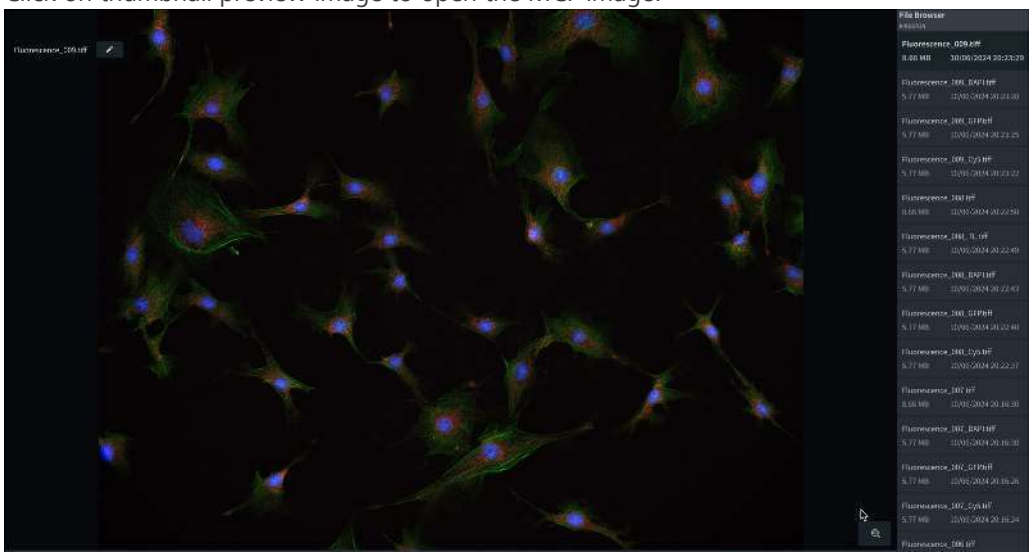
1. Click (left mouse) on the selected fluorescent channel button to switch on fluorescent LED and start camera live view (in Live View or acquisition settings).

→ A live image is displayed on the screen.

2. If desired, optimize acquisition settings like exposure time gain manually to optimize your image e.g. by choosing manual settings.



3. Repeat the procedure for all channels you want to use for the MCF image acquisition. Channels without pseudo color assignment are not taken into account in the MCF recording. For configuration of fluorescent channels, see *General Tab [▸ 44]*.
4. Click on Multi-Channel button.
   → The multi-channel image is saved, and a thumbnail of the image is displayed.
5. Click on thumbnail preview image to open the MCF image.



6. By click on image name in left top corner a window opens to change the file name.
7. In file browser at the right side the single fluorescence channel images are listed and can be opened (by click).

5.3 Acquisition Modes

The following acquisition modes are available:

Icon	Mode
	Single image acquisition (Snap)
	Video recording
	Multi-channel acquisition

5.3.1 Acquisition Settings Menu

Based on the camera type and the microscope stand, the content of the **Acquisition Settings** menu may vary. The **Acquisition Settings** menu contains two layers, which can be selected by clicking the corresponding tab:

- **Basic**
- **Advanced**

5.3.2 Acquisition Settings Menu - Basic

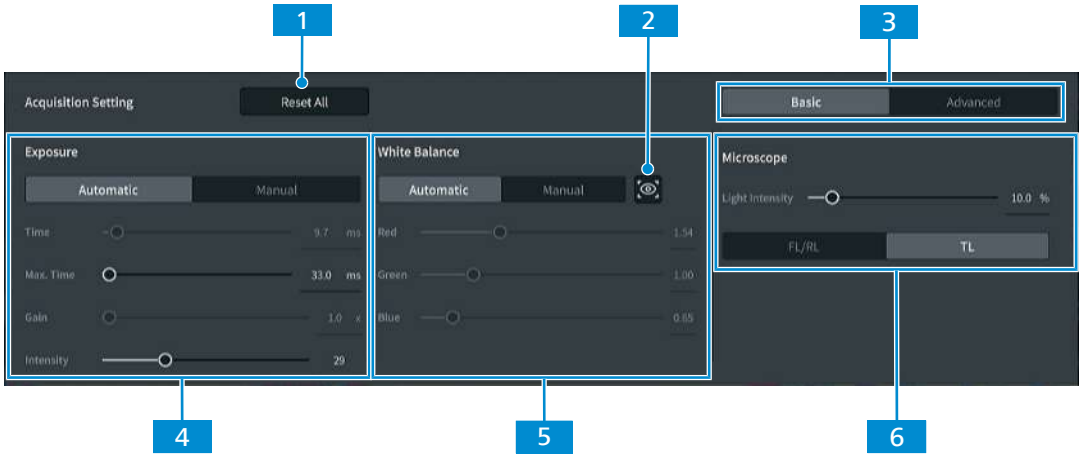


*Fig. 7: **Acquisition Settings** menu - Basic*

No.	Parameter	Description
1	**Reset all** button	Restore the default acquisition settings.
2	**Preset**	Preset the white balance of microscope, according to color temperature of the illuminator.
3	**Basic** tab	Open the **Basic** layer.
4	**Exposure** controls	See *Setting the Exposure [▸ 33]*.
5	**White balance** controls	See *Setting the White Balance Manually [▸ 34]*.

No.	Parameter	Description
6	**Microscope** controls	See *Setting the Light Intensity [▸ 35]*.

5.3.3 Acquisition Settings Menu - Advanced

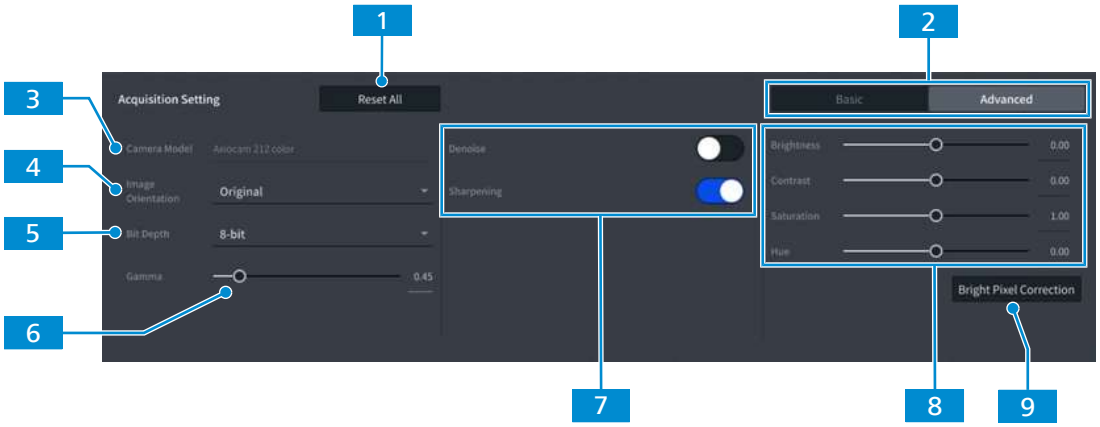


*Fig. 8: **Acquisition Settings** menu - Advanced*

No.	Parameter	Description
1	**Reset all** button	Restore the default acquisition settings.
2	**Advanced** tab	Open the **Advanced** layer.
3	**Camera model** display field	Displays the camera model.
4	**Image orientation** drop down list	Adjust the image orientation.
5	**Bit depth** drop down list	Select the bit depth.
6	**Gamma** slider	Adjust the gamma settings.
7	Image enhancement settings	Activate/deactivate automatic denoise or sharpening.
8	Image optimization settings	Adjustments for the image optimization.
9	**Bright Pixel Correction** button	Opens the bright pixel correction setup, see *Bright Pixel Correction [▸ 36]*.

5.3.4 Setting the Exposure

Automatically setting the exposure

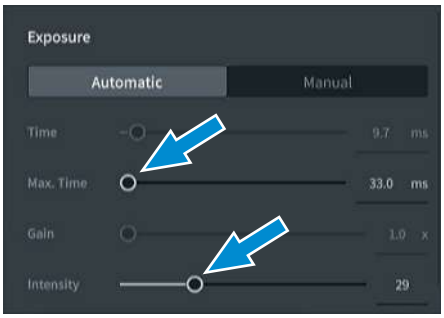
The automatic exposure setting mode ensures a consistent brightness of the image by continuously calculating the correct exposure time based on the current light intensity.

Procedure

1. At the OSD menu, navigate to the **Acquisition Settings** menu.

2. At the **Exposure** controls, click the **Automatic** button.

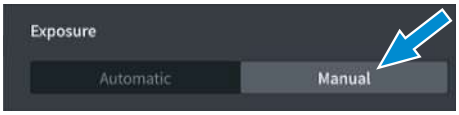
3. If necessary, fine-tune the exposure **Max. Time / Intensity** using the respective **slider** or the input field.



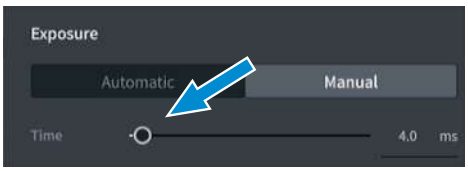
Manually setting the exposure

Procedure

1. At the OSD menu, navigate to the **Acquisition Settings** menu.
2. At the **Exposure** controls, click the **Manual** button.



3. Set the exposure **Time** using the respective **slider** or the input field.



4. Set the **Gain** value using the respective **slider** or input field.

5.3.5 Setting the White Balance Manually

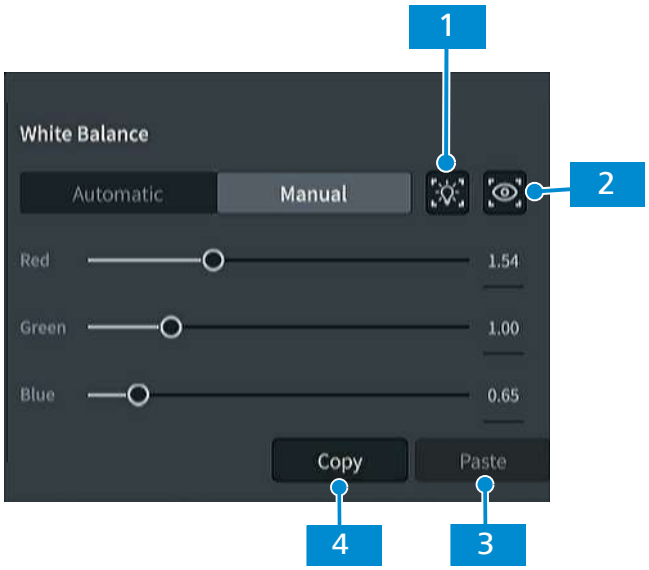


Fig. 9: Setting the White Balance Manually

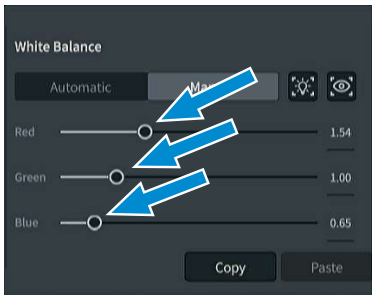
No.	Parameter	Description
1	**Run Auto White Balance Once** button	Initiates a one-time auto white balance adjustment based on the current field of view.

No.	Parameter	Description
2	**Microscope White Balance Preset** button	Chooses the preset of color temperature that most closely matches the light source's color temperature.
3	**Paste** button	Applies the Red, Green, and Blue gain values previously stored in temporary memory.
4	**Copy** button	Copies the current Red, Green, and Blue gain values to temporary memory.

Procedure

1. At the OSD menu, navigate to the **Acquisition Settings** menu.
2. At the **White balance** controls, click the **Manual** button.

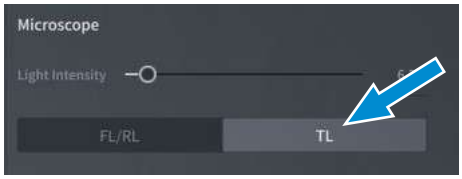
3. Select suitable color temperature preset by pressing **Microscope White Balance Preset** button. The default preset is "**Microscope LED 5500K**".
4. Press **Run Auto White Balance Once** button. Ensure that the entire field of view is white before using this function. For example, in transmitted observation mode, this can be achieved by simply removing the sample from the stage.
5. If necessary, fine-tune the white balance using the **RGB sliders**.



5.3.6 Setting the Light Intensity

Procedure

1. At the OSD menu, navigate to the **Acquisition Settings** menu.
2. At the **Light intensity** controls, tap the **TL** button, if a TL light source is installed.



3. If necessary, fine-tune the **Light Intensity** for the TL light source using the respective **slider** or the input field.

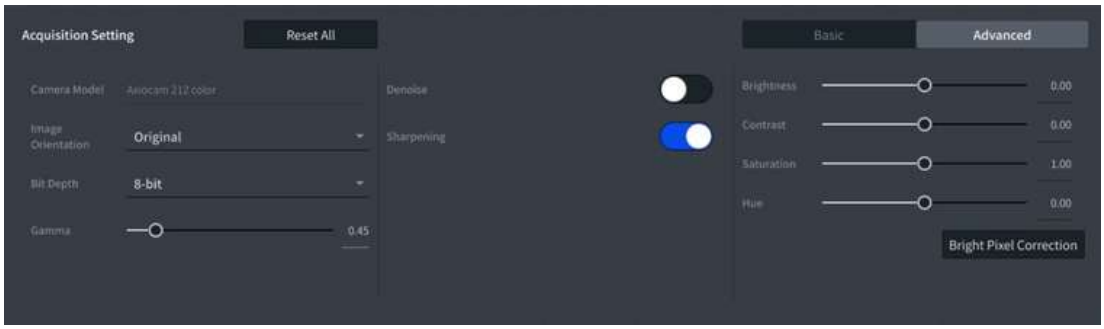
4. Tap the **FL/RL** button, if a RL or FL light source is installed.

5. If necessary, fine-tune the **Light Intensity** for the RL light source using the respective **slider** or the input field.

5.3.7 Bright Pixel Correction

The **Bright Pixel Correction** setup allows you to apply the Bright Pixel Correction procedure. This procedure corrects newly developed bright (or hot) pixels due to long exposure times, high gain settings or cosmic events.

Open the Bright Pixel Correction setup by click on respective button in Acquisition menu under Advanced:

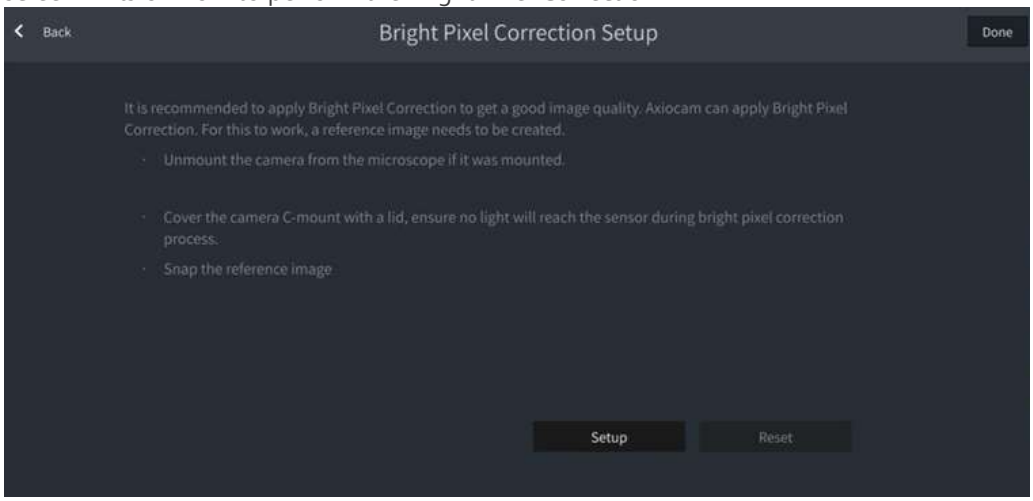


Prerequisite

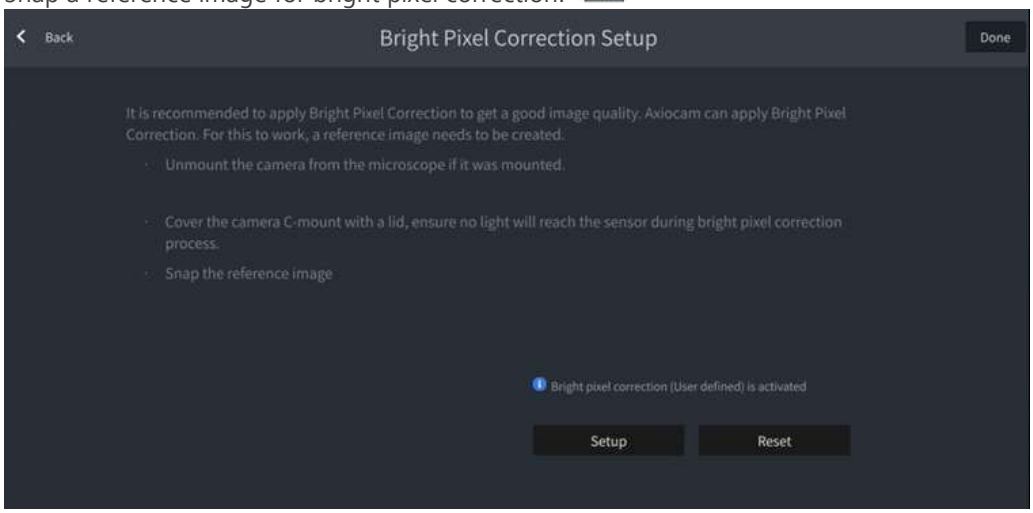
✓ The C-mount port is closed so that no light will reach the image sensor during the procedure. You can close the C-mount port by either closing the light path of the microscope stand or detaching the camera from the stand and protect sensor from light by screwing the protective cap onto the camera's C-mount thread.

Procedure

1. Click on **Setup** button in Bright Pixel Correction Setup menu. Read and observe the on-screen hints on how to perform the Bright Pixel Correction.



2. Snap a reference image for bright pixel correction.



3. Close Bright Pixel Correction Setup by click on **Done** button.

5.4 Annotations Menu

You can add measurements, markers or text annotations to an image in live view. The annotations can be customized with the available colors – red, blue, green, yellow, black and various line thicknesses and font sizes. Below you can find the list of the available annotations and measurement tools.

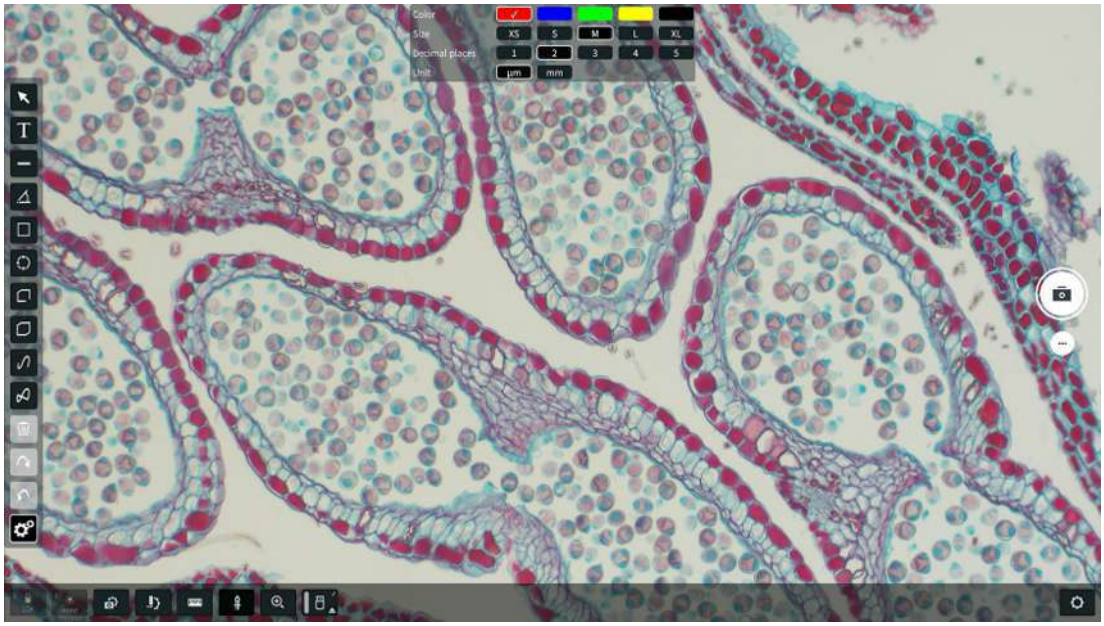


*Fig. 10: **Annotations** Menu*

Parameter	Description
Arrow 	Click on an annotation item to select it individually, and use the arrow keys to slowly move the selected item.
Text 	Allows to enter text in a box.
Distance 	Draws a line and measures the length.
Angle 	Allows to measure an angle.
Rectangle 	Draws a rectangle and measures area.
Circle 	Draws a circle and measures the area.
Polyline 	Draws a polyline and measures the distance.

Parameter	Description
Polygon 	Draws a polygon and measures the area.
Spline 	Draws a spline and measures the distance.
Spline Contour 	Draws a spline contour and measures the area.
Remove 	Removes the selected annotation items. If several annotations are selected with the selection arrow, they can be deleted at once. Also, use Ctrl+A to select all annotation items; press the Delete key to remove the selected annotations.
Redo 	Redo the previous change.
Undo 	Undo the last change.
Setting 	Show or hide the setting window for Color, Size Decimal places and Unit.

For measuring, ensure a correct configuration of camera adapter, objectives and filter sets in accord to the actual components on your microscope. And in the live view, always check and confirm the current selected objective magnification in OSD microscope configuration is identical as the current objective on the nosepiece.

Info

To improve the accuracy of locating the measurement endpoint, enable the **Zoom Window** feature.

To perform a series of measurements using the same tool, double-click the desired measuring tool icon. The tool will remain active for continuous use until you single-click the same or another tool icon.

5.5 Configure Microscope Menu

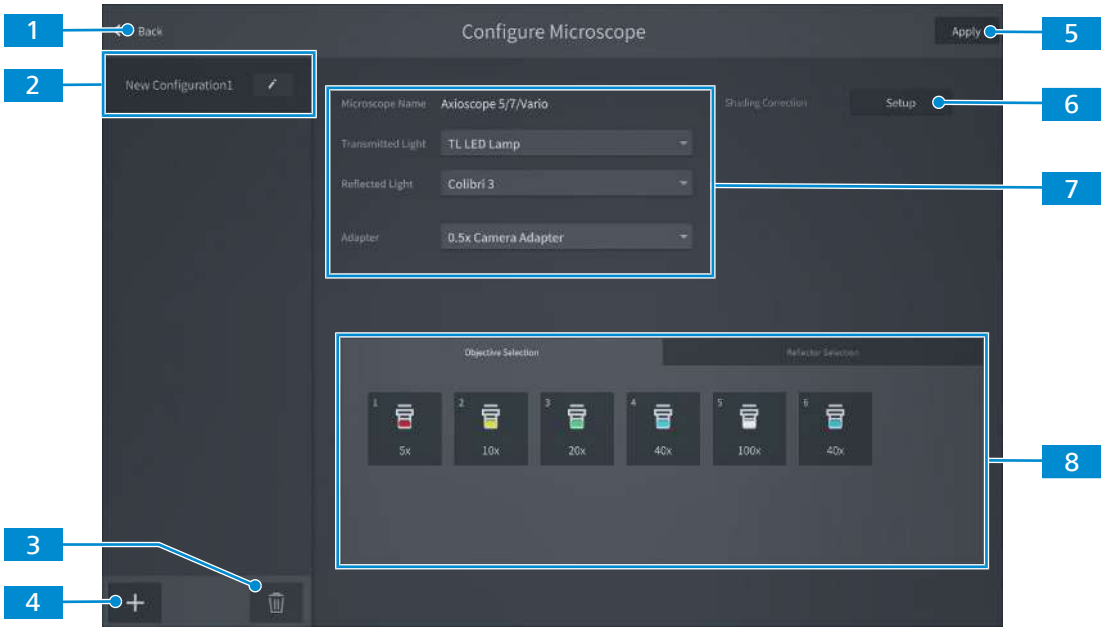


*Fig. 11: **Configure Microscope** menu*

No.	Parameter	Description
1	**Back** button	Close the menu.
2	Configuration list	The microscope and the camera are recognized automatically.
3	**Delete** button	Delete the selected microscope configuration from the list.
4	**Add** button	Perform auto configuration to add the new microscope configuration to the list.
5	**Apply** button	Apply the changes.
6	**Setup** button	Opens the shading correction setup menu, see *Performing a Shading Correction [▶ 42]*.
7	Microscope configuration area	Select the microscope configurations.
8	Objective selection/Reflector selection area	Select the objective and the reflector set, see *Assigning Objectives and Filter Sets [▶ 40]*.

See also

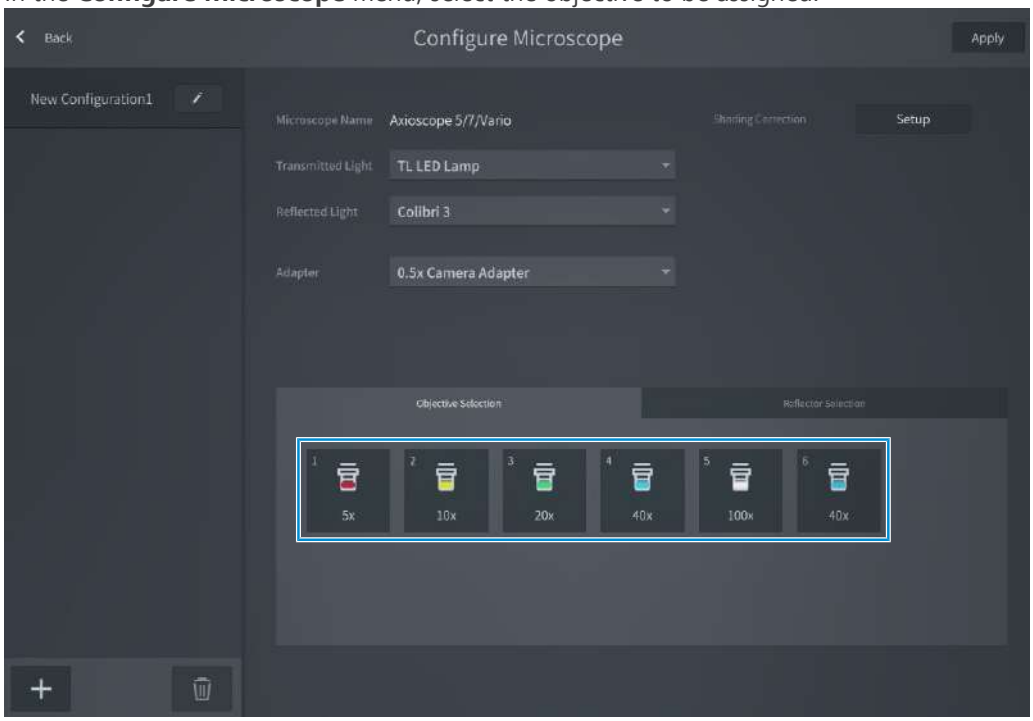
Configure Microscope Menu [▶ 39]

5.5.1 Assigning Objectives and Filter Sets

Prerequisite ✓ The microscope is operational.

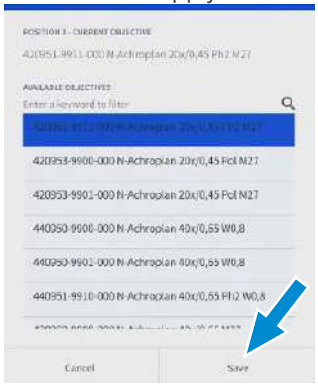
Procedure

1. In the **Configure Microscope** menu, select the objective to be assigned.



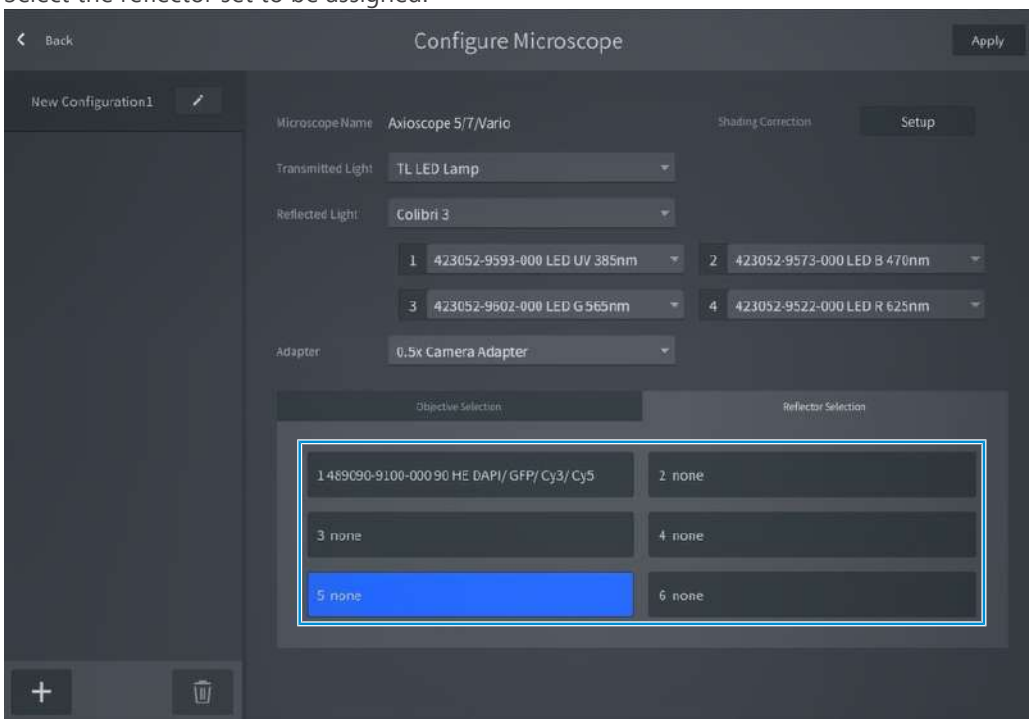
→ The **Objective** submenu opens.

2. Select one of the available objectives from the list.
3. Click **Save** to apply the selection.



4. Repeat the procedure for other objective positions, if required.
5. Click on the **Reflector selection** tab.

6. Select the reflector set to be assigned.



→ The **Reflector selection** submenu opens.

7. Select one of the available reflector modules from the list.
8. Click **Save** to apply the selection.

9. Repeat the procedure for other reflector set positions, if required.
10. Click **Apply** to save the selection.
11. Click **< Back** to return to the live image.

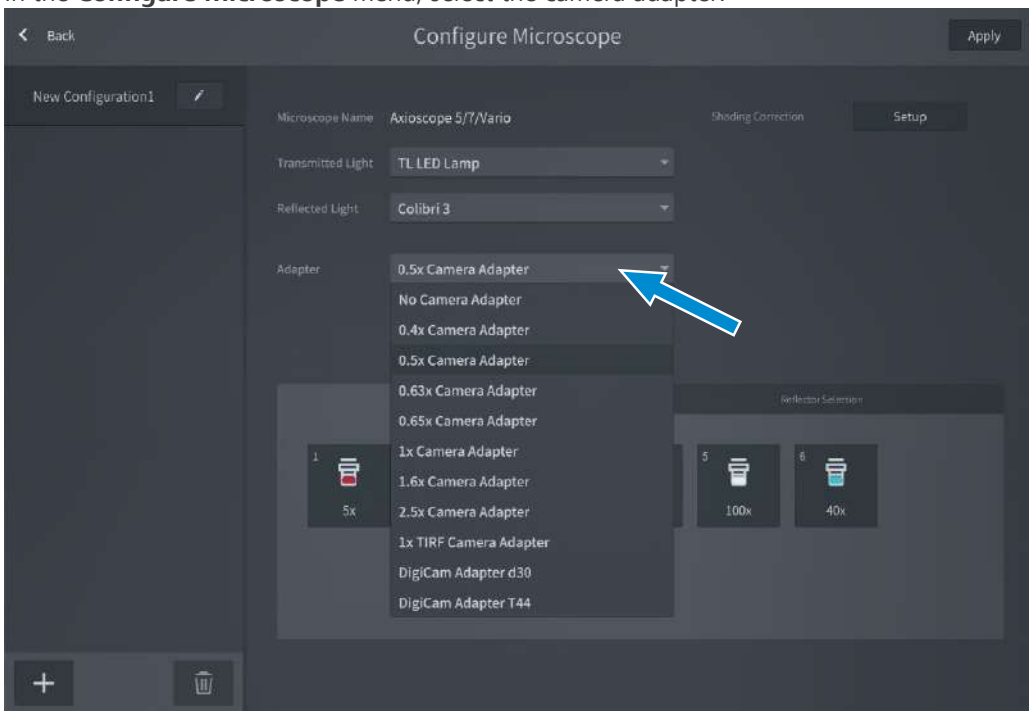
5.5.2 Performing a Shading Correction

> **Info**
>
> **Insufficient image quality after changing the configuration of the microscope.**
>
> It is recommended to perform a shading correction for each objective of any newly configured microscope before starting to work.

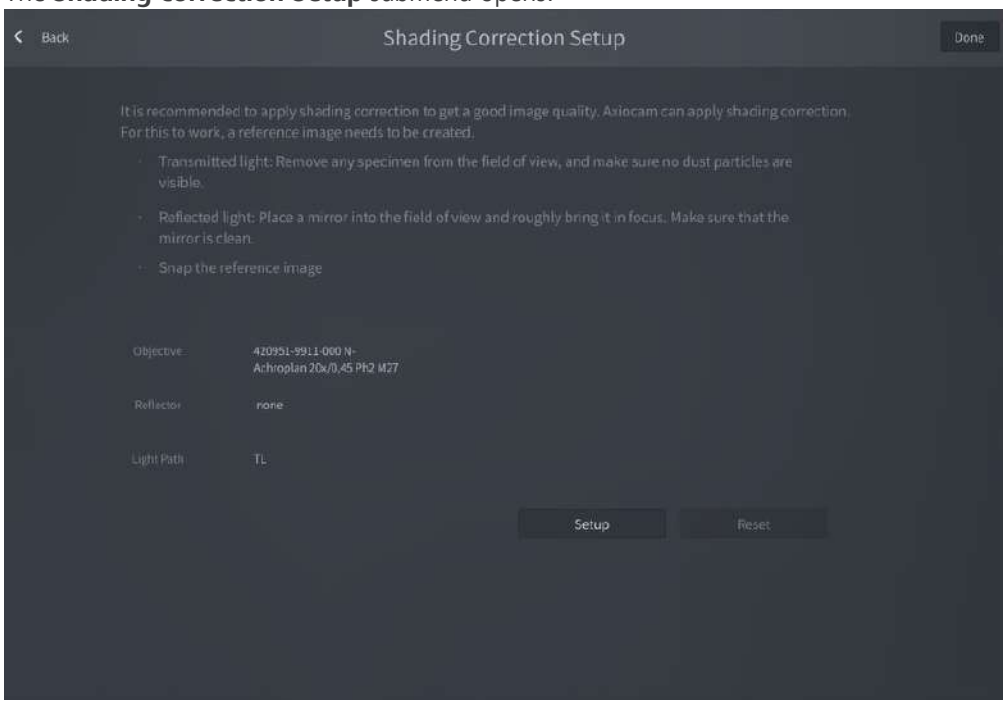
Prerequisite ✓ The microscope is operational.

Procedure

1. In the **Configure Microscope** menu, select the camera adapter.



2. Click on the **Setup** button.
   → The **Shading correction Setup** submenu opens.



3. Read and observe the on-screen hints on how to perform an individual shading correction.

4. Click on the **Setup** button.

5.6 Global Settings Menu

The **Global Settings** menu contains four layers, which can be selected by clicking the corresponding tab:

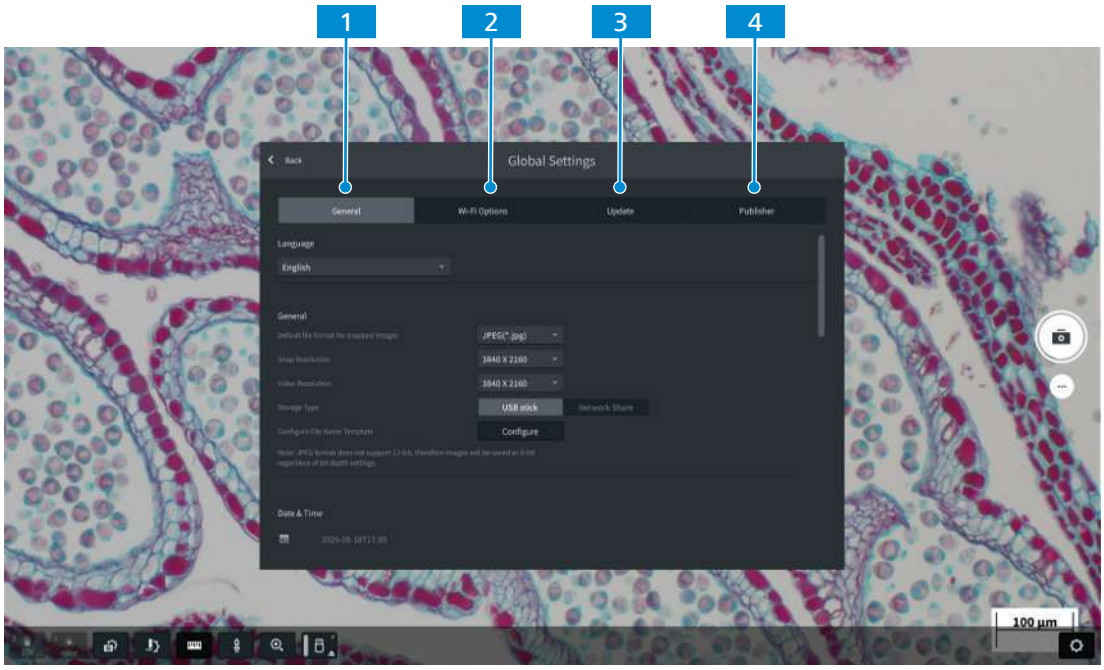


*Fig. 12: **Global Settings** menu*

1	General Tab	2	Wi-Fi Options Tab
3	Update Tab	4	Publisher Tab

5.6.1 General Tab

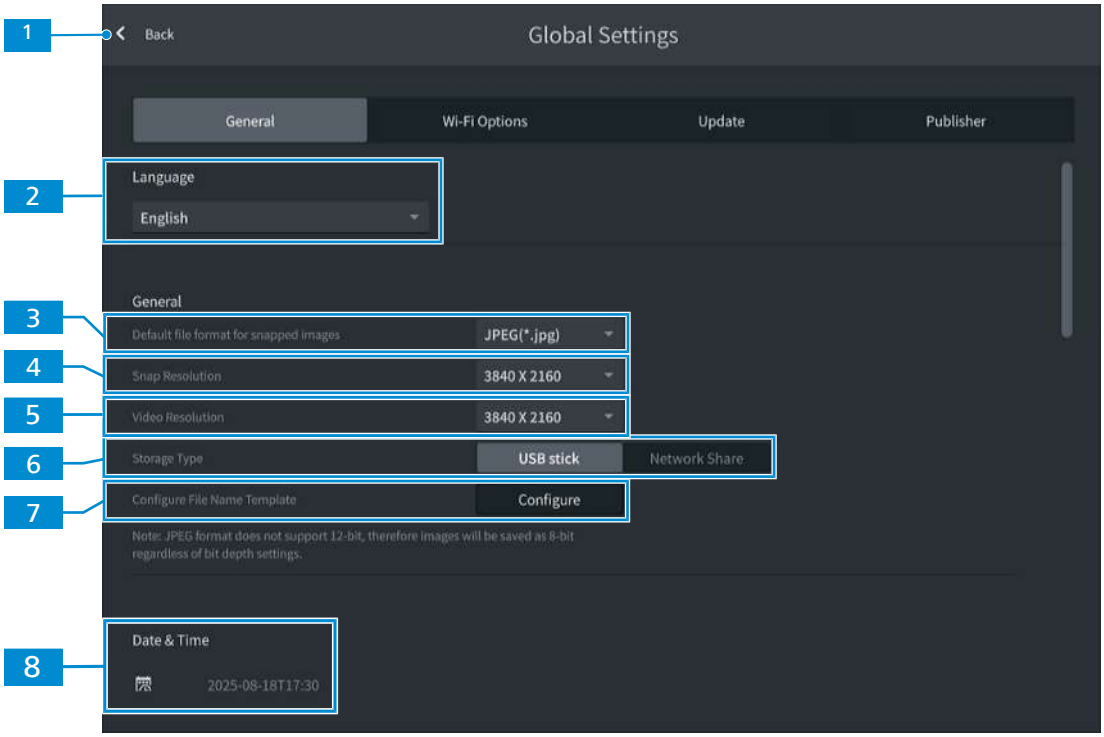


*Fig. 13: **Global Settings** menu, **General** tab 1*

No.	Parameter	Description
1	**Back** button	Close the menu.
2	**Language selection** drop down menu	Select the language of the application.
3	**Default file format** drop down menu	Select the default file format for the generated images.
4	**Snap Resolution** drop down menu	Select the resolution for snapped images.
5	**Video Resolution** drop down menu	Select the resolution for recorded videos.
6	**Storage Type** tab	Select the type of file format for storage.
7	**Configure File Name Template** button	Configure the file name template.
8	**Date & Time** setting field	Set date and time.

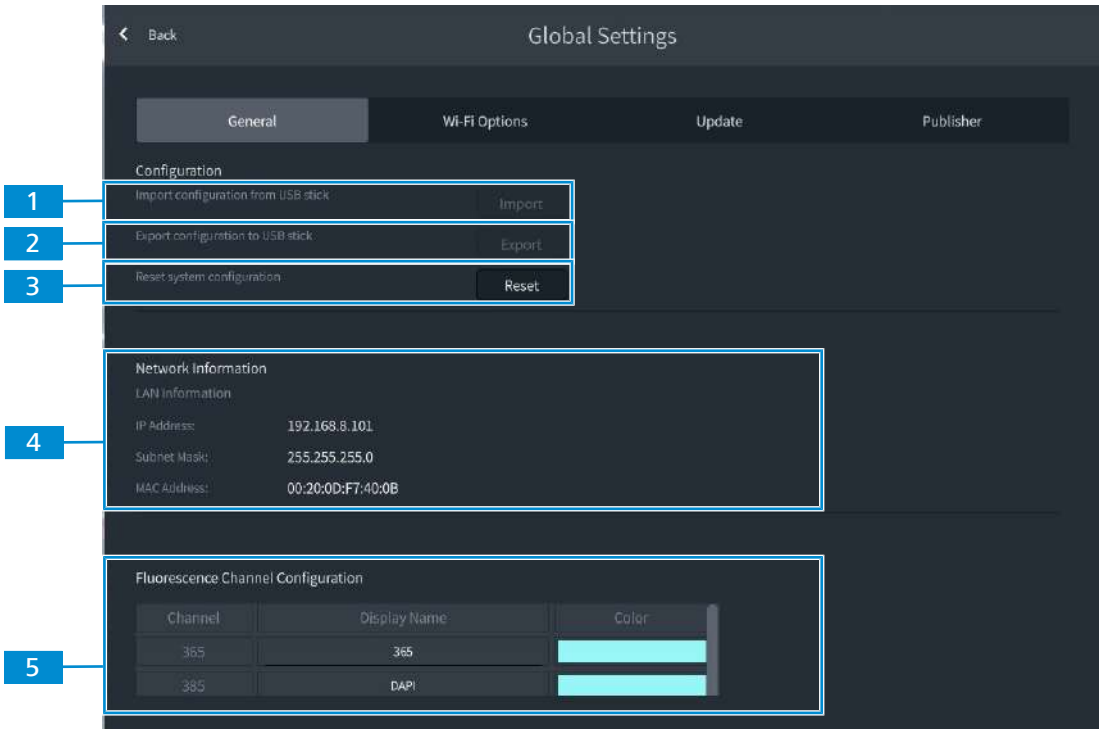


*Fig. 14: **Global Settings** menu, **General** tab 2*

No.	Parameter	Description
1	**Import** button	Import an existing configuration file.
2	**Export** button	Export the configuration file.
3	**Reset** button	Reset the system configuration. Reset all camera settings and microscope configurations to factory settings.
4	Network Information	Network Information is displayed.
5	Fluorescence Channel Configuration	Pseudo colors for respective fluorescence channel can be assigned.

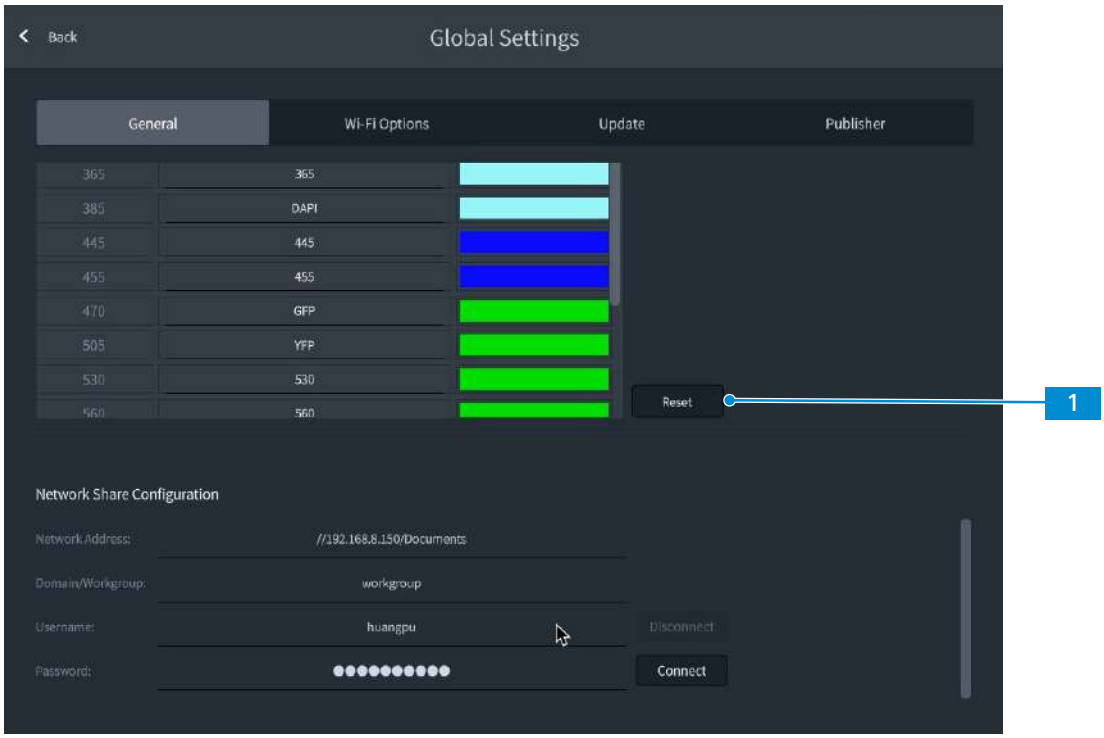


*Fig. 15: **Global Settings** menu, **General** tab 3*

No.	Parameter	Description
1	**Reset** button	Reset the fluorescence channel configuration.

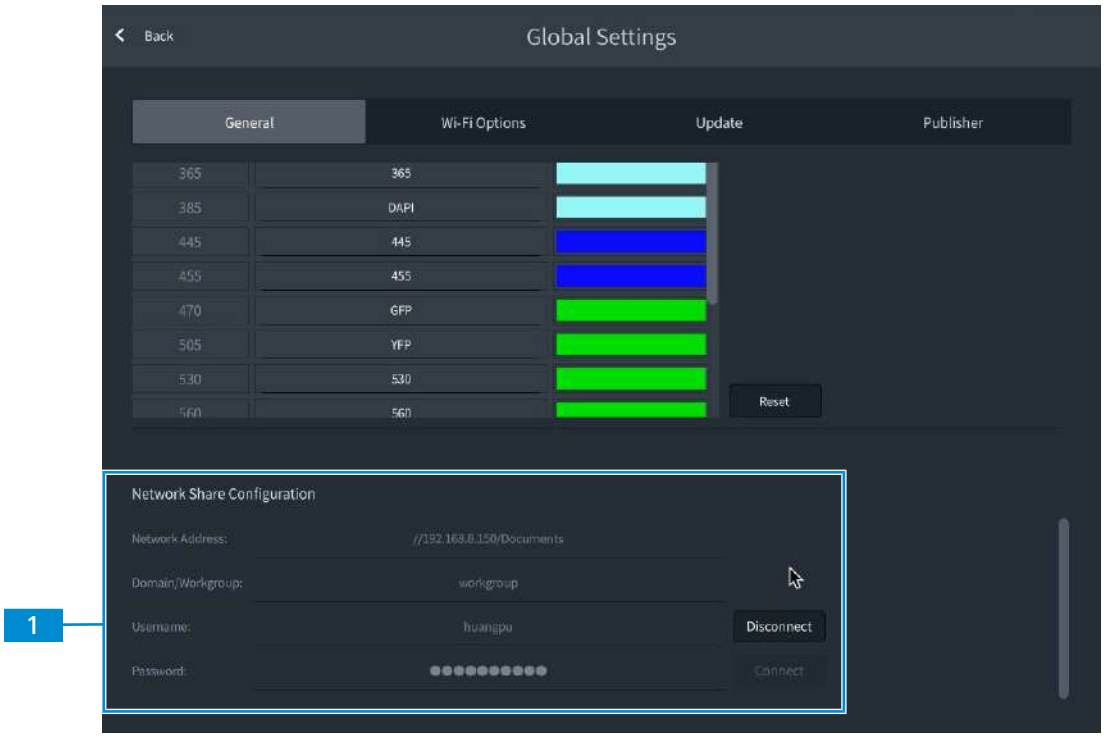


*Fig. 16: **Global Settings** menu, **General** tab 4*

No.	Parameter	Description
1	Network Share Configuration	Set the network address/ domain/ workgroup/ username/ password.

5.6.1.1 Setting Up a Network Share

Procedure

1. Ensure the camera and PC/laptop are connected to the same LAN (e.g., camera IP: 192.168.8.101, PC IP: 192.168.8.150).
2. Create a shared folder on the PC/laptop (e.g., \\192.168.8.150\Documents) and assign read/write permissions.
3. Set **Storage Type** to Network Share in the general setting.
4. Fill in all required fields under the **Network Share Configuration** section.
5. Click the **Connect** button to establish the connection, and a success message will confirm the shared folder is connected.
6. Captured images will be automatically saved to the shared folder and can be accessed via the **storage icon** in the menu bar.

Info

Refer to screenshots in *General Tab [▸ 44]* for visual guidance on important steps.

5.6.2 Wi-Fi Options Tab

As an access point

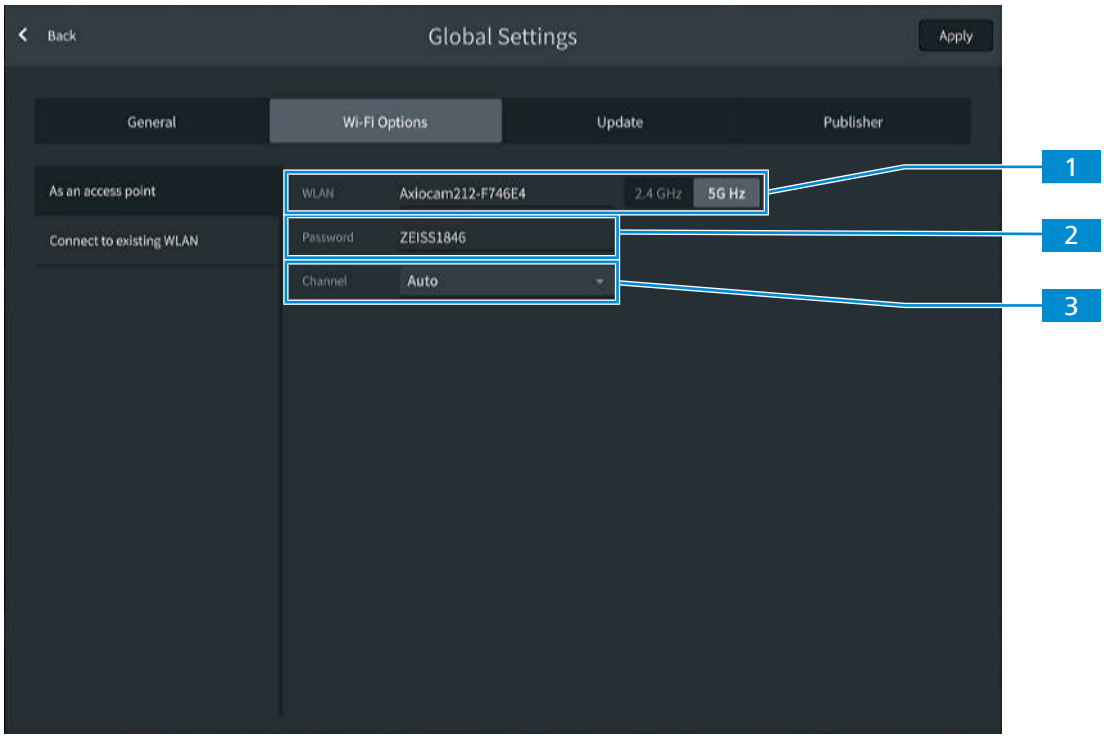


*Fig. 17: **Global Settings** menu, **Wi-Fi Options** tab **As an access point** settings*

No.	Parameter	Description
1	**WLAN** setting field and **GHz** button	Set the WLAN name and select the frequency.
2	**Password** setting field	Set the password (default password is **ZEISS1846**).
3	**Channel** drop down menu	Select the channel.

Connect to existing WLAN

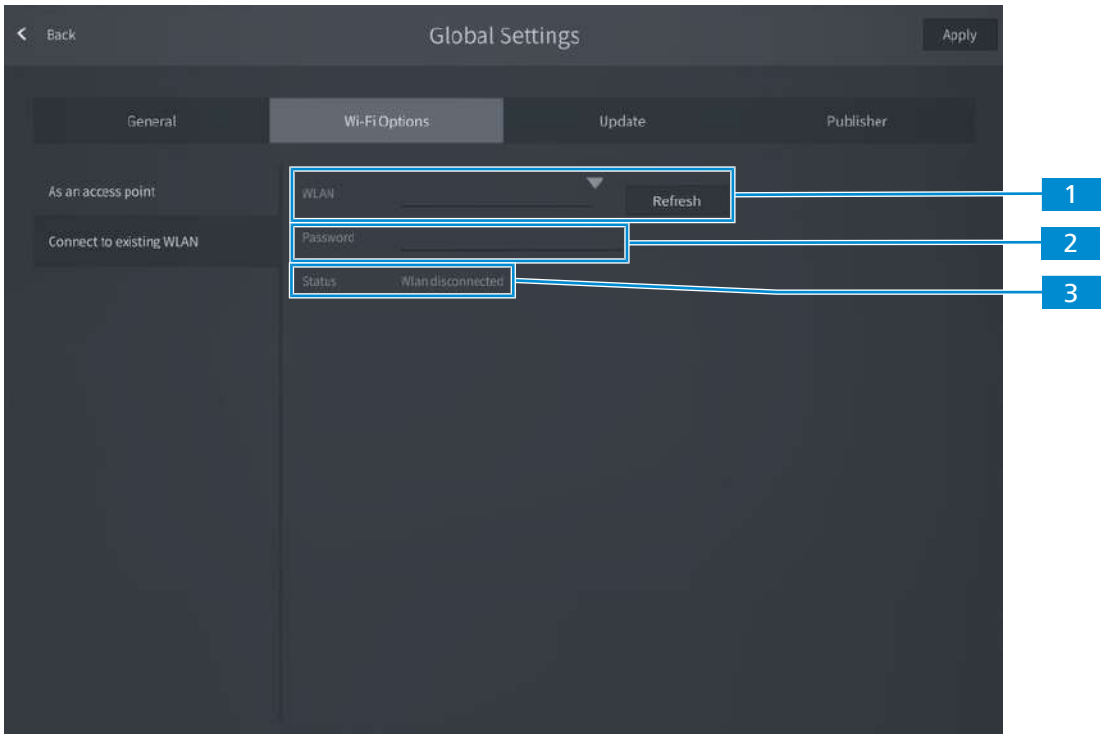


*Fig. 18: **Global Settings** menu, **Wi-Fi Options** tab **Connect to existing WLAN** settings*

No.	Parameter	Description
1	**WLAN** drop down menu	Select the WLAN you want to connect to.
2	**Password** setting field	Set the password.
3	Status	The network status is displayed.

5.6.3 Update Tab

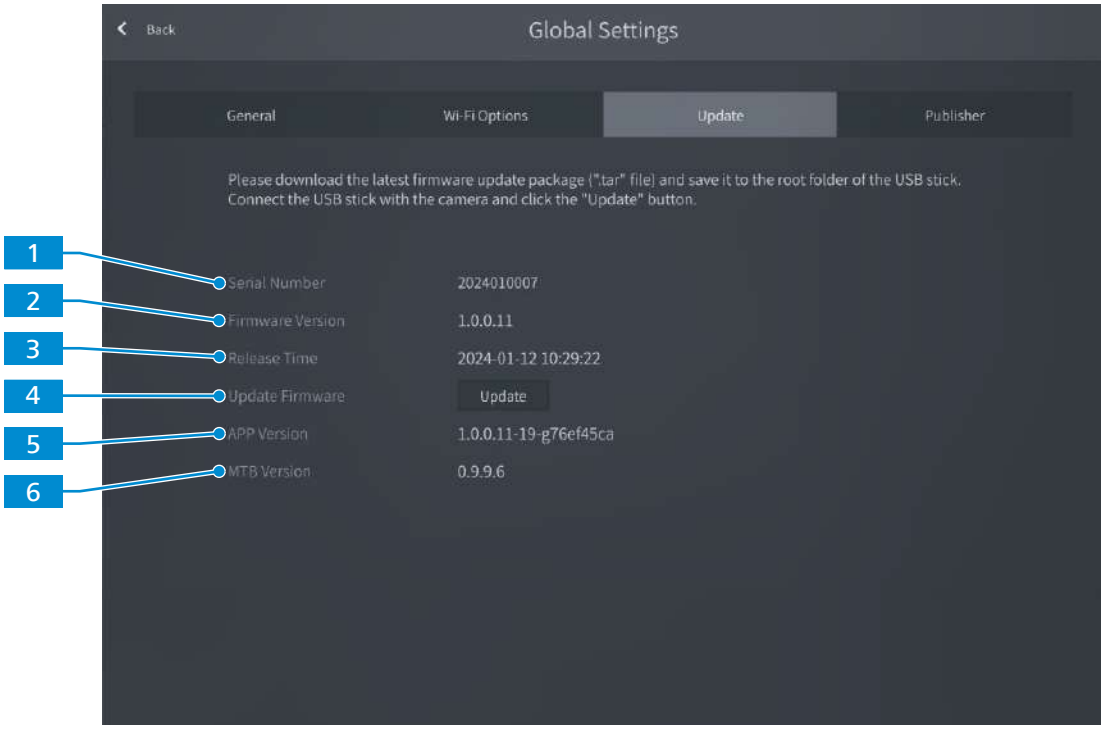


*Fig. 19: **Global Settings** menu, **Update** tab*

No.	Parameter	Description
1	Serial Number	The serial number of installed firmware is displayed.
2	Firmware version	The version of the installed firmware is displayed.
3	Release Time	The release date and time of the installed firmware is displayed.
4	**Update** button	Start a firmware update.
5	APP Version	The version of the installed APP software is displayed.
6	MTB Version	The version of the installed MTB software is displayed.

5.6.4 Publisher Tab

The **Publisher** tab displays legal information regarding the publisher as well as links to the user support forum, data protection notice, and end user license agreement.

6 Installing Software and Drivers

6.1 Installing Software on PC

To acquire images with the camera(s) on a PC, you must install ZEISS software (e.g. ZEN or Labscope). You will find links to the software manuals on the delivered flyer. The camera drivers are also installed during the software installation. The latest version of ZEISS software products can be downloaded via ZEISS Microscopy Installer or from the ZEISS Portal web page.

Info

For information on how to acquire images with the specific software, refer to the respective software manual.

6.1.1 Installing ZEN via ZEISS Microscopy Installer

NOTICE

- The installation of **ZEN** and other components is performed using the **ZEISS Microscopy Installer**. Download the **ZEISS Microscopy Installer** in the **ZEISS Portal** from the **Download Center** under https://portal.zeiss.com/download-center/softwares/mic.
- Do not install an older ZEN version over a newer ZEN version.
- If ZEN is already installed on your PC, during installation the current version will be uninstalled first.
- Depending on your PC configuration, the system requests an optional restart at the **beginning** of the installation.
- The system requests a restart at the **end** of the installation. This restart is required for the successful camera driver installation. You can postpone the restart until all components selected in the **ZEISS Microscopy Installer** are installed. After restart of the computer, reopen the **ZEISS Microscopy Installer** to install remaining components.
- In case of installing ZEN on a SEM system, make sure that SmartSEM is not running when installing ZEN.

Prerequisite

- ✓ Your system is connected to the Internet.
- ✓ You have opened the **ZEISS Microscopy Installer** with admin rights and you are logged in.
- ✓ You have selected (default setting) the online installation, see **ZEISS Microscopy Installer** manual.

Procedure

1. Open the **Install** tab.
2. On the left, activate **ZEN** with the respective version number.
   → The available components and tools for installation are displayed on the right side.
3. On the right side, activate all components you want to install.
   → If the **3rd party Python Tools** are not installed, the machine learning based Intellesis functionalities will not work. This also includes their use in other parts of the software, like the neural networks in certain Bio Apps.
4. Activate **I agree to the Terms and Conditions of the selected software**.
5. Click **Install**.
   → The selected components are downloaded and installed. The status is displayed in the ZEISS Microscopy Installer.
6. After successful installation, close the **ZEISS Microscopy Installer** and restart your PC to complete the installation.

6.1.2 Installing Labscope for Windows

Procedure

1. Download the latest **Labscope** for Windows via the product website: https://www.zeiss.com/labscope
   → You will be directed to the ZEISS Portal for downloading the installation files.
2. Double-click on **LabscopeSetup_vx.exe** to install the software.
3. Perform the required steps shown by the installation wizard. Agree if you are asked to install additional drivers.
   → Some modules of Labscope require additional installation, e.g. **BioModuleSetup.exe**, which is for **AI Cell Counting and AI Cell Confluency** models, and you can find the installer in the same page of Labscope download in Zeiss Portal.

Alternatively, you can install **Labscope** via ZEISS Microscopy Installer

6.2 Installing Labscope for Android or iOS

For Android

Procedure

1. Open the Google Play Store.
2. Search for **Labscope** by ZEISS.
3. Download **Labscope**.
4. Follow the instructions on your Android device to install the app.

For iOS

Procedure

1. Open the App store.
2. Search for **Labscope** by ZEISS.
3. Download **Labscope**.
4. Follow the instructions on your iOS device to install the app.

6.3 Installing TWAIN Plugin on PC

The TWAIN plugin for Axiocam 212 color / 203 mono is a standardized software interface to call up and control basic camera functions via a TWAIN-compatible non-ZEISS app.

Procedure

1. Go to https://portal.zeiss.com/download-center/softwares/mic.
2. Select **TWAIN** from the list.
3. Click on the **Download** Button.
   → The installation file is downloaded.
4. Open your **Downloads** folder and unzip the TWAIN installation file.
5. Double-click the **TWAIN** installation file (.exe).
6. Follow the instructions of the wizard.

For more information see the **Quick Guide ZEISS TWAIN for Axiocam**. You can find the PDF document in the **TWAIN** download folder.

6.4 Installing TWACKER DEMO Application

To demonstrate the image acquisition with the **TWAIN** plugin you can use the **TWACKER** application. **TWACKER** is not mandatory for operating the **TWAIN** plugin. If your laboratory software supports the **TWAIN** standard, you don't need to install **TWACKER**.

Procedure

1. Go to https://portal.zeiss.com/download-center/softwares/mic.
2. Select **TWAIN** from the list.
3. Click on the **Download** Button.

→ The installation file is downloaded.

4. Open your **Downloads** folder and unzip the TWAIN installation file.
5. Double-click the **TWACK_32.msi** installation file.
6. Follow the instructions of the wizard.

For more information see the **Quick Guide ZEISS TWAIN for Axiocam**. You can find the PDF document in the **TWAIN** download folder.

7 Acquiring Images and Videos

7.1 Introduction

The Axiocam 212 color and the Axiocam 203 mono are high definition cameras for color and monochromatic imaging, respectively. They are suitable for use as accessories for educational and routine microscopy in laboratory environments and for use by trained laboratory personnel. The cameras have been designed to be used in the field of light microscopy for general observation, routine work, and simple applications in which a sufficient amount of light is available.

7.2 Basic Procedure using OSD Menu

Prerequisite

- ✓ The USB flash drive and mouse/keyboard have been inserted into the respective USB interfaces of the camera.
- ✓ The camera is connected to a monitor via HDMI.
- ✓ The OSD menu has opened by moving the mouse over the live view screen.

Procedure

1. Position your specimen on the microscope and adjust the microscope to see a focused image on the monitor.
2. To take a single image, click on the **Snap** button in the **Live View** menu.
   → The image is saved to the USB flash drive in either JPEG or TIFF format.
3. To start video recording, click on the **Record** button in the **Live View** menu.
4. To finish video recording click on the **Stop** button in the **Live View** menu.
   → The video is saved to the USB flash drive in MP4 format.

7.3 Image Acquisition with Labscope

Upon first starting Labscope, each screen starts with an overlaying information screen explaining the functions. Refer to the displayed information for using the software. Disable or re-enable the information screens in the software`s **Settings** menu on your PC monitor iPad.

> **Info**
> For support in using Labscope, visit our support forum under https://forums.zeiss.com/microscopy/community/viewforum.php?f=38. Check the Labscope threads for problem-solving notes.

8 Care and Maintenance

To ensure the optimum performance of the device, preventive maintenance work should be performed at regular intervals.

Time interval	Component	Activity
As required	Infrared filter or protective glass	Cleaning
As required	Firmware	Update

Tab. 3: Maintenance plan

8.1 Optical System

The internal optical components of the camera should always be protected. If no lens, or camera adapter with optics, is screwed into the camera's C-Mount thread, the camera's sensor and protective glass must be protected by screwing the protective cap onto the camera's C-Mount thread.

8.2 Cleaning the Infrared Filter or Protective Glass

NOTICE

Sensitive optical parts

An inadequate handling of optical components may damage the components or decrease the device's imaging quality. The unauthorized handling of device components leads to the loss of warranty.

- Do not remove the filter or the protective glass.
- Do not clean the sensor directly.
- Do not use tap water to clean the IR filter.

Tool / part	Quantity
Soft brush	1
Cotton	1
Distilled water and 70% ethanol Always follow instruction from ZEISS microscopy web page: https://www.zeiss.com/microscopy/en/c/edr/20/how-to-keep-your-microscope-clean.html	1

Tab. 4: Tools and parts

Procedure

1. Use a soft brush or cotton to wipe away dry dust from the front side of the infrared filter or the protective glass.
2. Use cotton and 70% ethanol for optics to wipe away more serious contamination from the infrared filter.

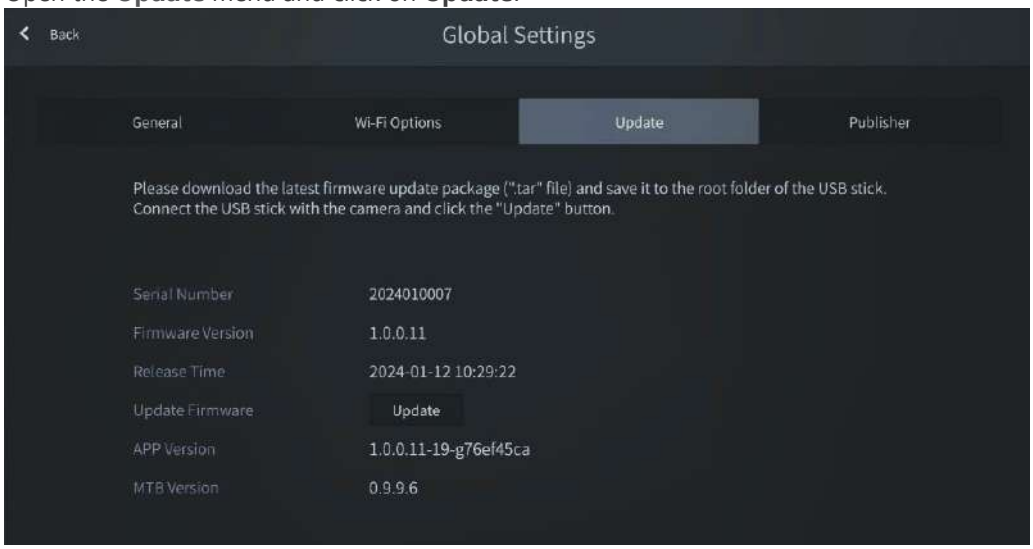
8.3 Updating the Firmware

Follow the subsequent instructions to update the camera's firmware:

Procedure

1. Download the latest firmware for your respective camera from the webpage https://portal.zeiss.com/download-center/softwares/mic/software/13053/.

2. Save the latest firmware update package (".tar" file) to the root folder of the USB flash drive (contained in the scope of delivery).
3. Insert the flash drive into the USB 3.0 Type C of the camera.
4. At the OSD menu, navigate to **Global Settings**.
5. Open the **Update** menu and click on **Update**.



→ Note that the update procedure takes several minutes.

→ Do not operate the camera or unplug the USB flash drive during the update procedure.

↳ The firmware is updated.

9 Troubleshooting

9.1 ZEN Software

Symptom	Cause	Measure
Camera does not appear in the menu for selectable cameras.	The camera is not properly connected.	Check and adjust the camera connections to PC and power supply, if necessary.
	The software and the drivers are not properly installed.	Make sure you installed the software and the drivers with administrative rights and according to the instructions in this manual.
	Incompatible accessories (e.g. USB adapters, cables etc.) were used, so the camera was brought into wrong mode and failed to be recognized.	**Procedure** 1. Connect the camera to the PC with the accessories provided in the delivery package. 2. Restart the camera.
	The PC's USB driver is outdated.	Upgrade to the latest driver provided by the PC manufacturer.
No camera image visible on the screen.	The camera is not properly connected.	**Procedure** 1. Make sure, the camera's status LED constantly lights blue. 2. If necessary, check and adjust the camera connections to PC and power supply. 3. Restart the camera.
	The illumination reaching through to the camera is not sufficient.	**Procedure** 1. Check the light path settings of the microscope. 2. If necessary, check and adjust the position of the beam splitter between the ocular and the camera port. 3. If necessary, check and adjust the setting of the aperture diaphragm of the microscope, if necessary. 4. Execute an automatic exposure measurement.
	Inappropriate display settings are used.	Check and adjust the display device's settings for live imaging, if necessary.
The color of the displayed image taken by Axiocam 212 color does not correspond to the image seen through the eyepieces.	The color matching is inappropriate.	Set the color temperature. Check the monitor's color temperature setting. If necessary, reduce the color temperature to the lowest value possible.

Symptom	Cause	Measure
The color of the displayed MCF image taken by Axiocam 203 mono does not correspond to the image seen through the eyepieces.	Unsuitable overlay colors are used to represent fluorescence dyes.	Select alternative overlay colors.

9.2 Camera

Symptom	Cause	Measure
The LED indicator is off.	The camera is not powered on properly.	Make sure the camera is powered by the plug-in power supply and switched on.
The LED indicator flashes red.	The camera is updating firmware or being reset.	***NOTICE*** **Do not switch off the power supply.**
The image / video cannot be saved to the USB flash drive.	USB flash drive is not in correct format.	Format the USB flash drive to FAT32 format on a PC.
	USB flash drive has not enough free memory.	Make sure there is enough free memory on the flash drive.
	USB flash drive cannot be recognized.	Restart the camera.
The firmware update does not function.	USB flash drive is not in correct format.	Format the USB flash drive to FAT32 format on a PC.
	USB flash drive does not enough free memory.	Make sure there are at least 200 MB of free memory on the USB flash drive.
	USB flash drive cannot be recognized.	Restart the camera.
	The firmware cannot be found.	Make sure the latest firmware is stored to the root folder of the USB flash drive.
	The firmware is not uploaded properly.	Restart the firmware update process and exactly follow the instructions in the firmware update menu.
The camera date and time is not correct.	Date and time are not set correctly.	**Procedure** 1. At the OSD menu, navigate to **Settings > Operating System**. 2. Tap the **Date & Time** button. 3. Set the camera date and time.
	The buffer battery is empty.	Contact your local ZEISS service organization to change the battery. The expected battery lifetime is approx. 4-5 years.
The image has severe noise.	The amplification (gain) is set too high.	Manually reduce the gain value.

Symptom	Cause	Measure
	The exposure time is set too low.	Manually adjust the exposure time.
	The light intensity is set too low.	Increase the light intensity. Activate denoise function in Image setting menu.
The image is too dark or too bright.	Automatic exposure time has not been activated.	Activate the automatic exposure settings or manually adjust the exposure settings to the current light situation.
The camera settings are not saved after a camera restart.	The camera has been powered off to early after changing the settings.	For the settings to be automatically stored, wait at least 5 seconds after changing the settings before you power off the camera.
Monitor connected via HDMI does not display an image.	The camera is not delivering a signal, or signal is not compatible with the monitor.	Ensure that the camera has been switched on for at least 30 seconds and the LED indicator is blue. Check the plug connections on the camera and monitor.
The image appears distorted on full screen monitor.	The monitor's image aspect ratio is not set to 16:9.	Set the monitor's aspect ratio to 16:9.
The image is blurred on the screen, but the sample is in focus through the eyepieces.	The focus plane of the camera is different from that of the eyepieces.	**Procedure** 1. Focus the sample through the eyepieces. 2. Calibrate the camera adaptor until image is in focus on the monitor. If camera adapter cannot be calibrated, adjust at microscope focus knob until camera image is in focus.
The Camera otherwise behaves abnormally.	The camera may have been brought into a non-intended state.	Press the reset to factory settings button on the camera.

9.3 Labscope

Info

For support in using Labscope, visit our support forum under https://forums.zeiss.com/microscopy/community/viewforum.php?f=38. Check the Labscope threads for problem-solving notes.

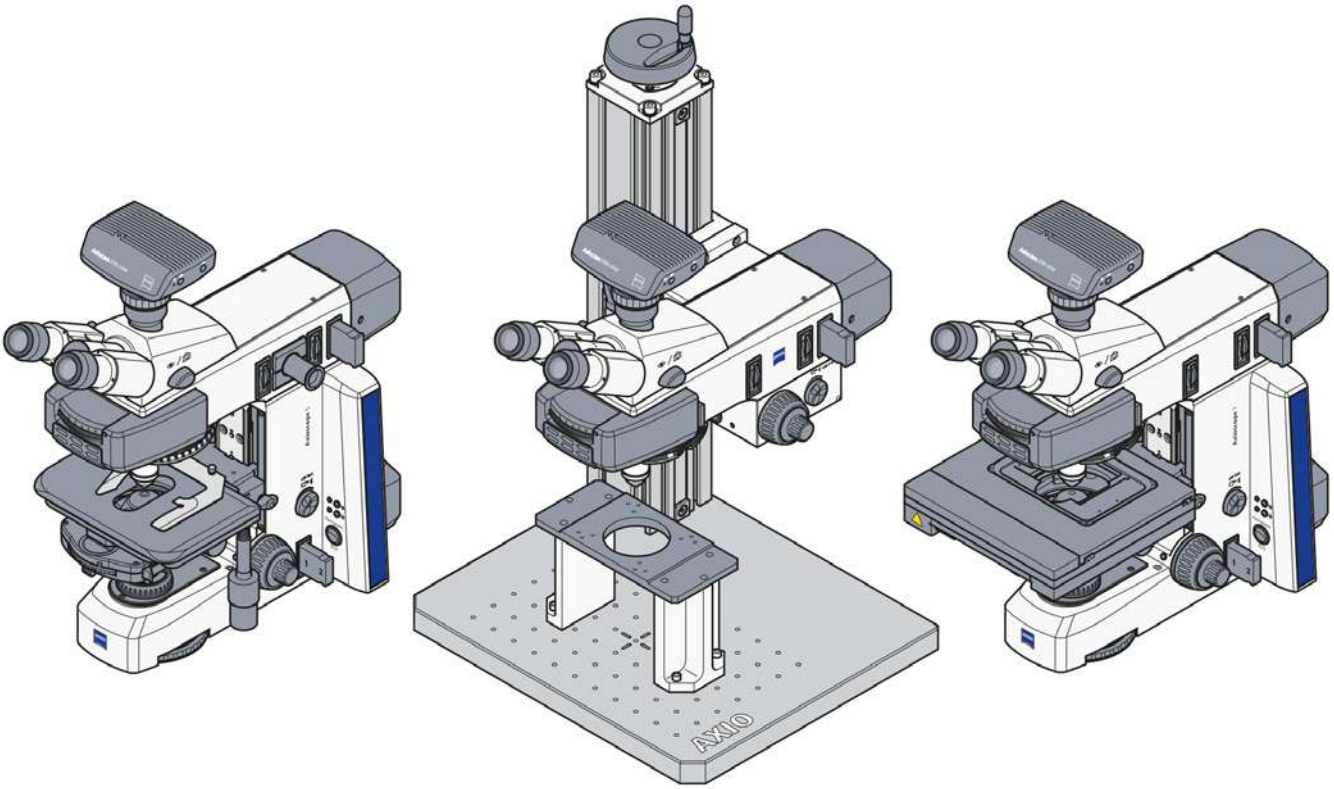
10 Disposal

The product must not be disposed of as domestic waste or through municipal disposal companies. It must be disposed of in accordance with applicable regulations (WEEE Directive 2012/19/EU). ZEISS has implemented a system for the return and recycling of devices in member states of the European Union that ensures suitable reuse according to the EU Directives mentioned.

For detailed information on disposal and recycling consult your ZEISS Sales & Service Partner.

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

Instruction Manual ZEISS Axiocam 212 color / 203 mono
en-US | Rev. 3 | 10/2025



Instruction Manual

ZEISS Axioscope 5, Axioscope 5/7 MAT

Upright Microscope for Routine and Entry-Level Research

ZEISS Axioscope 5, Axioscope 5/7 MAT

Original Manual

Document Title: Instruction Manual ZEISS Axioscope 5, Axioscope 5/7 MAT
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Table of Contents

1 Contact and Addresses

ZEISS Contact

Find your contact at ZEISS Microscopy at www.zeiss.com/microscopy/contact.

ZEISS Academy

For information on microscopy courses, training, and education visit the ZEISS Academy Microscopy at www.zeiss.com/microscopy-training.

Legal Manufacturer

Carl Zeiss Suzhou Co., Ltd.
No. 26 Wusheng Road, SIP
215126 Suzhou
China

Authorized Representatives, Importers, etc.

This section informs about responsible entities for certain obligations in the identified country or jurisdiction.

EU REP

Carl Zeiss Microscopy GmbH
Carl-Zeiss-Promenade 10
07745 Jena
Germany

CH REP

Carl Zeiss AG
Feldbachstrasse 81
8714 Feldbach
Switzerland

UK Responsible Person / UK Importer

Carl Zeiss Ltd
1030 Cambourne Business Park, Cambourne
CB23 6DW Cambridge
United Kingdom

KZ REP

Carl Zeiss LLC
Masanchi 78
050000 Almaty
Kazakhstan

2 About this Instruction Manual

This Instruction Manual (further called "document") is considered to be part of the Axioscope 5, Axioscope 5/7 MAT, herein after referred to as "microscope".

This document contains basic steps and safety information that must be observed during operation and maintenance. Therefore, the document must be read by the operator prior to commissioning and must always be available at the place of use of the microscope.

This document is an essential part of the microscope and, if the microscope is resold, the document must remain with the microscope or be handed over to the new owner.

2.1 Text Conventions and Link Types

Explanation	Example
Software controls and GUI elements.	Click **Start**.
Hardware controls and elements.	Press the **Standby** button.
Key on the keyboard.	Press **Enter** on the keyboard.
Press several keys on the keyboard simultaneously.	Press **Ctrl + Alt + Del**.
Follow a path in the software.	Select **Tools > Goto Control Panel > Airlock**.
Text to be entered by the user.	Enter *example.pdf* in this field.
Anything typed in literally during programming, for example macro codes and keywords.	Enter `Integer` in the console.
Link to further information within this document.	See: *Text Conventions and Link Types [▸ 9]*.
Link to a website.	https://www.zeiss.com

2.2 Explanation of Warning Messages and Additional Information

DANGER, WARNING, CAUTION, and NOTICE are standard signal words used to determine the levels of hazards and risks of personal injury and property damage.

Always observe the safety and warning messages in **all** chapters of this document. Failure to comply with these instructions and warnings may result in personal injury, property damage, and the loss of any claims for damages.

The following warning messages indicating dangerous situations and hazards are used in this document.

⚠ DANGER

Type and source of danger

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Type and source of danger

WARNING indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.

⚠ CAUTION

Type and source of danger

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

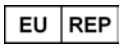
Type and source of danger

NOTICE indicates a potentially harmful situation which, if not avoided, may result in property damage.

Info

Provides additional information or explanations to help the user better understand the contents of this document.

2.3 Explanation of Symbols

	CE marking (Conformité Européenne)
	UKCA marking (UK conformity assessed)
	CSA label: product tested by CSA to meet U.S. and Canadian standards. CSA approval master number optionally given adjacent to this symbol
	Manufacturer
	Country of manufacture. "CC" is the country code, e.g. "DE" for Germany, "CN" for China. Date of manufacture optionally given adjacent to this symbol
	Importer
	Authorized representative in the European Community
	Swiss authorized representative
	In vitro diagnostic medical device
	Serial number
	Catalogue number
	WEEE label: Do not discard as unsorted waste. Send to separate collection facilities for recovery and recycling

2.4 Further Applicable Documents

Brochures and Certificates

For brochures, certificates (e.g. ISO, CSA, SEMI), and declarations of conformity (e.g. EU, UK) ask your ZEISS Sales & Service Partner.

Local and National Health and Safety Regulations

Observe local and national health and safety regulations for the location of installation and during the use of the microscope.

Consult with your ZEISS Sales & Service Partner if these regulations are in conflict with the installation requirements of the microscope.

Safety Data Sheets

Observe the enclosed safety data sheets. The instructions and guidelines given in the respective safety data sheets must be complied with.

System and Third-Party Components, Accessories

Information about the individual components, enhancements, and accessories can be obtained from your ZEISS Sales & Service Partner. Also refer to the documentation of third-party manufacturers.

Instruction Manuals

For detailed information refer to the following Instruction Manuals of:

- Axiocam 212 color
- Axiocam 203 mono
- Light sources (e.g. HBO 100, HXP 120 V, HAL 100, HAL 50, Colibri 3, Viluma 5/7)
- Mechanical stage, 80X60, motorized

3 Safety

This chapter contains general requirements for safe working practices. Any person using the microscope or commissioned with installation or maintenance must read and observe these general safety instructions. Knowledge of basic safety instructions and requirements is a precondition for safe and fault-free operation. Operational safety of the supplied microscope is only ensured if it is operated according to its intended use.

If any work is associated with residual risks, this is mentioned in the relevant parts of this document in a specific note. When components must be handled with special caution, they are marked with a warning label. These warnings must always be observed.

Improper use of the microscope and its components can easily lead to impairment of their function or even damage them. Damage caused by incorrect operation, negligence, or unauthorized intervention, in particular by removing, modifying, or replacing parts of the microscope or its components, cannot be held liable by the device manufacturer. Third-party devices or components that are not expressly approved by ZEISS may not be used.

Any serious incident that has occurred in relation to the microscope and its components shall be reported to these institutions:

- the competent authority of the Member State in which the user is established
- ZEISS
  - for users within the EU:
    Carl Zeiss Microscopy GmbH, Jena, Germany
  - for users outside the EU:
    Carl Zeiss Suzhou Co., Ltd., Suzhou, China

3.1 Intended Purpose

The Axioscope 5/7 BIO microscopes are non-automatic microscopes for general microscopic imaging for the in vitro examination of various samples, such as tissue or blood, derived from the human body that are mounted on microscopic glass slides. Axioscope 5/7 BIO must be operated by qualified users like medical technical assistants or pathologists. The observation of the sample through the microscope is intended to aid in routine diagnostics by providing qualitative information for subsequent assessment of physiological or pathological processes or conditions by qualified users such as pathologists, cytologists or hematologists. The microscope is not intended for direct diagnosis, screening, monitoring, prognosis, prediction, companion diagnostic, blood grouping, tissue typing, and detection.

Axioscope 5/7 BIO microscopes include:

- Axioscope 5 TL (430035-9201-000)
- Axioscope 5 TL HAL 50 (430035-9032-000)
- Axioscope 5 TL/FL (430035-9061-000)
- Axioscope 7 TL (430035-9310-000)
- Axioscope 7 TL/FL (430035-9320-000)

The Axioscope 5/7 MAT microscopes are universally usable microscopes for applications such as materials analyses. It is not intended to either directly or indirectly generate medical diagnostic results.

Axioscope 5/7 MAT microscopes include:

- Axioscope 5 RL (430035-9091-000)
- Axioscope 5 TL/RL (430035-9121-000)
- Axioscope 5 TL/RL Pol (430035-9291-000)
- Axioscope 5 TL Pol (430035-9261-000)
- Axioscope 7 RL (430035-9340-000)
- Axioscope 7 TL/RL MAT (430035-9330-000)
- Axioscope 5 Vario (430035-9150-000)

Info

The catalogue number can be found on the type plate, see *Labels and Lights [▸ 20]*.

3.2 General Safety Information

This document must be read before commissioning in order to ensure safe and uninterrupted operation. Pay particular attention to all listed safety notes. Make sure, that

- the operating personnel has read and understood this manual, associated documents and particularly all safety regulations and instructions, and applies them.
- the local and national safety and accident prevention regulations must be observed, as well as the applicable laws and regulations in your country.
- this document is always available at the place of use of the microscope.
- the microscope is always in perfect condition.
- in case of defect or damage, the affected parts and the microscope are taken out of operation immediately and are secured against unintentional use.
- maintenance and repair work, retrofitting, removal or replacement of components, as well as any other intervention in the microscope not described in this document, may only be carried out by the manufacturer ZEISS or persons expressly authorized by ZEISS to do so.

3.2.1 Requirements for Operators

The microscope, components, and accessories may only be operated and maintained by authorized and trained personnel. The microscope may only be used in accordance with this document. If the microscope is not used as described, the safety of the user may be impaired and/or the microscope may be damaged.

Any unauthorized intervention or use other than within the scope of the intended use shall void all rights to warranty claims. The regional regulations on health protection and accident prevention must be observed at all times and during all work on and with the microscope.

Training Authorized ZEISS personnel will provide basic training in operating the microscope, as well as information on equipment safety and maintenance work that can be conducted by the operator. The training will be documented by ZEISS and its completion is to be confirmed by the operator.

Special application training is offered for a fee. Current training dates, additional information and the registration form can be found at www.zeiss.com or at the ZEISS Portal.

3.2.2 Safe Operating Condition

If circumstances occur which impair safety and cause changes in operating behavior, the microscope and its components must be shut down immediately and a ZEISS service representative should be informed.

The microscope may only be operated if the operating conditions are adhered to.

- Do not operate the microscope and its components until you have completely read and understood the entire documentation.
- Make sure that all protective cover panels are installed and all warning labels are available and legible.
- Ensure conditions and take measures to prevent the build up of electrostatic charge on the workplace.

3.2.3 Order and Use of Spare Parts

Using spare parts that are not provided by ZEISS can be hazardous or can lead to property damage.

- Unless authorized by ZEISS, all spare parts should be installed by a ZEISS service representative.
- Contact your ZEISS service representative for information on spare parts order.
- Only genuine parts supplied by ZEISS are to be used in servicing the microscope and its components.

3.2.4 Lifetime

A microscope is an opto-electronic device. Its availability for use is significantly determined by the performed maintenance. ZEISS guarantees the ability for maintenance and repair within eight years after initial operation. This is ensured by a corresponding service and spare parts concept, thus enabling the intended purpose within this duration.

3.2.5 Optical Risk Grouping

According to IEC 62471 sources of optical radiation are classified into risk groups subject to their potential photobiological hazard. Sources are classified into the following four groups according to hazard, based on the emission limit as well as permissible exposure time before hazard exceeded.

Risk group	Description
Exempt	No photobiological hazard.
1 (low risk)	No hazard due to normal behavioral limitations on exposure.
2 (moderate risk)	No hazard due to the aversion response to very bright light sources or thermal discomfort.
3 (high risk)	Hazardous even for momentary exposure.

The following table lists the risk grouping of the available light sources/illumination units according to the mentioned standard:

Light source/Illumination unit	Risk group
Colibri 3	3
Viluma 5/7	3
HBO 100	2
HXP 120 V	2
LED modules	2
HAL 100	2
HAL 50	1

3.2.6 EMC Information

3.2.6.1 Axioscope 5/7 BIO

The following EMC information is valid for the Axioscope 5/7 BIO microscopes. For a definition of the included microscopes, see *Intended Purpose [▸ 13]*.

The microscope is intended to be used in an industrial electromagnetic environment for non-clinical applications or in a home healthcare environment for clinical applications.

Use of this microscope in a dry environment, especially if synthetic materials are present (synthetic clothing, carpets, etc.), may cause electrostatic discharges that may cause erroneous results.

Do not use the microscope in proximity to sources of strong electromagnetic radiation, as these can interfere with proper operation.

If it is suspected that performance is affected by electromagnetic interference, correct operation may be restored by increasing the distance between the equipment and the source of the interference.

The microscope complies with the emission and immunity requirements as a CISPR 11 / EN 55011 / class B group 1 system according to IEC 61326-1 and IEC 61326-2-6. Emissions, which exceed the levels required by CISPR 11 / EN 55011, can occur when the microscope is connected to other devices.

The electromagnetic environment should be evaluated prior to operation of the microscope.

The following EMC user notice is for Canada only:

This device complies with CAN ICES-001 (B) / NMB-001 (B).

The following EMC user notice is for Korea only:

기종별	사용자안내문
B급기기 (가정용 방송통신기자재)	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

3.2.6.2 Axioscope 5/7 MAT

The following EMC information is valid for the Axioscope 5/7 MAT microscopes, except Axioscope 5 Vario. For a definition of the included microscopes, see *Intended Purpose [▸ 13]*.

The microscope is intended to be used in an industrial electromagnetic environment.

The microscope complies with the emission and immunity requirements as a CISPR 11 / EN 55011 / class B group 1 system according to IEC 61326-1. Emissions, which exceed the levels required by CISPR 11 / EN 55011, can occur when the microscope is connected to other devices.

The following EMC user notice is for Canada only:

This device complies with CAN ICES-001 (B) / NMB-001 (B).

The following EMC user notice is for Korea only:

기종별	사용자안내문
B급기기 (가정용 방송통신기자재)	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

3.2.6.3 Axioscope 5 Vario

The following EMC information is valid for the Axioscope 5 Vario microscope.

The microscope is intended to be used in an industrial electromagnetic environment.

The microscope complies with the emission and immunity requirements as a CISPR 11 / EN 55011 / class A group 1 system according to IEC 61326-1. Emissions, which exceed the levels required by CISPR 11 / EN 55011, can occur when the microscope is connected to other devices.

The following EMC user notice is for Canada only:

This device complies with CAN ICES-001 (A) / NMB-001 (A).

The following EMC user notice is for Korea only:

기종별	사용자안내문
A급기기(업무용방송통신기자재)	이기기는업무용(A급) 전자파적합기기로서 판매자또는사용자는이점을주의하시기바라며, 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

3.3 Prevention of Hazards

This section summarizes potential hazards and recommended safety precautions. Failure to follow the safety instructions and instructions may result in personal injury and property damage.

3.3.1 Mechanical Hazards

Crushing Hazards due to Motorized Components

The microscope contains motorized components. Fingers could be trapped. Do not reach into the working area of motorized components when they are in operation.

Property Damage due to Transport

There is a risk of injury and property damage if the microscope is improperly handled and transported.

- Only use the handle, if applicable, for transport of the microscope. Otherwise hold the microscope with one hand and the base plate with the other hand.
- The weight of the Axioscope ranges from 14 to 32 kg, depending on the configuration. Handle it carefully with both hands or with two people together.

3.3.2 Electrical Hazards

Voltage Hazards

Risk of electric shock in case of contact with live parts.

- Detachable mains supply cords must not be replaced with inadequately rated cords.
- Disconnect all power cords before cleaning.
- Only connect electrical systems that are authorized by ZEISS to the supplied power supply cord.
- Set up and operate the microscope so that the connectors are easily accessible.
- Position the microscope in a way so that you can easily unplug the power cord at any time.
- The microscope must be plugged into a properly installed power socket with protective earth contact using the supplied mains cords. The protective earth connection must not be impaired by the use of extension cables.
- Always use the power cords supplied by ZEISS. When an unsuitable power cord is used, ZEISS can no longer guarantee the electrical safety and functionality of the microscope.
- Shut down the microscope when not using the microscope.
- Safe disconnection from the power supply is only ensured by pulling out the power cord. The switch on the microscope only switches to standby mode.

3.3.3 Hazards Generated with the Operating Environment

Explosive Hazard

Fire hazard due to explosive or flammable environment.

Do not operate the microscope and its components in a potentially explosive atmosphere, in the presence of volatile anesthetics or flammable solvents such as alcohol, petrol, or similar substances.

Dirt, Dust, and Moisture

Dirt, dust, and moisture can impair the microscope's functionality.

- Shut down the microscope whenever it is not used and cover it with a dust protection cover (if available).
- Always cover unused openings/ports with the corresponding system component or with blind caps.
- Perform regular maintenance and cleaning according to the instructions in this manual.
- Make sure that no cleaning liquid or moisture gets inside the microscope.
- Make sure that the electrical parts never come into contact with moisture.
- Never expose the microscope to inadmissible climate conditions (high humidity and temperature).

3.3.4 Ergonomic Hazards

Prevention of Musculoskeletal Disorders

Musculoskeletal disorders (MSDs) affect the muscles, nerves, blood vessels, ligaments and tendons. Workers in many different industries and occupations can be exposed to risk factors at work, such as lifting heavy items, bending, reaching overhead, pushing and pulling heavy loads, working in awkward body postures and performing the same or similar tasks repetitively. Employers are responsible for providing a safe and healthful workplace for their workers.

3.3.5 Hazards Generated by Materials and Substances

Infection Hazards

Direct contact with the eyepieces can be a potential way of passing on bacterial and viral infections.

- The risk can be lowered by using personal eyepieces or eyecups. If eyepieces need to be disinfected frequently, ZEISS recommends to use the eyepieces without eyecups.
- To avoid infections, the use of personal protective equipment (PPE), e.g. gloves, for operation, cleaning, and decontamination is highly recommended. Disposable gloves can be decontaminated with alcohol for example, if necessary, or should be changed frequently to minimize the risk of contamination.

Biological Hazard

Biological substances/agents may pose a risk to the health of humans and other living organisms.

- Keep a logbook of the known biological substances/agents used when working with the microscope and show it to the ZEISS service representative before they perform any work on the microscope.

Consumable Hazards

Incorrect handling of consumables and cleaning agents can lead to property damage or skin and eye injuries. Consumables that are not approved by ZEISS can lead to property damage. Consult your ZEISS Sales & Service Partner to learn what consumables you can order and how to handle them.

Immersion Oil

Ensure that no immersion oil enters the surface water or the sewage system. The immersion oil can cause skin irritation.

- Avoid any contact with skin, eyes and clothes.
- Read and observe the safety data sheet of the immersion fluid.
- In the event of skin contact, wash the oil off with plenty of water and soap.
- In the event of eye contact, flush eyes with copious amounts of water for a minimum of 5 minutes. See a medical specialist if the irritation persists.

Hazardous Substances

The microscope and other components can come into contact with various samples and substances that can be hazardous to humans and the environment. The microscope is not equipped with special user protection against substances that are corrosive, potentially infectious, toxic, radioactive or otherwise hazardous to health. When handling such substances, make sure to observe all legal regulations, particularly the relevant national accident prevention regulations.

- Make sure that the microscope and its components was not in contact with hazardous substances (check the laboratory logbook); otherwise, the microscope and its components must be cleaned/decontaminated/disinfected.
- Label contaminated/infected components that cannot be properly cleaned.
- Direct contact with the eyepieces (if applicable) can be a potential way of passing on bacterial and viral infections. The risk can be lowered by using personal eyepieces or eyecups. If eyepieces need to be disinfected frequently, ZEISS recommends to use eyepieces with eyeglass protection rings instead of foldable eyepieces.
- Contaminated parts shall not be returned to any ZEISS department. Decontaminated parts can be sent to ZEISS accompanied by a signed „Customer Declaration of Decontamination".
- Wear personal protective equipment if necessary.

3.3.6 Hazards Generated by Radiation

Optical Radiation Hazards

Gas discharge lights, LED lights and other sources of white light emit strong optical radiation (e.g. UV, VIS, IR). Optical radiation may cause damage to the skin and eyes. The extent of the damage depends on the parameters such as wavelength, exposure time, mode of operation (continuous or pulsed), etc.

- Avoid exposure of eyes and skin to radiation.
- Do not introduce reflective objects into the beam path.
- Never remove covers or cover panels during operation.
- Do not disable any interlock system elements.
- Use suitable protective equipment / protective clothing if required.

Electromagnetic Radiation Hazards

The microscope may cause radio interference, which may be mitigated by relocating or re-orienting the equipment. The use of non-specified accessories, cables, or other auxiliary parts from the field of information technology may lead to increased electromagnetic emissions and reduced immunity to interference. Any integration into the system may result in a degradation of the EMC performance.

3.3.7 Thermal Hazards

Burning Hazards

Hot surfaces, radiation and/or aggressive chemicals can cause burns.

- Use suitable protective equipment / protective clothing if mandatory.
- Always observe the cooling time of the hot surfaces.

Heat Accumulation

Covering the ventilation openings can lead to heat accumulation that may damage the microscope and its components and, in extreme cases, can cause a fire.

- Keep ventilation openings unobstructed at all times.
- Do not cover devices or openings emitting heat.
- Comply with minimum distance from walls.

3.4 Labels and Lights

This chapter shows labels and, where applicable, indicator lights.

All parts that may pose specific hazards are marked with warning labels.

Always observe **all** warning labels!

- Check all warning labels for availability and legibility.
- Immediately replace damaged or illegible warning labels.

In case a label is missing, contact your ZEISS service representative for free of charge replacement.

3.4.1 Labels on the Axioscope

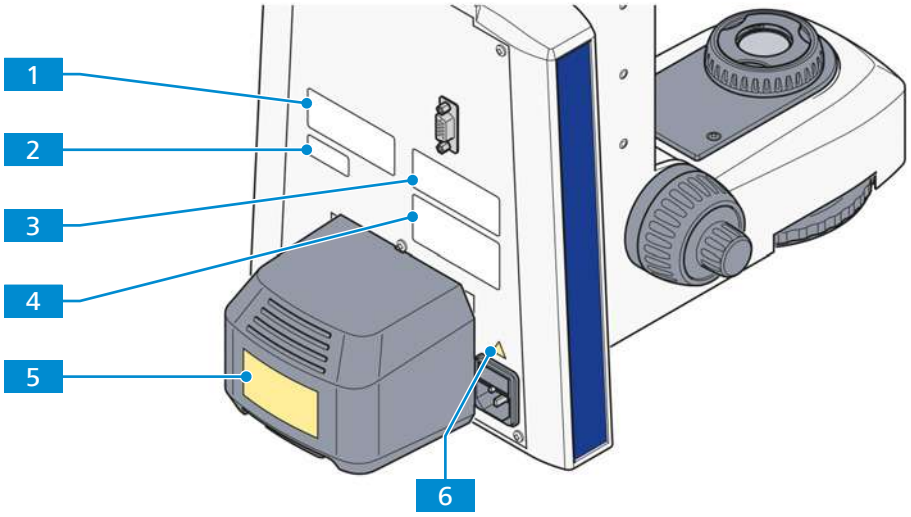
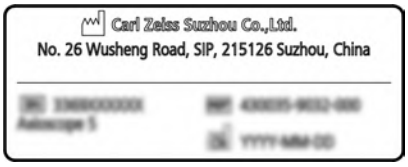


Fig. 1: Warning labels on microscopes with LED light source for transmitted light

Pos.	Symbol	Description
1		Microscope type label
2		Serial number label
3		Microscope type label valid for the Axioscope 5/7 BIO microscopes
		Microscope type label valid for the Axioscope 5/7 MAT microscopes

Pos.	Symbol	Description
4	EU REP Carl Zeiss Microscopy GmbH Carl-Zeiss-Promenade 10 07745 Jena Germany CH REP Carl Zeiss AG Feldbachstr. 81 8714 Feldbach Switzerland	Representatives and importer label not applicable for Axioscope 5/7 MAT microscopes
	Carl Zeiss Microscopy GmbH Carl-Zeiss-Promenade 10 07745 Jena Germany	Importer label only applicable for Axioscope 5/7 MAT microscopes
5	⚠ CAUTION LED RADIATION Do not stare at operating lamp. May be harmful to the eyes.	CAUTION LED Radiation Do not stare at operating lamp. May be harmful to the eyes.
6		Observe notes in the instruction manual and the supplied documents.

3.4.2 Labels on the motorized 80x60 Mechanical Stage

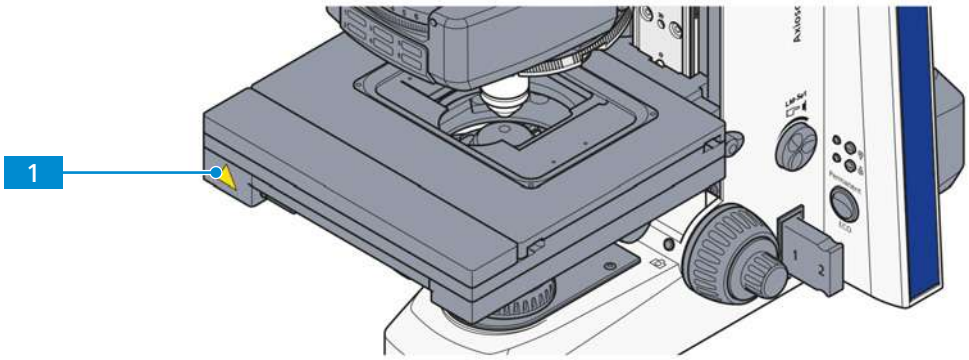


Fig. 2: Warning label on the motorized 80x60 mechanical stage

Pos.	Symbol	Description
1		Crushing Hazards Fingers may be pinched!

3.5 Safety Devices and Interlocks

In order to prevent injuries and/or property damage, the microscope and its components are equipped with several safety devices and interlocks. In case of defect or damage, the affected parts and the microscope must be taken out of operation immediately and must be secured against unintentional use.

To verify the safety of the microscope and its components, contact your ZEISS service representative and keep the service logs and logbooks.

4 Product and Functional Description

The Axioscope 5, Axioscope 5/7 MAT are microscopes designed for biological and medical applications as well as materials analyses. Depending on the configuration of the microscope stand, they may be used with transmitted light only or with a combination of transmitted light and reflected light.

Depending on the configuration of the microscope, the following microscopy and contrast techniques are available:

Transmitted Light (TL)

- *Brightfield (BF) [▸ 56]*
- *Darkfield (DF) [▸ 56]*
- *Phase contrast (PhC) [▸ 56]*
- *Differential Interference Contrast (DIC) [▸ 56]*
- *PlasDIC contrast [▸ 57]*
- *Polarization contrast (Pol): orthoscopy and conoscopy [▸ 57]*

Reflected Light (RL)

- *Brightfield (BF) [▸ 60]*
- *Darkfield (DF) [▸ 60]*
- *Differential Interference Contrast (DIC) [▸ 60]*
- *Differential Interference Contrast in circularly polarized light (C-DIC) [▸ 60]*
- *Total Interference Contrast in circularly polarized light (TIC) [▸ 60]*
- *Polarization contrast (Pol) [▸ 63]*
- *Fluorescence contrast [▸ 63]*

The following microscope types are available:

Axioscope 5 TL	Transmitted light stand for bioscience
Axioscope 5 TL HAL 50	Transmitted light stand for bioscience
Axioscope 5 TL/FL	Transmitted light and reflected light fluorescence stand for bioscience
Axioscope 5 RL	Reflected light stand for material
Axioscope 5 TL/RL	Transmitted light and reflected light stand for material
Axioscope 5 TL/RL Pol	Transmitted light and reflected light stand for polarization
Axioscope 5 TL Pol	Transmitted light stand for polarization
Axioscope 7 TL	Transmitted light stand for bioscience
Axioscope 7 TL/FL	Transmitted light and reflected light fluorescence stand for bioscience
Axioscope 7 RL	Reflected light stand for material
Axioscope 7 TL/RL MAT	Transmitted light and reflected light fluorescence stand for material
Axioscope 5 Vario	Transmitted and reflected light stand for material

Typical Applications

Axioscope 5/7 BIO

- examination of blood and tissue samples taken from the human body, from plants, or animals
- medical examinations in laboratories, hospitals, and doctors' offices
- academic and practical education in medicine and biology
- industrial applications, e.g. in pharmacology, food technology, and wastewater examination

Axioscope 5/7 MAT

- metallographic laboratories
- automotive industry
- microsystems engineering
- geoscientific institutes
- mineral exploration industry

Info

Additional information about the hardware configuration and optional enhancements can be obtained from your ZEISS Sales & Service Partner.

4.1 Axioscope 5 TL

4.1.1 Main Components of Axioscope 5 TL

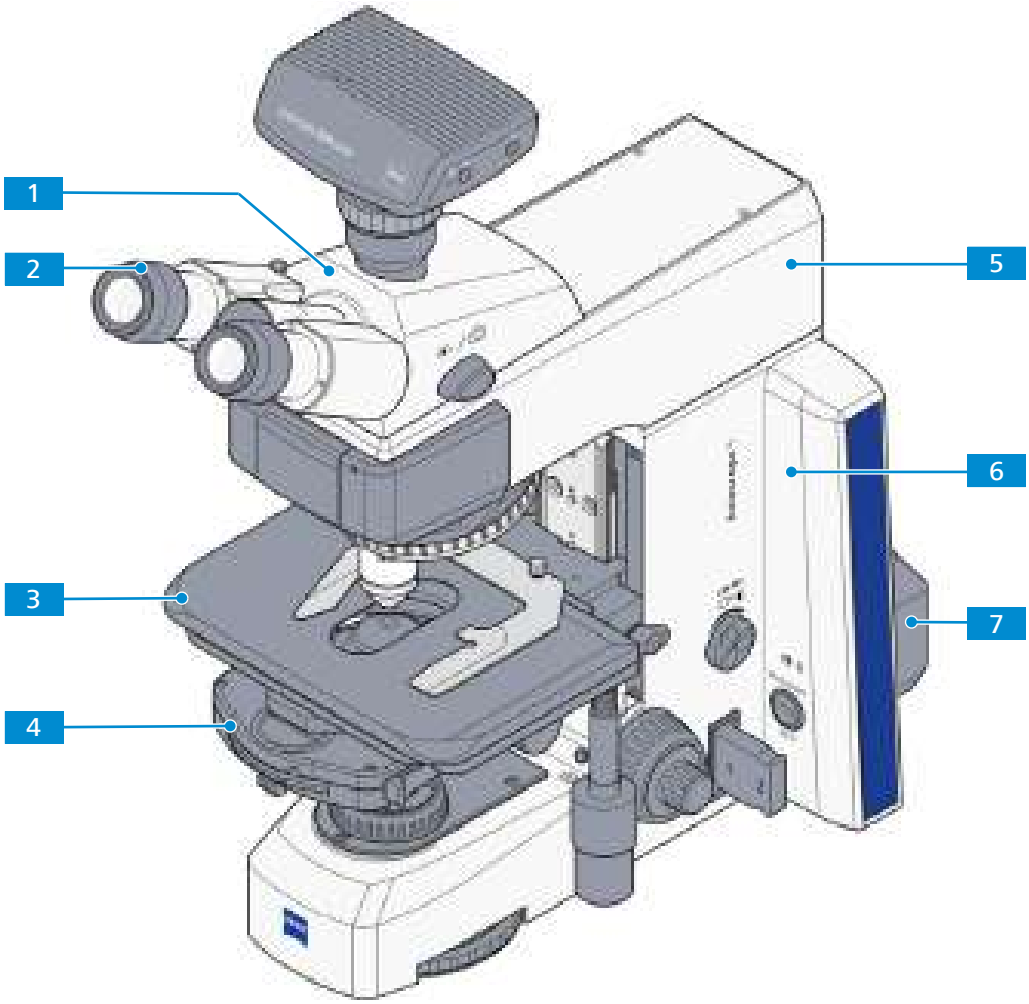


Fig. 3: Main components - Axioscope 5 TL

1	*Binocular tube [▸ 44]*	2	*Eyepieces [▸ 48]*
3	*Mechanical stage [▸ 52]*	4	*Condenser [▸ 50]*
5	Upper part of the stand	6	Lower part of the stand
7	TL *light source [▸ 131]*		

4.1.2 Controls and Functional Elements of Axioscope 5 TL

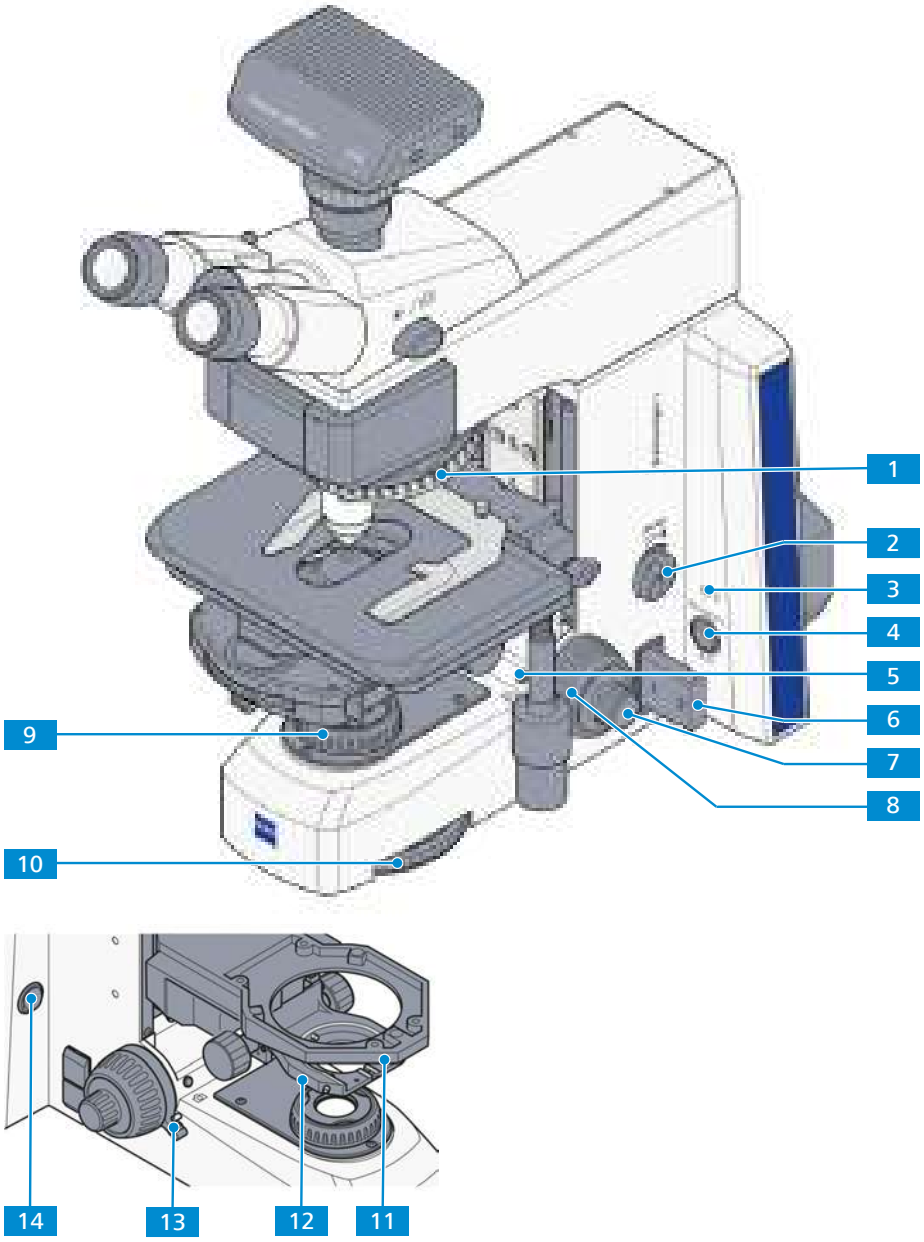


Fig. 4: Controls and functional elements - Axioscope 5 TL

1	Nosepiece	2	**Intensity/LM** knob for light intensity and Light Manager function
3	Indicator light for transmitted light	4	**Permanent/ECO** mode switch
5	**Snap** buttons (left and right)	6	Filter slider for transmitted light
7	Focusing drive – fine adjustment (left and right)	8	Focusing drive – coarse adjustment (left and right)
9	Luminous-field diaphragm	10	6-position filter wheel (operable from left and right)
11	Stage carrier	12	Condenser carrier
13	Release lever for height stop on focusing drive	14	Power switch **On/Off**

4.2 Axioscope 5 TL/FL

4.2.1 Main Components of Axioscope 5 TL/FL

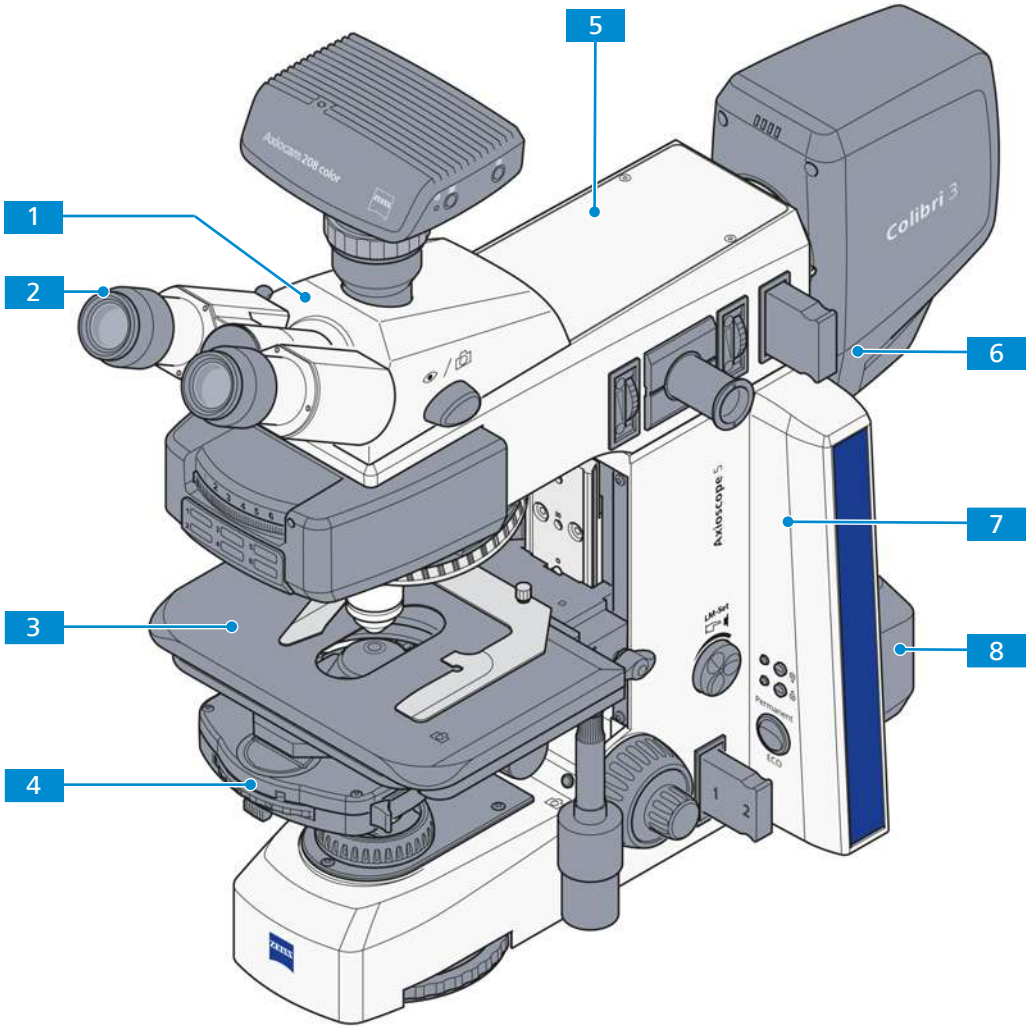


Fig. 5: Main components - Axioscope 5 TL/FL

1	*Binocular tube [▸ 44]*	2	*Eyepieces [▸ 48]*
3	*Mechanical stage [▸ 52]*	4	*Condenser [▸ 50]*
5	Upper part of the stand	6	RL light source for fluorescence
7	Lower part of the stand	8	TL *light source [▸ 131]*

4.2.2 Controls and Functional Elements of Axioscope 5 TL/FL

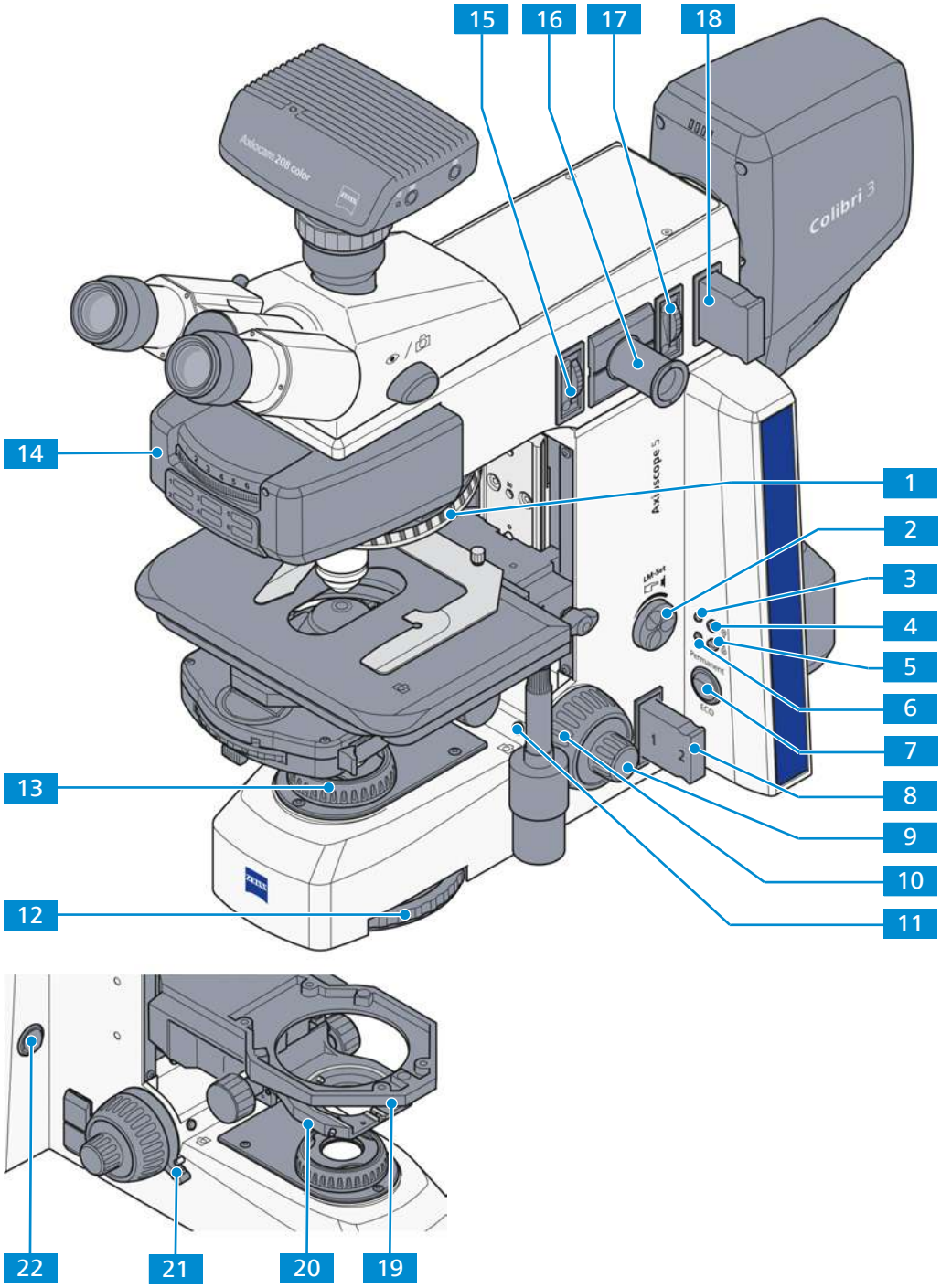


Fig. 6: Controls and functional elements - Axioscope 5 TL/FL

1	Nosepiece	2	**Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels
3	Indicator light for reflected light	4	Reflected light (**RL**) button
5	Indicator light for transmitted light	6	Transmitted light (**TL**) button
7	**Permanent/ECO** mode switch	8	Filter slider for transmitted light
9	Focusing drive – fine adjustment (left and right)	10	Focusing drive – coarse adjustment (left and right)

11	**Snap** buttons (left and right)	12	6-position filter wheel (operable from left and right)
13	Luminous-field diaphragm for transmitted light	14	Reflector turret (for replaceable reflector modules)
15	Luminous-field diaphragm for reflected light	16	Adjustment tool
17	Aperture diaphragm or FL attenuator for reflected light	18	Filter slider for reflected light
19	Stage carrier	20	Condenser carrier
21	Release lever for height stop on focusing drive	22	Power switch **On/Off**

4.3 Axioscope 5 TL/RL

4.3.1 Main Components of Axioscope 5 TL/RL and Axioscope 5 TL/RL Pol

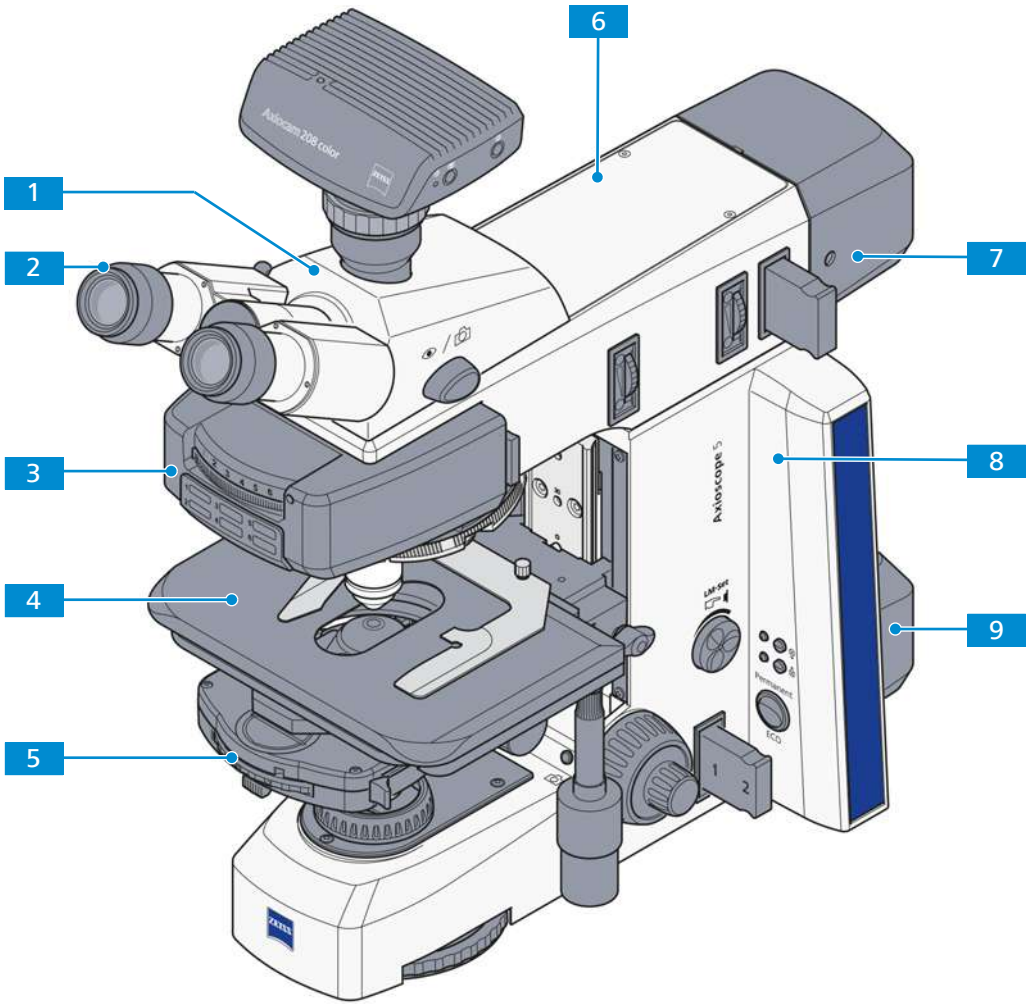


Fig. 7: Main components - Axioscope 5 TL/RL

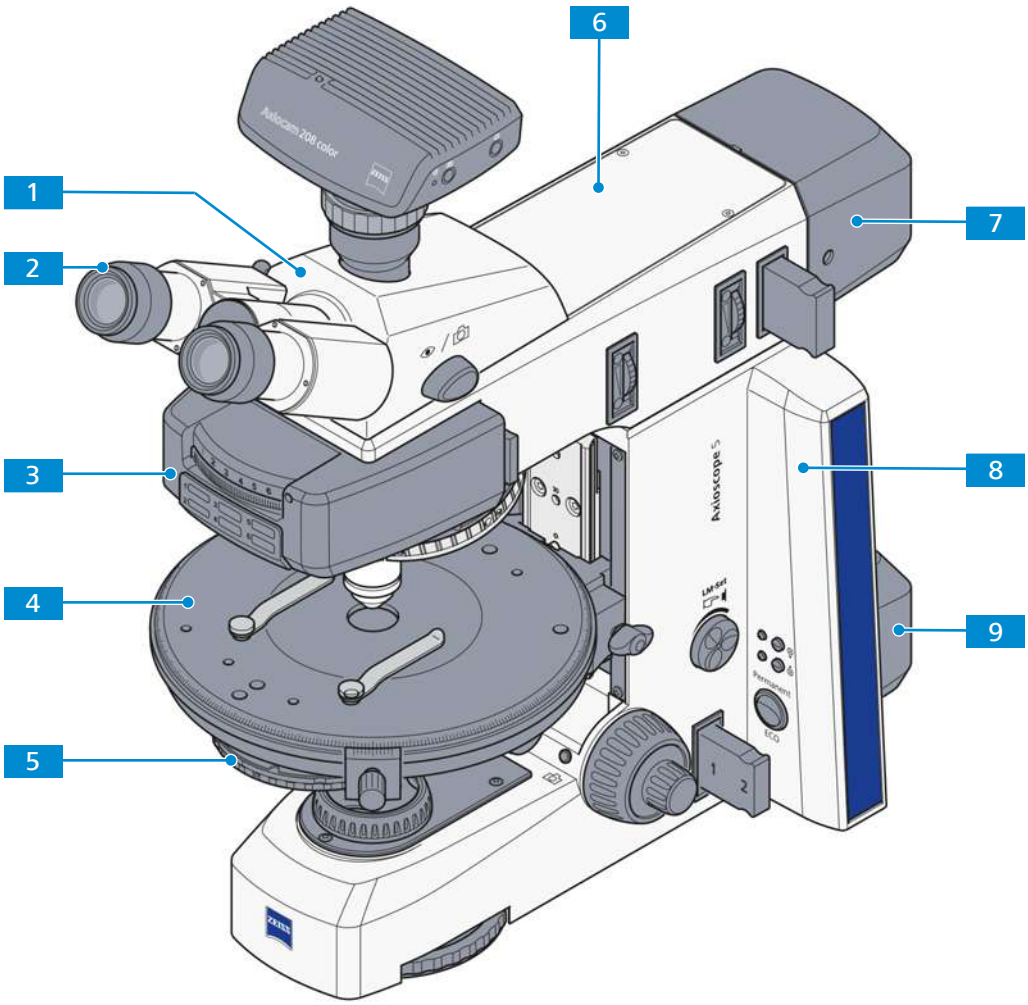


Fig. 8: Main components - Axioscope 5 TL/RL Pol

1	*Binocular tube [▸ 44]*	2	*Eyepieces [▸ 48]*
3	*Reflector turret [▸ 55]*	4	*Mechanical stage [▸ 52]* *Rotary stage [▸ 52]**
5	*Condenser [▸ 50]*	6	Upper part of the stand
7	RL *light source [▸ 131]*	8	Lower part of the stand
9	TL *light source [▸ 131]*		

*only with Axioscope 5 TL/RL Pol

4.3.2 Controls and Functional Elements of Axioscope 5 TL/RL and Axioscope 5 TL/RLPol

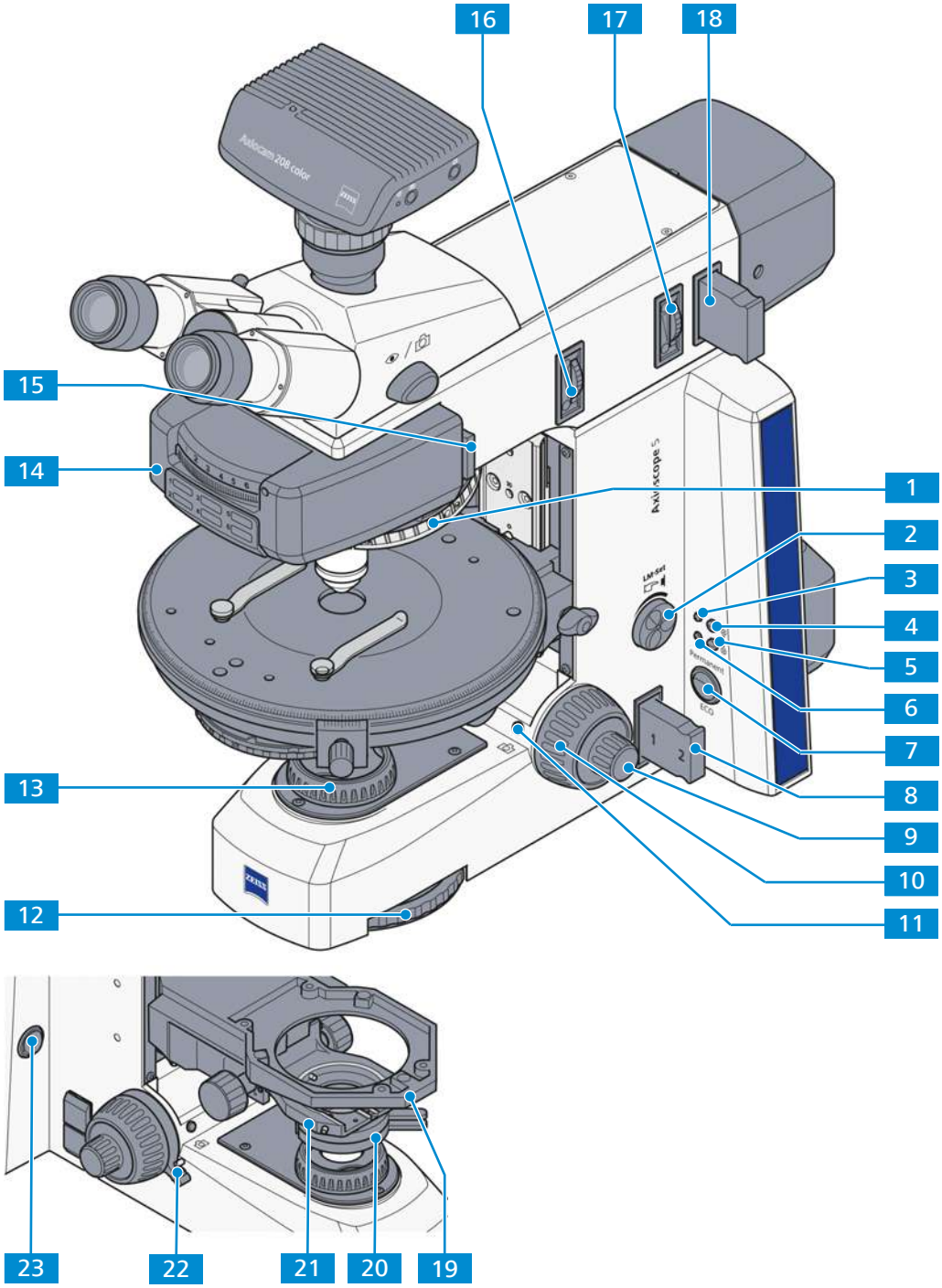


Fig. 9: Controls and functional elements - e.g. Axioscope 5 TL/RL Pol

1 Nosepiece

2 **Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels

3 Indicator light for reflected light

4 Reflected light (**RL**) button

5 Transmitted light (**TL**) button

6 Indicator light for transmitted light

7 **Permanent/ECO** mode switch

8 Filter slider for transmitted light

9 Focusing drive – fine adjustment (left and right)

10 Focusing drive – coarse adjustment (left and right)

11 **Snap** buttons (left and right)

12 6-position filter wheel (operable from left and right)

13 Luminous-field diaphragm for transmitted light

14 Reflector turret (for replaceable reflector modules)

15 Slot for polarizer slider A 60x30 mm

16 Luminous-field diaphragm for reflected light

17 Aperture diaphragm for reflected light

18 Filter slider for reflected light

19 Stage carrier

20 Polarizer *

21 Condenser carrier

22 Release lever for height stop on focusing drive

23 Power switch **On/Off**

*only with Axioscope 5 TL/RL Pol

4.4 Axioscope 5 Vario

4.4.1 Main Components of Axioscope 5 Vario

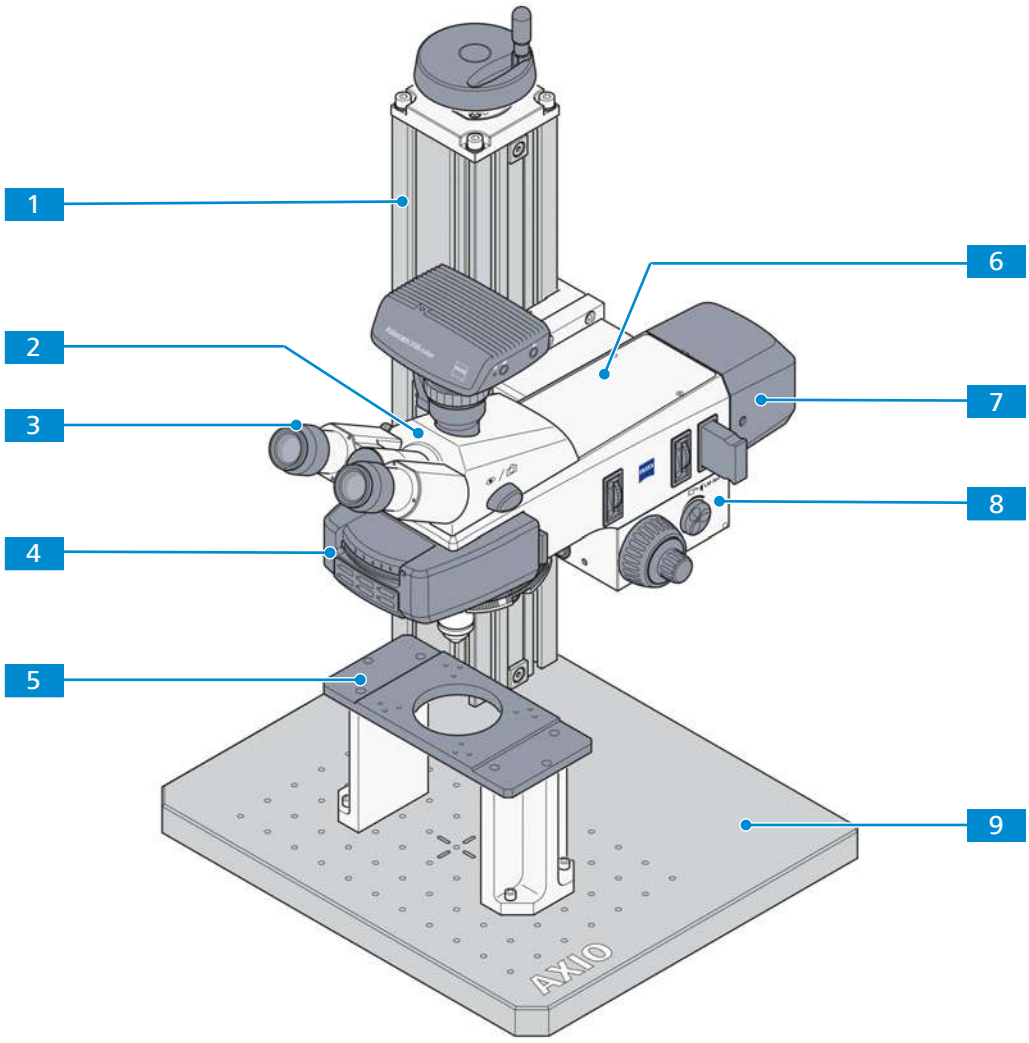


Fig. 10: Main components - Axioscope 5 Vario

1	Stand column Axioscope 5 Vario, 560 mm	2	*Binocular tube [▸ 44]*
3	*Eyepieces [▸ 48]*	4	*Reflector turret [▸ 55]*
5	Stage carrier, H = 140 mm	6	Upper part of the stand (including focusing gear box)
7	RL *light source [▸ 131]*	8	Focusing gear box for Axioscope 5 Vario, 15 mm focus lift
9	Base plate		

4.4.2 Controls and Functional Elements of Axioscope 5 Vario Stand

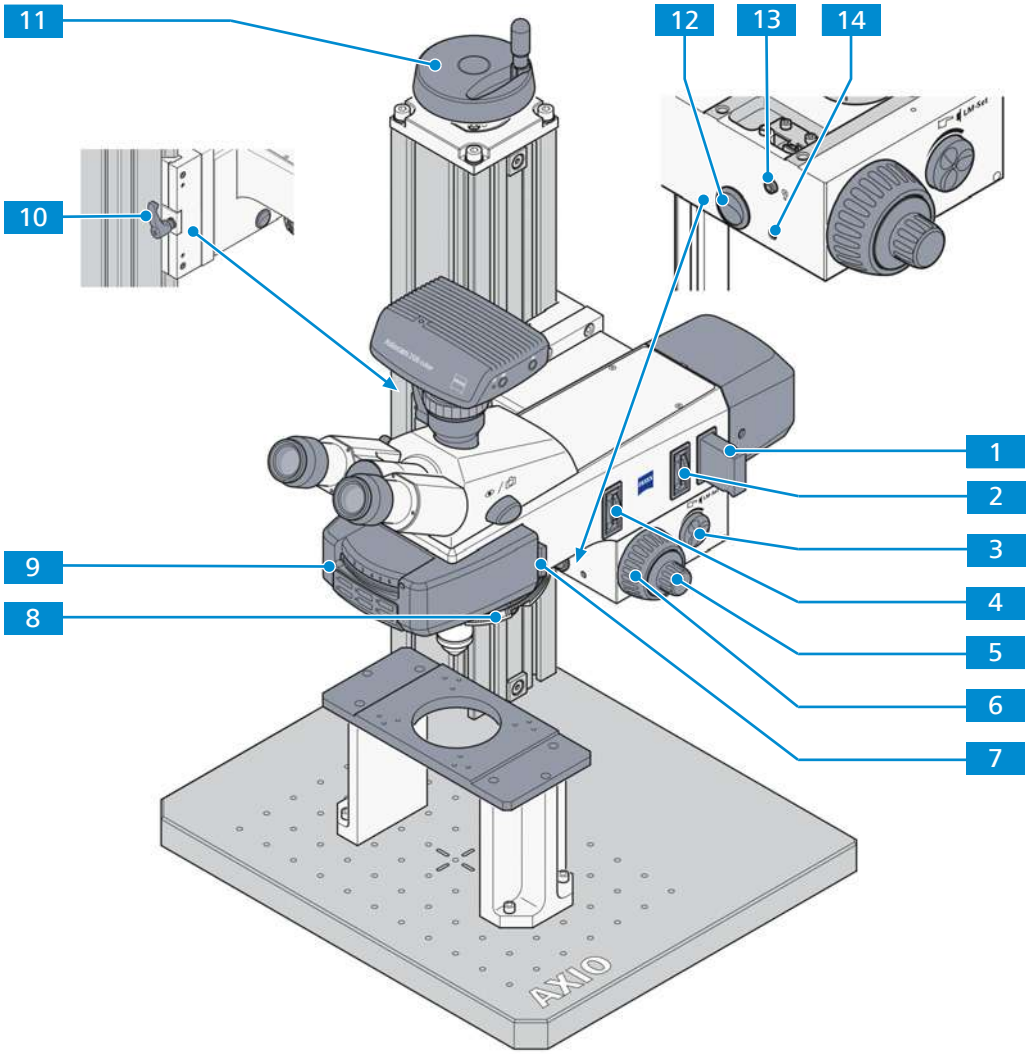


Fig. 11: Controls and functional elements - Axioscope 5 Vario

1	Filter slider for reflected light	2	Aperture diaphragm for reflected light
3	**Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels	4	Luminous-field diaphragm for reflected light
5	Focusing drive – fine adjustment (left and right)	6	Focusing drive – coarse adjustment (left and right)
7	Slot for polarizer slider A 60x30 mm	8	Nosepiece
9	Reflector turret (for replaceable reflector modules)	10	Release lever for vertical adjustment
11	Hand wheel for vertical adjustment	12	**Permanent/ECO** mode switch
13	**Snap** button	14	Indicator light for reflected light

4.5 Axioscope 7 TL

4.5.1 Main Components of Axioscope 7 TL

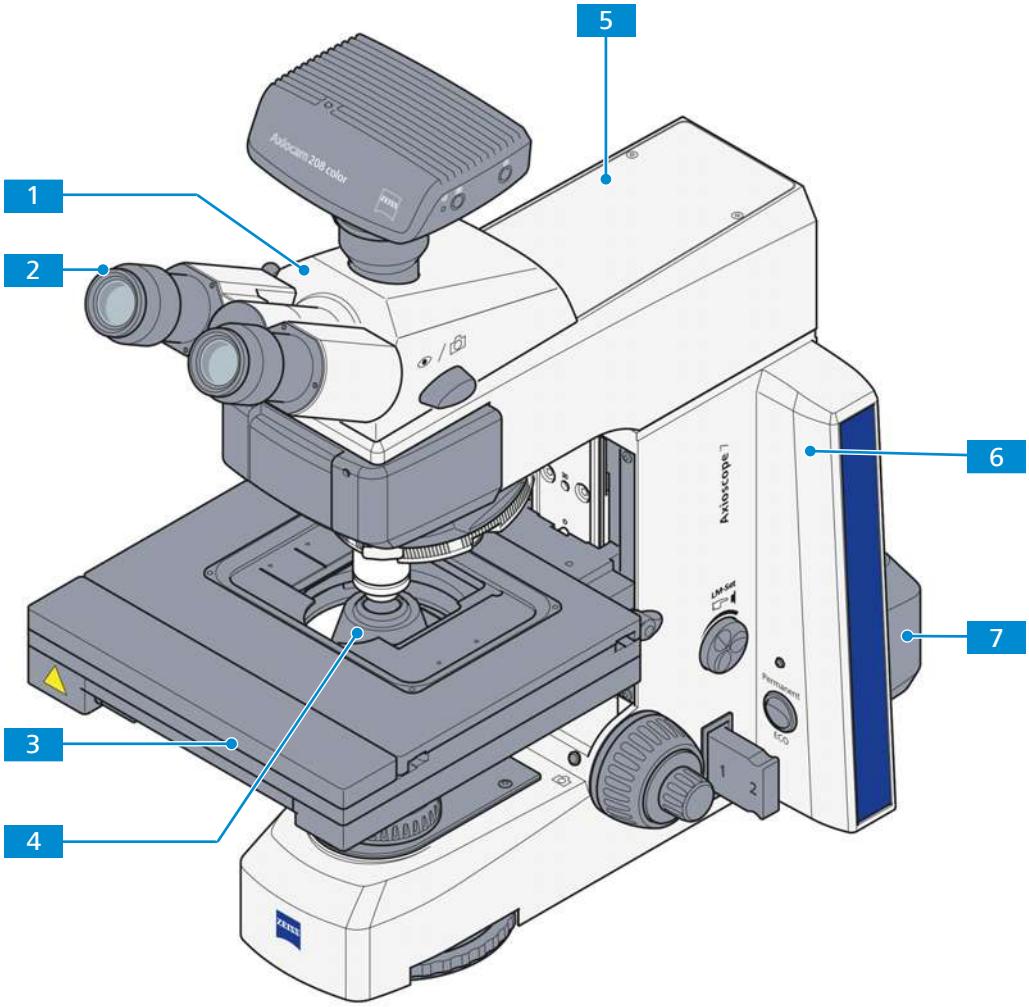


Fig. 12: Main components - Axioscope 7 TL

1	*Binocular tube [▸ 44]*	2	*Eyepieces [▸ 48]*
3	*Mechanical stage [▸ 52]* 80x60 mot. with sample holder	4	*Condenser [▸ 50]*
5	Upper part of the stand	6	Lower part of the stand
7	TL *light source [▸ 131]*		

4.5.2 Controls and Functional Elements of Axioscope 7 TL

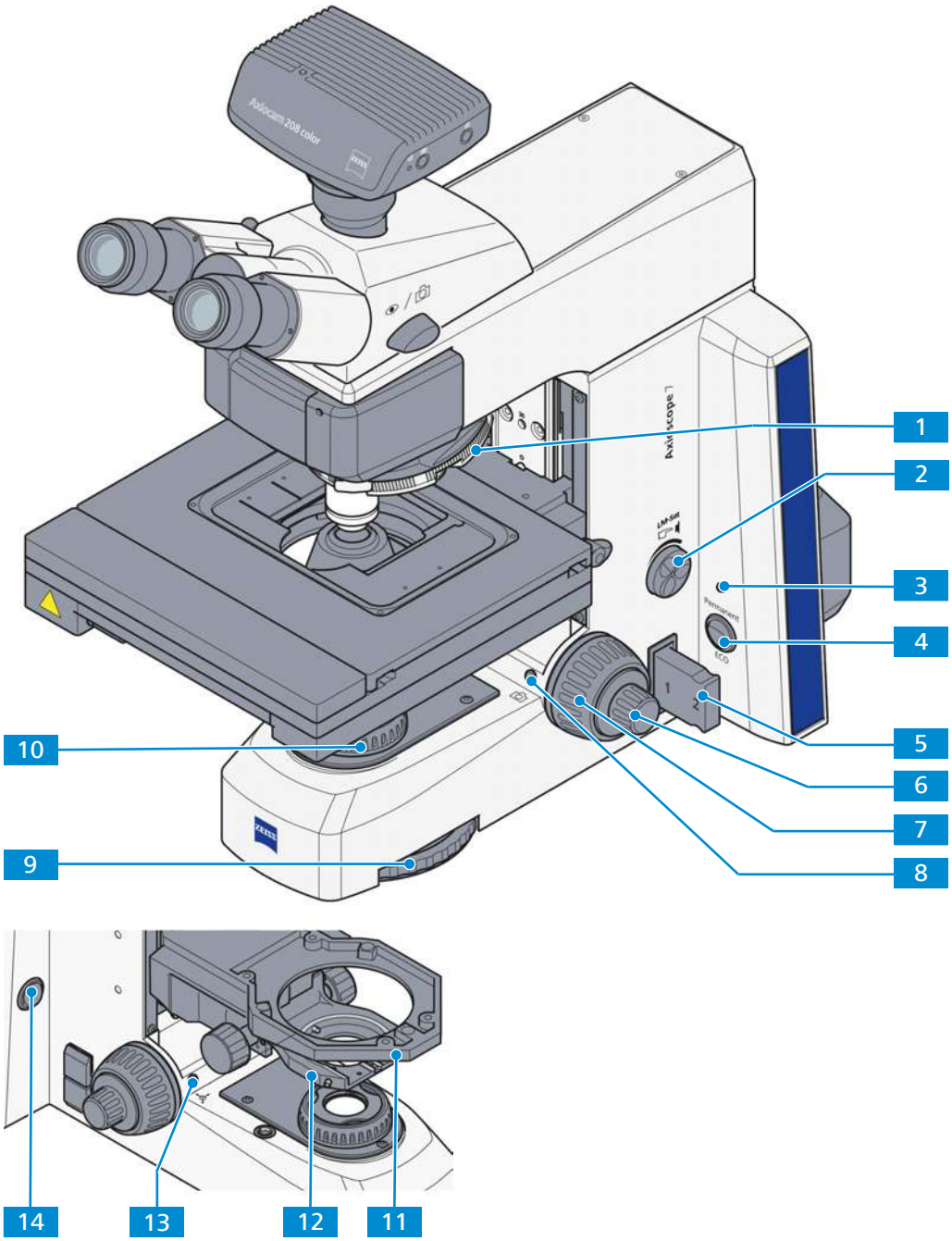


Fig. 13: Controls and functional elements - Axioscope 7 TL

1	Nosepiece	2	**Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels
3	Indicator light for transmitted light	4	**Permanent/ECO** mode switch
5	Filter slider for transmitted light	6	Focusing drive – fine adjustment (left and right)
7	Focusing drive – coarse adjustment (left and right)	8	**Snap** button (on the right side)

9 6-position filter wheel (operable from left and right)

10 Luminous-field diaphragm for transmitted light

11 Stage carrier

12 Condenser carrier

13 **Stage control** button (on the left side)

14 Power switch **On/Off**

4.6 Axioscope 7 TL/FL

4.6.1 Main Components of Axioscope 7 TL/FL

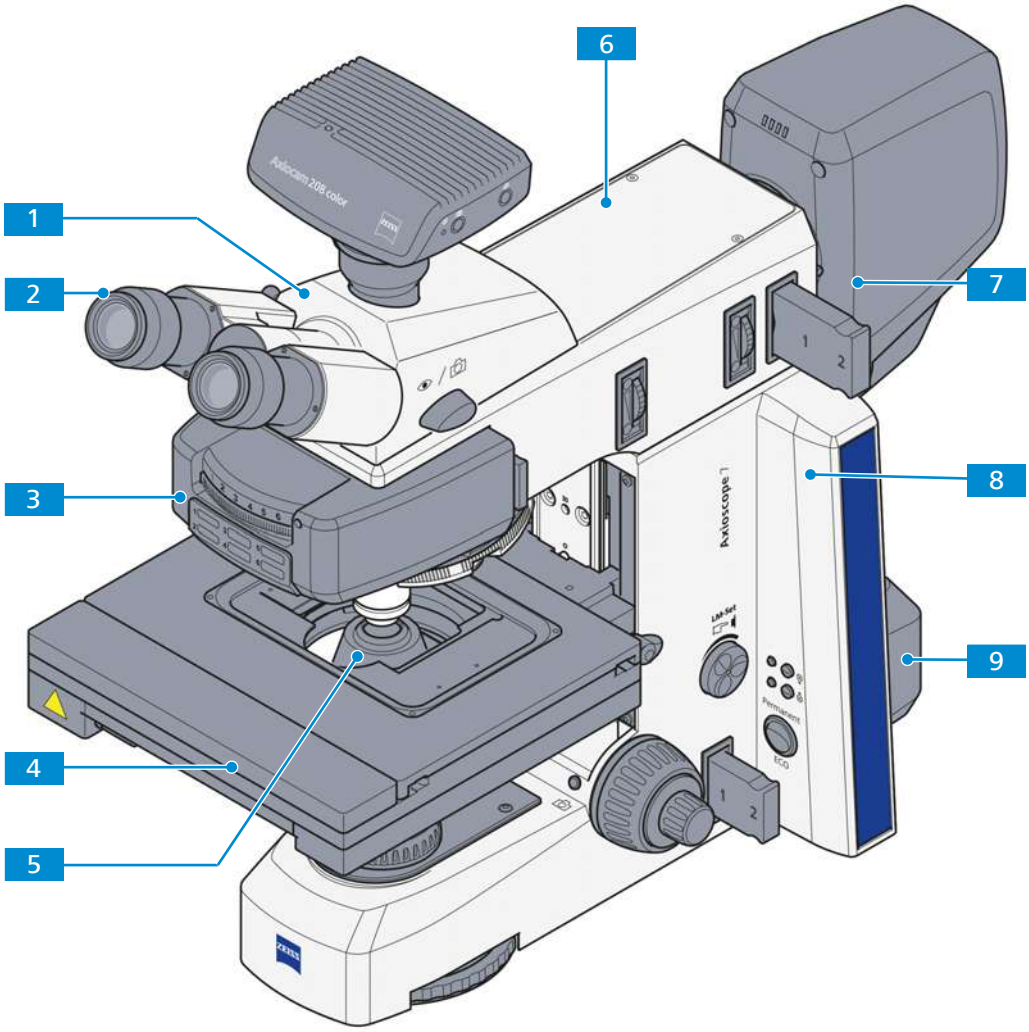


Fig. 14: Main components - Axioscope 7 TL/FL

1 *Binocular tube [▸ 44]*

2 *Eyepieces [▸ 48]*

3 *Mechanical stage [▸ 52]* 80x60 mot. with sample holder

4 *Condenser [▸ 50]*

5 Upper part of the stand

6 Lower part of the stand

7 TL *light source [▸ 131]*

8 Reflector turret

9 RL light source for fluoresence

4.6.2 Controls and Functional Elements of Axioscope 7 TL/FL

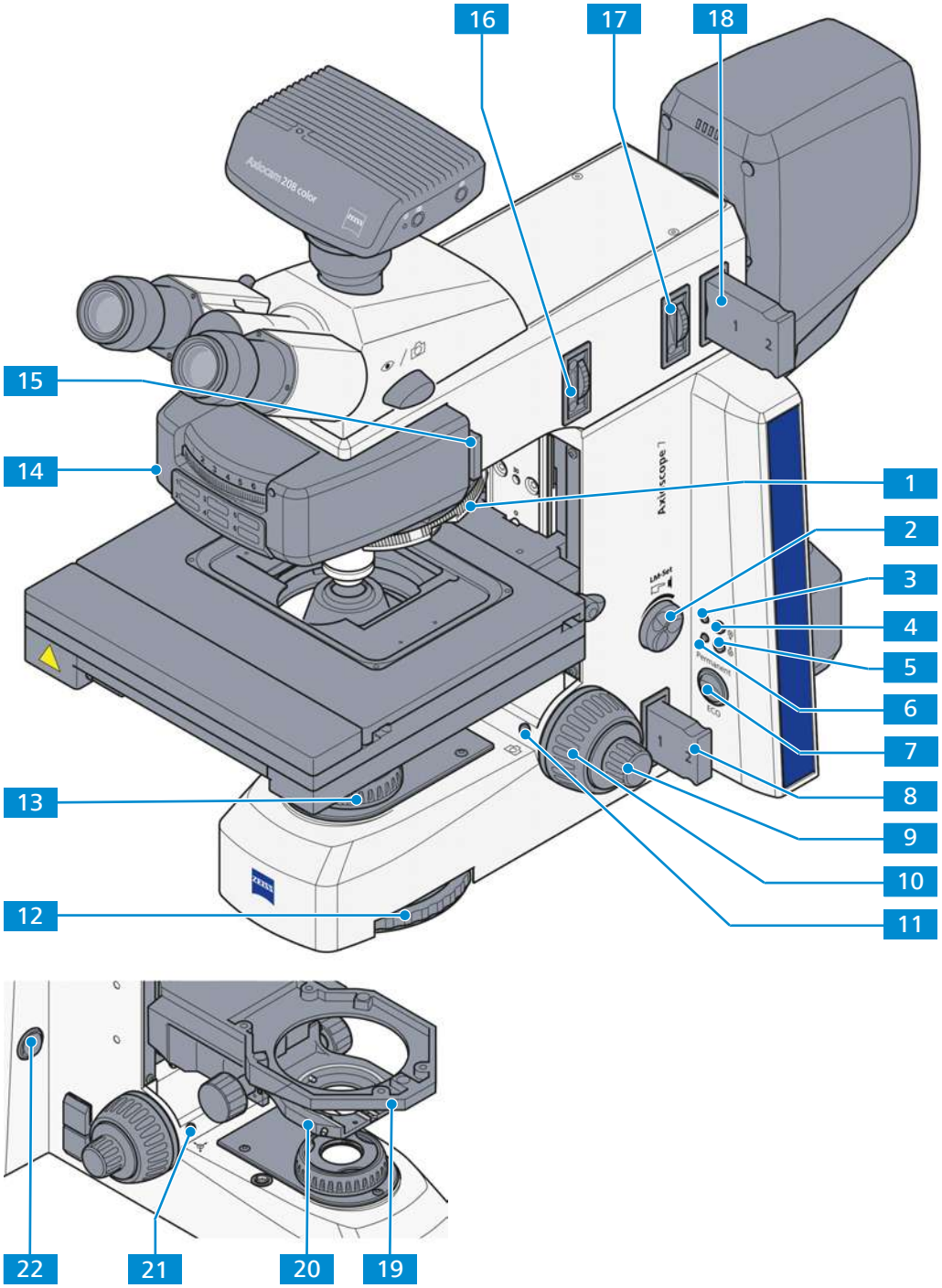


Fig. 15: Controls and functional elements - Axioscope 7 TL/FL

1 Nosepiece	**2** **Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels
3 Indicator light for fluorescence	**4** **Fluorescence** (FL) button
5 **Transmitted light** (TL) button	**6** Indicator light for transmitted light
7 **Permanent/ECO** mode switch	**8** Filter slider for transmitted light
9 Focusing drive – fine adjustment (left and right)	**10** Focusing drive – coarse adjustment (left and right)

11	**Snap** button (on the right side)	12	6-position filter wheel (operable from left and right)
13	Luminous-field diaphragm for transmitted light	14	Reflector turret (for replaceable reflector modules)
15	Slot for polarizer slider A 60x30 mm	16	Luminous-field diaphragm for reflected light
17	Aperture diaphragm for fluorescence	18	Filter slider for fluorescence
19	Stage carrier	20	Condenser carrier
21	**Stage control** button (on the left side)	22	Power switch **On/Off**

4.7 Axioscope 7 RL

4.7.1 Main Components of Axioscope 7 RL

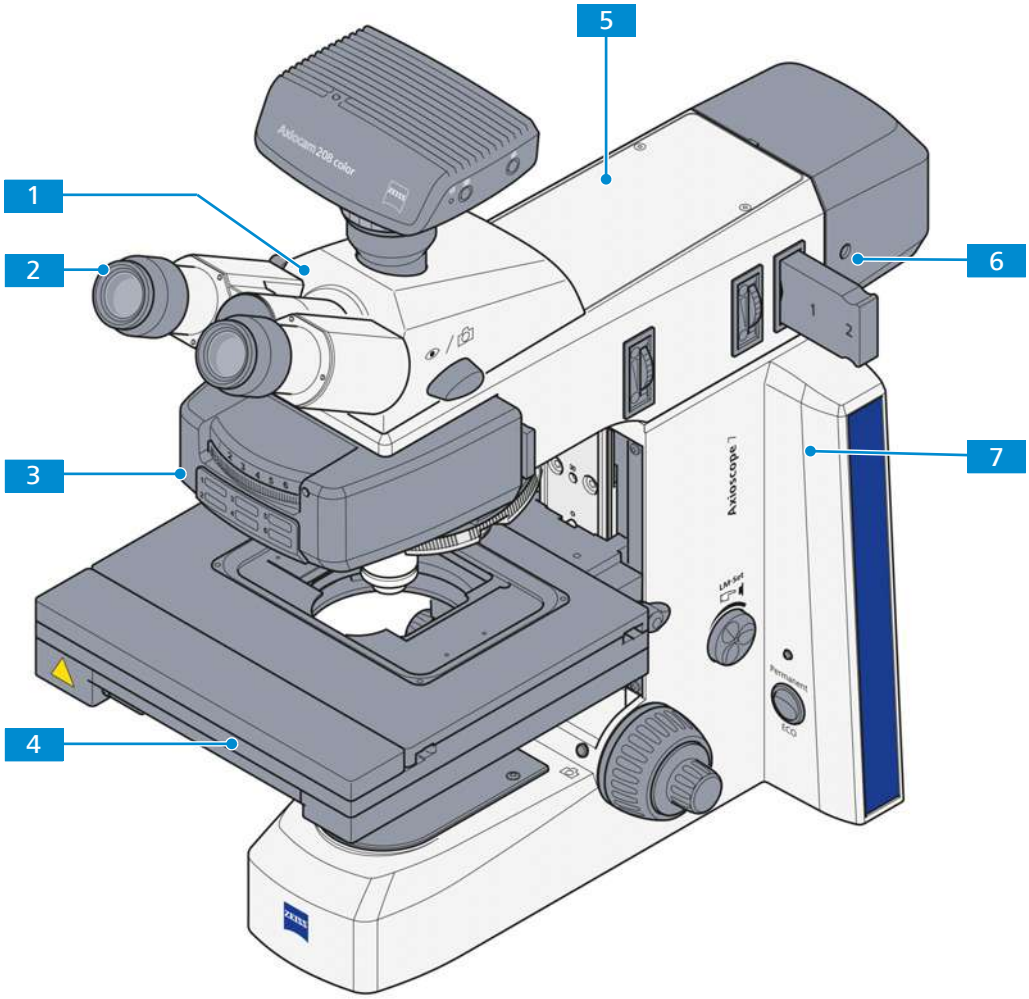


Fig. 16: Main components - Axioscope 7 RL

1	*Binocular tube [▸ 44]*	2	*Eyepieces [▸ 48]*
3	Reflector turret	4	*Mechanical stage [▸ 52]* 80x60 mot. with sample holder
5	Upper part of the stand	6	RL *light source [▸ 131]*
7	Lower part of the stand		

4.7.2 Controls and Functional Elements of Axioscope 7 RL

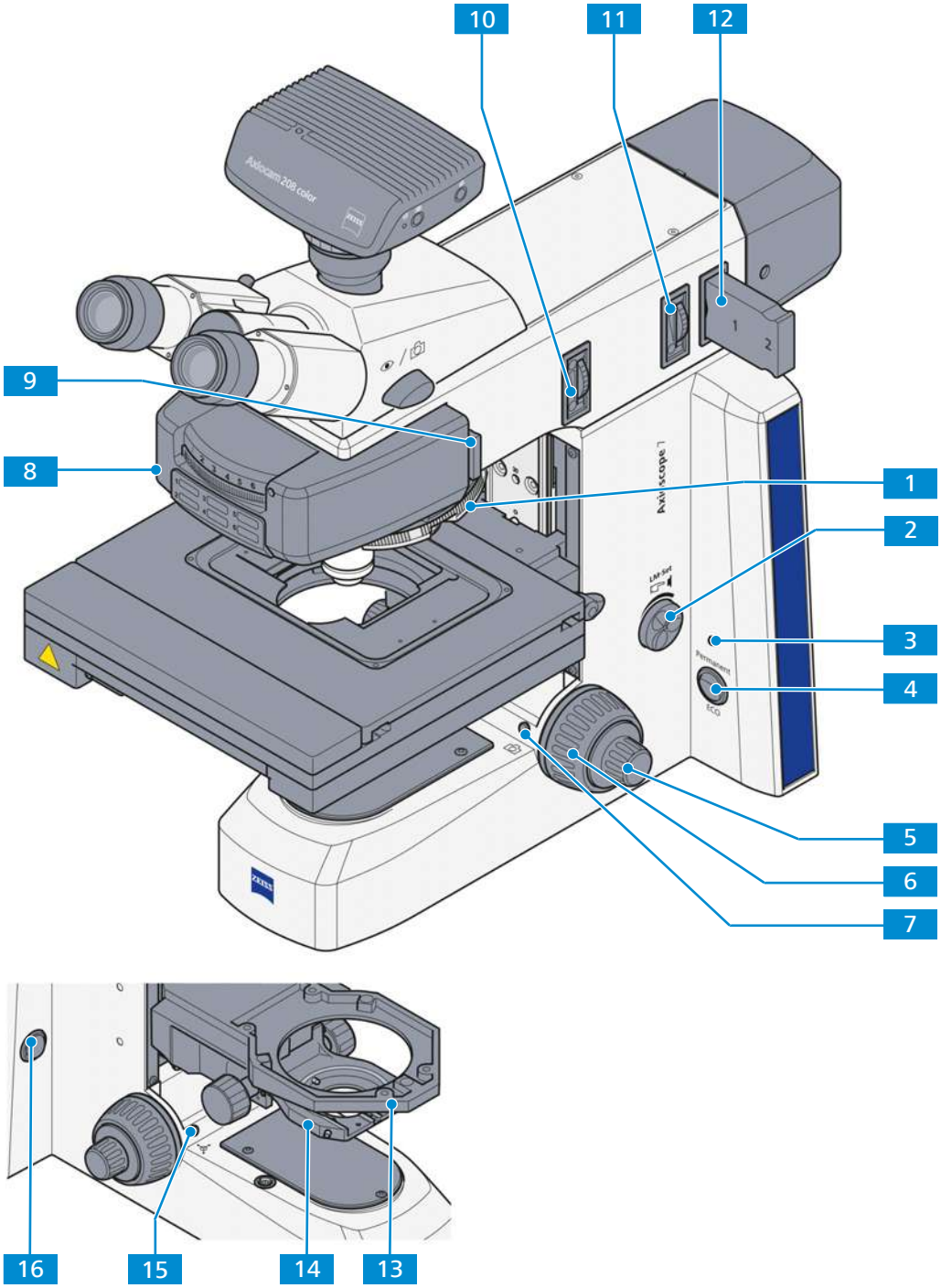


Fig. 17: Controls and functional elements - Axioscope 7 RL

1	Nosepiece	2	**Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels
3	Indicator light for reflected light	4	**Permanent/ECO** mode switch
5	Focusing drive – fine adjustment (left and right)	6	Focusing drive – coarse adjustment (left and right)
7	**Snap** button (on the right side)	8	Reflector turret (for replaceable reflector modules)

9	Slot for polarizer slider A 60x30 mm	10	Luminous-field diaphragm for reflected light
11	Aperture diaphragm for reflected light	12	Filter slider for reflected light
13	Stage carrier	14	Condenser carrier
15	**Stage control** button (on the left side)	16	Power switch **On/Off**

4.8 Axioscope 7 TL/RL MAT

4.8.1 Main Components of Axioscope 7 TL/RL MAT

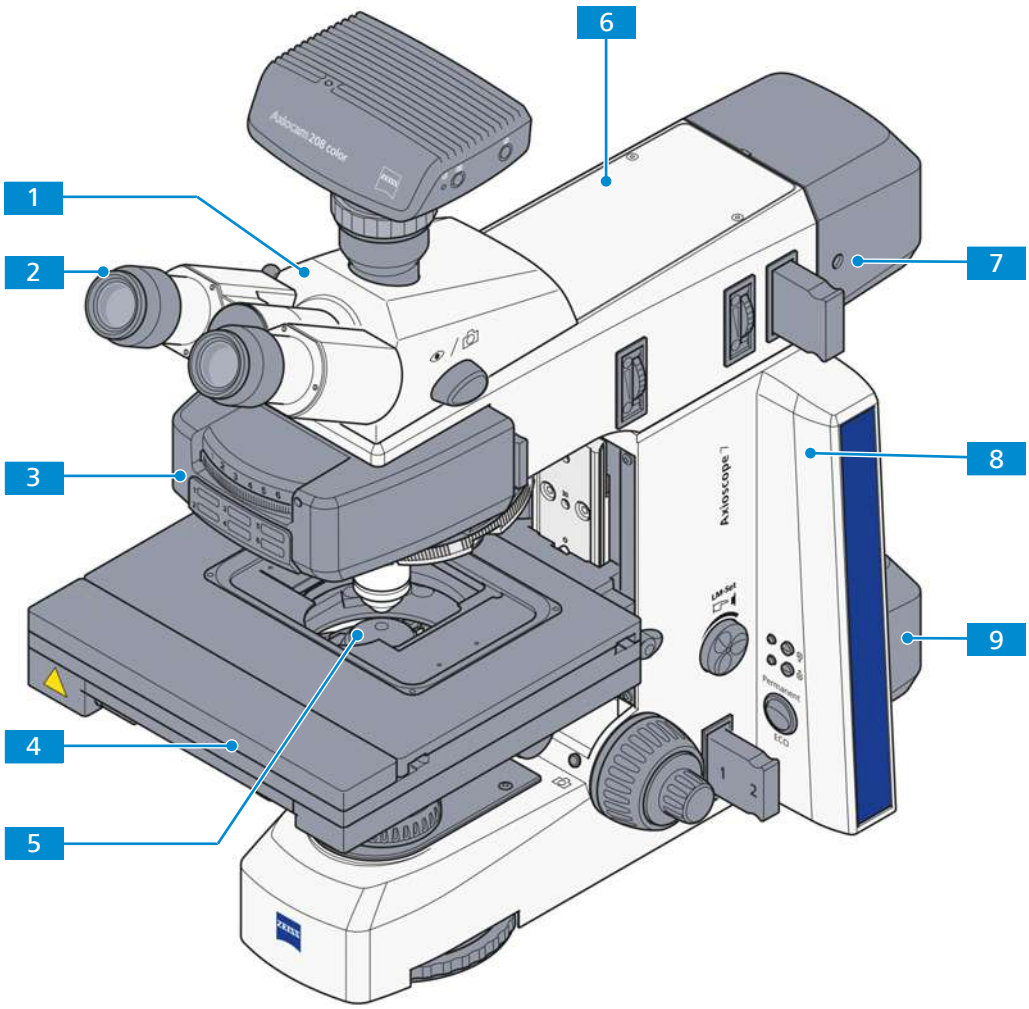


Fig. 18: Main components - Axioscope 7 TL/RL MAT

1	*Binocular tube [▸ 44]*	2	*Eyepieces [▸ 48]*
3	*Reflector turret [▸ 55]*	4	*Mechanical stage [▸ 52]* 80x60 mot. with sample holder
5	*Condenser [▸ 50]*	6	Upper part of the stand
7	RL *light source [▸ 131]*	8	Lower part of the stand
9	TL *light source [▸ 131]*		

4.8.2 Controls and Functional Elements of Axioscope 7 TL/RL MAT Stand

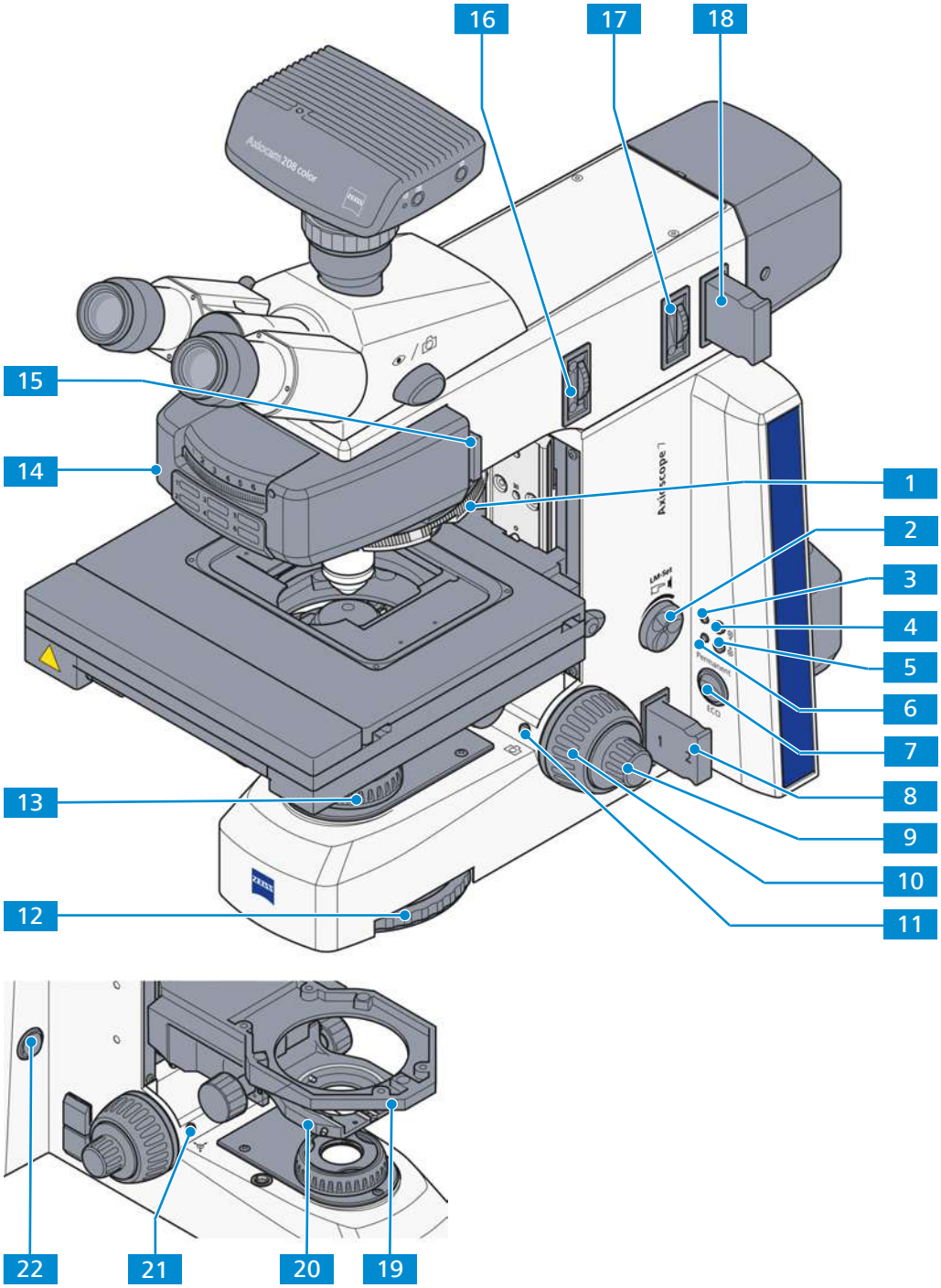


Fig. 19: Controls and functional elements - Axioscope 7 TL/RL MAT

1	Nosepiece	2	**Intensity/LM** knob for light intensity and Light Manager function (LM) and switching between fluorescence channels
3	Indicator light for reflected light	4	Reflected light (**RL**) button
5	Transmitted light (**TL**) button	6	Indicator light for transmitted light
7	**Permanent/ECO** mode switch	8	Filter slider for transmitted light
9	Focusing drive – fine adjustment (left and right)	10	Focusing drive – coarse adjustment (left and right)

11 **Snap** button (on the right side)

12 6-position filter wheel (operable from left and right)

13 Luminous-field diaphragm for transmitted light

14 Reflector turret (for replaceable reflector modules)

15 Slot for polarizer slider A 60x30 mm

16 Luminous-field diaphragm for reflected light

17 Aperture diaphragm for reflected light

18 Filter slider for reflected light

19 Stage carrier

20 Condenser carrier

21 **Stage control** button (on the left side)

22 Power switch **On/Off**

4.9 Controls and Functional Elements on Components

4.9.1 Functions of Stand Keys and Display Elements

Key	Availability	Action	Functionality/Description
Power switch **On/Off**	Axioscope 5/7/Vario	I = on; O = off	Switches the microscope on/off.
Permanent/ECO mode switch	Axioscope 5/7/Vario	Toggle	Switches between Permanent (continuous) mode and ECO mode of the microscope illumination. ▪ Permanent mode active: illumination is continuously switched on. ▪ ECO mode active: illumination switches off after 15 minutes without action. Do not use ECO mode for experiments involving time-lapse or video recording.
RL button, **TL** button	Axioscope 7 Optional Axioscope 5	press < 1 s	Switches RL/TL illumination alternately on/off. The respective indicator light lights up GREEN continuously as long as the illumination source is activated. Second press to the **RL/TL** button to turn off/on the illumination (the indicator light not affected).
Intensity/LM knob	Axioscope 5/7/Vario	Turn	Controls the light intensity of the active light source.
		press < 1 s	Repeated short pressing switches a single LED or all LEDs of the fluorescence light source together on or off.
		press > 1.5 s	Light Manager function: Saves the set light intensity. During this action, the indicator light blinks twice in GREEN and the image background appears BLACK for 300 ms (this does not apply to halogen illumination).

Key	Availability	Action	Functionality/Description
		press for 20 s	Activates the factory default settings (enables Light Manager (LM), sets light intensity to the initial value, enables parfocality function, clears all saved parfocal positions). When the knob is pressed, the indicator light starts blinking* in RED after 3 s until 20 s is reached. After 20 s, the indicator light blinks in GREEN. Then release the knob. The indicator light turns to GREEN permanently if the system reset is done. After factory default reset, re-power the system.
Left **Snap** button (only if Axiocam 203 or 212 is attached)	Axioscope 5	press < 1 s	Snaps an image; when the snap is completed, the attached monitor appears in BLACK for 50 ms.
		press > 1.5 s	Starts video recording; another short press is required to stop recording. After recording is finished, the attached monitor appears in BLACK for 300 ms.
Right **Snap** button (only if Axiocam 203 or 212 is attached)	Axioscope 5/7/ Vario	press < 1 s	Snaps an image; when the snap is completed, the attached monitor appears in BLACK for 50 ms.
		press > 1.5 s	Starts video recording; another short press is required to stop recording. After recording is finished, the attached monitor appears in BLACK for 300 ms.
Snap button + **Intensity/ LM** knob	Axioscope 5/7/ Vario	press > 1.5 s simultaneously	Disables/enables the Light Manager (LM) functionality: ▪ Disabling: The indicator light blinks GREEN / ORANGE / GREEN in sequence. ▪ Enabling: The indicator light blinks GREEN / GREEN / GREEN in sequence. By factory default, the Light Manager functionality is enabled.
Left + Right **Snap** buttons	Axioscope 5	press > 1.5 s simultaneously	Disables/enables the dazzle protection function: ▪ Disabling: The indicator light blinks ORANGE twice. ▪ Enabling: The indicator light blinks GREEN twice. By factory default, the dazzle protection function is enabled.
Snap button + **Stage control** button	Axioscope 7		
Stage control button	Axioscope 7	press < 1 s	Switches between XY stage control and Z axis control via focus drives: If Z axis control is active: ▪ the indicator light **lights** in GREEN permanently ▪ the left and right fine focusing drive control slow Z-movement (focusing)

Key	Availability	Action	Functionality/Description
			▪ the left and right coarse focusing drive control fast Z-movement (focusing) If XY stage control is active: ▪ the indicator light **blinks** GREEN ▪ the **left** focus drives (fine or coarse) control **Y** movement (slow or fast) of the stage ▪ the **right** focus drives (fine or coarse) control **X** movement of (slow or fast) the stage
		press for 8 s	Starts and stops the parfocality calibration: ▪ Starting: indicator light turns RED. ▪ Stopping: indicator light turns GREEN.
		press < 1 s	During parfocality calibration: records the parfocal position. ▪ If using LED illumination: The LED shuts off for 300 ms for indication. If using halogen illumination: no indication ▪ the indicator light blinks twice in GREEN
Snap button+ **Stage control** button	Axioscope 7	press < 1 s simultaneously	Load/unload alternately.
Stage control button + **Intensity/ LM** knob	Axioscope 7	press > 1.5 s simultaneously	Disables/enables the parfocality function: ▪ Disabling: The indicator light blinks ORANGE twice. ▪ Enabling: The indicator light blinks GREEN twice. By factory default, the parfocality function is enabled.

* Blinking: the indicator light alternately goes on/off at 500 ms intervals

4.9.2 Binocular Tube

Various tubes with different inclination angles enable suitable eye levels to be selected for observation.

4.9.2.1 Binocular Photo Tube 30°/23 (50:50)

Purpose Binocular photo tubes are used to observe the microscopic image by means of the eyepieces and/or acquire images with a camera. Using the camera port, the microscopic image can be sent to a connected camera.

Position The binocular photo tube is mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

The following features and controls are available:

- reversed image
- camera port with fixed light graduation (50:50)
- viewing angle 30°
- field of view 23 mm

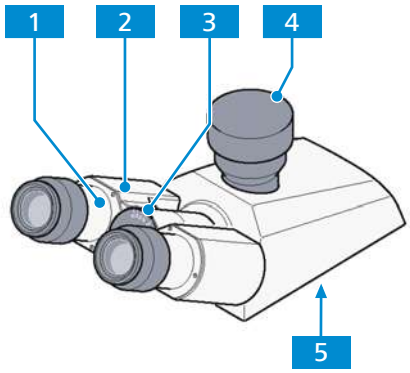


Fig. 20: Binocular Photo Tube 30°/23 (50:50)

1	Eyepiece socket	2	Binocular section
3	Angle scale	4	Camera port (covered)
5	Dovetail ring mount		

4.9.2.2 Binocular Photo Tube 30°/23 (100:0/0:100)

Purpose Binocular photo tubes are used to observe the microscopic image by means of the eyepieces and/or acquire images with a camera. Using the camera port, the microscopic image can be sent to a connected camera.

Position The binocular photo tube is mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

The following features and controls are available:

- reversed image
- camera port with toggle graduation (100:0/0:100)
- viewing angle 30°
- eyepiece shutter
- field of view 23 mm

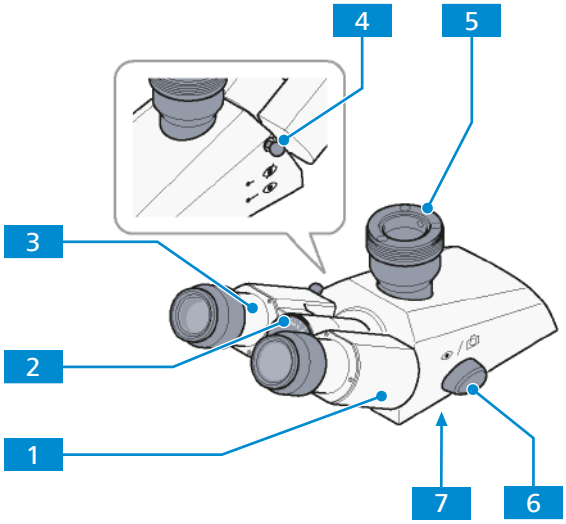


Fig. 21: Binocular Photo Tube 30°/23 (100:0/0:100)

1 Binocular section

2 Angle scale

3 Eyepiece socket

4 Eyepiece shutter

- Push-pull rod pushed in: eyepiece shutter closed
- Push-pull rod pulled out: eyepiece shutter opened

5 Camera port

6 Shift knob for selecting the graduation

- Shift knob to front (eye symbol): 100% light to eyepieces
- Shift knob to the rear (camera symbol): 100% light to camera

7 Dovetail ring mount

4.9.2.3 Binocular Photo Tube 20°/23 (100:0/0:100)

Purpose Binocular photo tubes are used to observe the microscopic image by means of the eyepieces and/or acquire images with a camera. Using the camera port, the microscopic image can be sent to a connected camera.

Position The binocular photo tube is mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

The following features and controls are available:

- upright image
- camera port with toggle graduation (100:0/0:100)
- viewing angle 20°
- field of view 23 mm

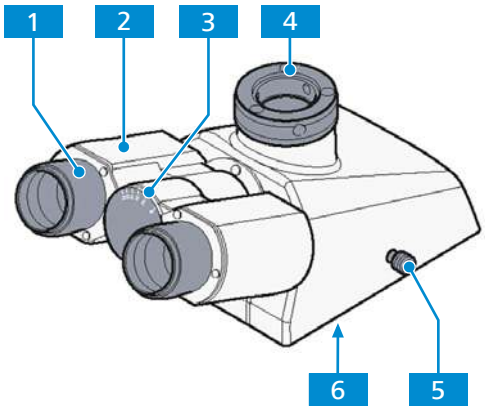


Fig. 22: Binocular Photo Tube 20°/23 (100:0/0:100)

1 Eyepiece socket

2 Binocular section

3 Angle scale

4 Camera port

5 Slider for selecting the graduation

- Slider pushed in: 100% light to eyepieces
- Slider pulled out: 100% light to camera. 100% light to camera

6 Dovetail ring mount

4.9.2.4 Binocular Ergo Photo Tube -2° to 28°/23 (50:50), Reversed Image

Purpose Binocular photo tubes provide users with the convenience of accessing the sample images using eyepieces as well as monitors through camera at the same time. Users can change the angle from -2° to 28° to meet the ergonomic requirement of specific operators.

Position The binocular photo tubes are mounted on the top of the stand.

Function The pupil distance and viewing height can be adjusted by bending the binocular device up or down.

The following features and controls are available:

- Reverse image
- Camera port with splitting ratio 50:50
- Viewing angle -2° to 28°
- Field of view 23 mm

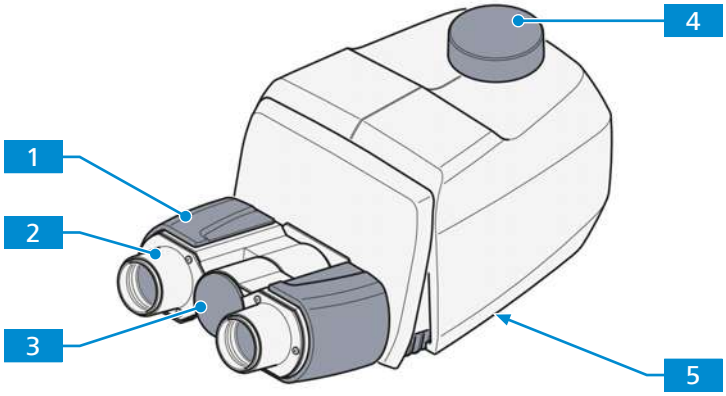


Fig. 23: Binocular ergo photo tube -2° to 28°/23 (50:50), reversed image

1	Binocular section	2	Eyepiece socket
3	Angle scale	4	Camera port (covered)
5	Dovetail ring mount		

4.9.2.5 Binocular Ergo Photo Tube -2° to 28°/25 (50:50), Reversed Image

Purpose Binocular photo tubes provide users with the convenience of accessing the sample images using eyepieces as well as monitors through camera at the same time. Users can change the angle from -2° to 28° to meet the ergonomic requirement of specific operators.

Position The binocular photo tubes are mounted on the top of the stand.

Function The pupil distance and viewing height can be adjusted by bending the binocular device up or down.

The following features and controls are available:

- Reverse image
- Camera port with splitting ratio 50:50
- Viewing angle -2° to 28°
- Field of view 25 mm

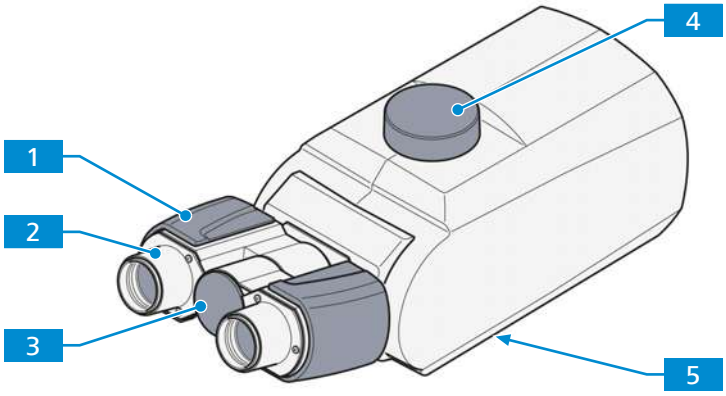


Fig. 24: Binocular ergo photo tube -2° to 28°/25 (50:50), reversed image

1	Binocular section	2	Eyepiece socket
3	Angle scale	4	Camera port (covered)
5	Dovetail ring mount		

4.9.3 Eyepieces

4.9.3.1 Eyepieces

Purpose The eyepieces serve to observe the microscopic image.

Position The eyepieces are inserted into the eyepiece sockets of the binocular tube.

Function Both eyepieces are suitable for spectacle wearers. Additionally, they contain a focusing ring for compensation of defective vision. The provided diopter scale helps to find the correct setting. When using the microscope for fluorescence applications, the special eyecups with light protection can be used. However, they cannot be folded over and are not suitable for spectacle wearers.

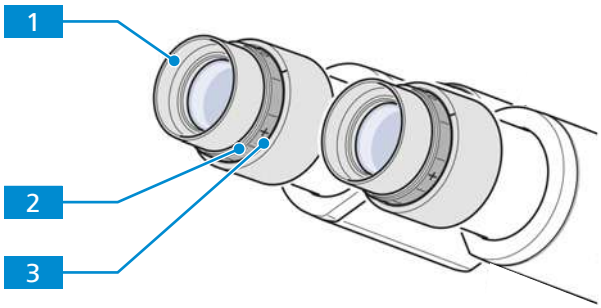


Fig. 25: Eyepiece

1	Eyecup (e.g. Foldover rubber eyecup)	2	Focusing ring
3	Diopter scale		

4.9.3.2 Eyepieces with Eyepiece Reticles

Purpose The eyepieces with eyepiece reticles serve to observe the microscopic image in special microscopy procedures.

Position The eyepieces with reticles are inserted into the tube. This should only be carried out by a ZEISS service representative. However, it is possible for users to insert the reticles themselves when adhering to the following instructions.

The eyepiece reticles must be inserted under dust-free conditions.

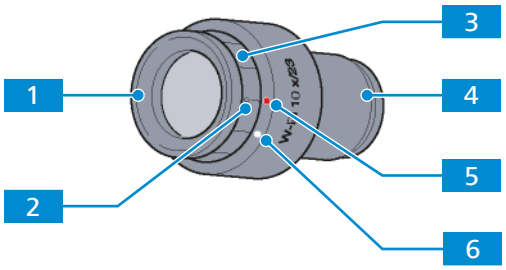


Fig. 26: Eyepiece with installed eyepiece reticle

1	Eyecup, changeable	2	Diopter scale with zero point to facilitate finding the correct setting
3	Focusing ring for compensation of defective vision	4	Mounting stop with inserted eyepiece reticle
5	Red dot, corresponds to the zero diopter setting when a reticle is inserted	6	White dot, corresponds to the zero diopter setting when no reticle is inserted

4.9.3.3 Focusable Pol Eyepiece

The focusable eyepiece can be set into the binocular photo tube with upright image.

The focusable Pol eyepiece contains a reticle firmly glued into it (cannot be changed), which is of defined orientation. When changing the interpupillary distance on the binocular photo tube, the two eyepiece tubes follow this rotary motion synchronously, so that the position of the orientation grooves in the eyepiece tubes remains unchanged.

The PL 10x/23 GW foc. Pol eyepiece can be combined with a PL 10x/23 GW foc. eyepiece.

4.9.4 Nosepiece with Objectives

Purpose The nosepiece is used to hold the objectives and to swivel the desired objective into the beam path.

Position The nosepiece is mounted on the upper part of the stand.

The following features and controls are available:

- nosepiece with M27 mounting thread for six objectives
- one objective position is fixed and four positions can be centered with the aid of two screws each
- equipped with three, six or no DIC positions depending on the configuration
- equipped with slot for 6x20mm sliders (compensators, analyzers, quarter plates or fluorescence protection shield)

> **Info**
>
> The nosepiece with 5-positions HF/DF/Pol and 1-position HF/DF/DIC is equipped with five centerable objective mounts (without DIC slots) as well as one objective mount with DIC slot (non-centerable). Accordingly, all objectives can be centered relative to the rotary stage.

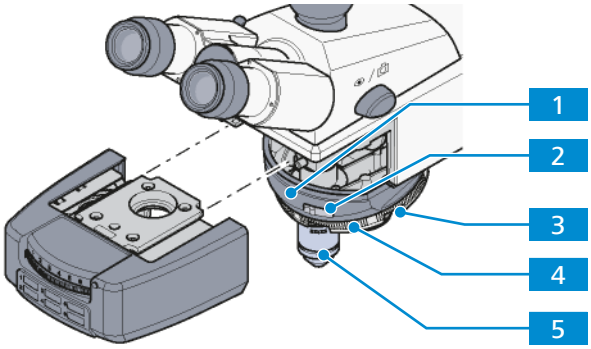


Fig. 27: Nosepiece with objectives

1	Nosepiece	2	Slot 6x20mm
3	DIC slot	4	Knurled ring for swivelling the nosepiece
5	Objective		

4.9.5 Condenser Carrier

Purpose The condenser carrier is used to hold the condenser.

Position The condenser carrier is mounted onto the stage carrier.

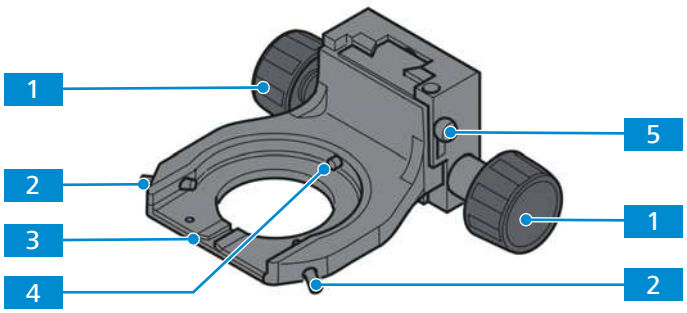


Fig. 28: Condenser carrier

1	Knurled knob for vertical adjustment (left/right)	2	Centering hex screw (left/right), optional: knurled screw
3	Orientation groove	4	Main spring
5	Fastening screw for height stop		

4.9.6 Condensers

4.9.6.1 Condenser 0.9/1.25 BF

Purpose Condensers are used to optimize the transmitted light illumination. The condenser 0.9/1.25 BF is usable for brightfield applications.

Position The condenser is mounted on the condenser carrier of the stand.

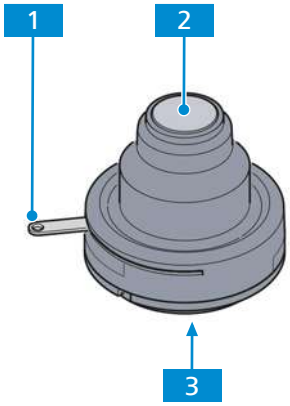


Fig. 29: Condenser 0.9/1.25 BF

1	Lever for setting the aperture diaphragm	2	Front lens
3	Dovetail ring mount		

4.9.6.2 Condenser 0.9/1.25 BF, DF, Ph1, Ph2, Ph3 with modulator disk

Purpose Condensers are used to optimize the transmitted light illumination. The condenser with modulator disk is usable for brightfield, darkfield and phase contrast applications.

Position The condenser is mounted on the condenser carrier of the stand.

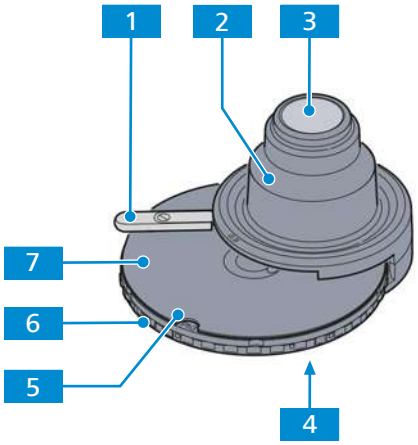


Fig. 30: Condenser 0.9/1.25 BF, DF, Ph1, Ph2, Ph3 with modulator disk

1	Lever for setting the aperture diaphragm	**2**	Front lens
3	Condenser 0.9/1.25 BF, optionally condenser 0.9/1.25 BF Pol	**4**	Dovetail ring mount
5	Display field of the adjusted modulator disk position	**6**	Knurled ring for adjusting the position of the modulator disk
7	Modulator disk with 5 positions for condenser modules		

4.9.6.3 Condenser 0.8 BF WD=5.8mm

Purpose Condensers are used to optimize the transmitted light illumination. The condenser 0.8 BF is usable for brightfield applications.

Position The condenser is mounted on the condenser carrier of the stand.

The following features and controls are available:

- NA of 0.8 in air and WD of 5.8 mm
- Suitable for brightfield observation with objectives 5x to 100x
- Compatible with low-power system for objectives 2.5x/4x

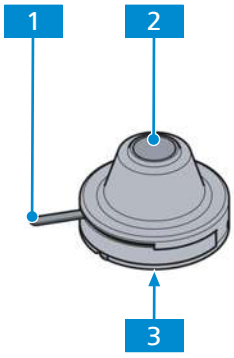


Fig. 31: Condenser 0.8 BF WD=5.8mm

1	Lever for setting the aperture diaphragm	2	Front lens
3	Dovetail ring mount		

4.9.7 Stages

A stage is a platform at right angles to the optical axis of the microscope, which carries the sample and which is often fitted with mechanical movements (as in a mechanical stage) to allow easy positioning of the object in the x- and y-axis, and movement along, and rotation about the z-axis.

4.9.7.1 Rackless Mechanical Stage, 75x50 R

Purpose Mechanical stages are used for fixing and positioning the sample for examination.

Position The mechanical stages are mounted on the stage carrier of the stand.

Function The sample is fixed on the stage by means of the sample holder. For this purpose, the sample holder is equipped with a spring lever.

The sample is positioned in the beam path by means of the two coaxial drives in x and y direction. The adjustment range can be read off the respective vernier scale.

The following features and controls are available:

- rackless stage
- coaxial drives in X and Y adjustment on the right (R), optionally on the left (L)
- travel range 75x50mm
- with hardcoat anodized surface

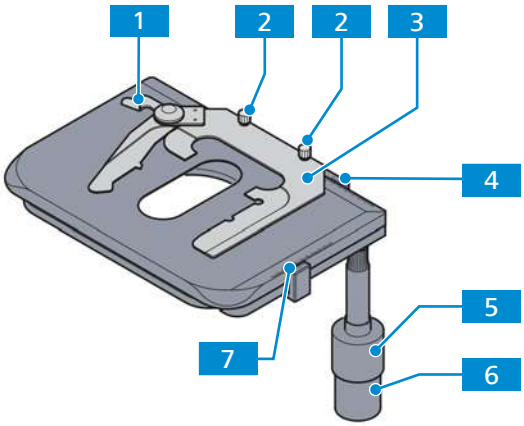


Fig. 32: Rackless mechanical stage, 75x50 R

1	Spring lever	**2**	Knurled screw (2x) for fixing the sample holder to the stage
3	sample holder for double slides 76x26	**4**	Vernier scale for display of the adjustment range in X
5	Coaxial knurled knob for Y adjustment	**6**	Coaxial knurled knob for X adjustment
7	Vernier scale for display of the adjustment range in Y		

4.9.7.2 Mechanical Stage, 80x60, Motorized

Purpose Mechanical stages are used for fixing and positioning the sample for examination.

Position This motorized mechanical stage is mounted on the stage carrier of the Axioscope 7 stand only.

Function The sample is fixed on the stage by means of insert plates (160x116) or mounting frames (for two sample sliders 76x26) that are inserted into the stage supporting surface.

The sample is positioned in the beam path by means of the motorized adjustment drives in X and Y direction using the *stage control button [▸ 41]*.

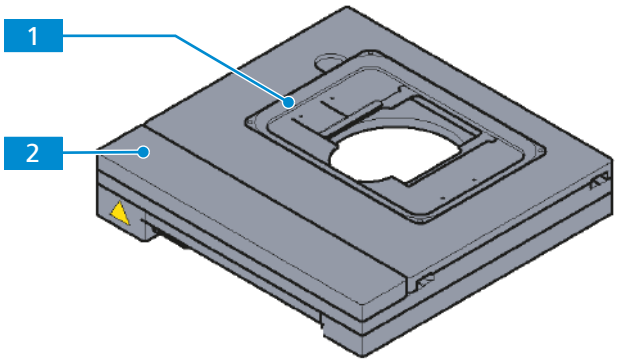


Fig. 33: Mechanical stage, 80x60, motorized

1	Supporting surface for insert plates or mounting frames	**2**	Mechanical stage

4.9.7.3 Rotary Stage Pol 360° with Specimen Guide

Purpose Rotary stages are used for fixing and positioning the sample for examination in polarized light.

Position The rotary stages are mounted on the stage carrier of the stand.

Function The sample is fixed on the stage by means of the sample guide. For this purpose, the sample guide is equipped with a spring lever.

The sample is positioned in the beam path by means of the two knurled knobs of the sample guide. The adjustment range can be read off the respective vernier scale.

The following features and controls are available:

- optionally equipped with: attachable sample guide for use of standard slides 45x25 mm and 75x25 mm (3"x1")
- 360° rotation with lock
- click stop every 45°

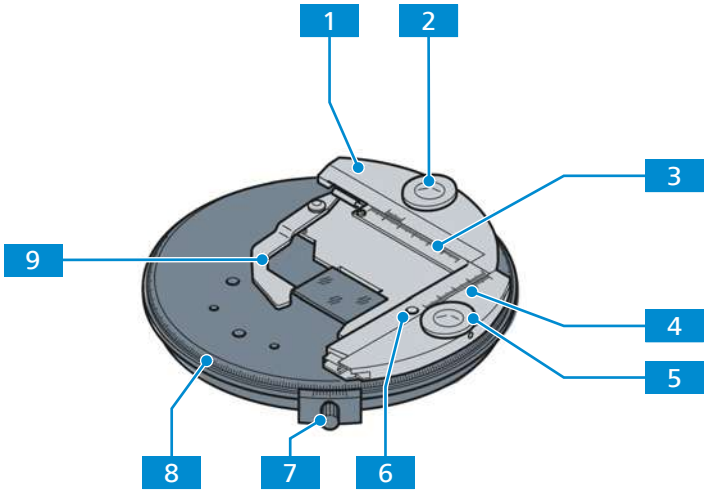


Fig. 34: Rotary Stage Pol 360° with Specimen Guide

1	Specimen guide	2	Knurled knob for adjustment in X direction
3	Vernier scale for display of the adjustment range in X	4	Vernier scale for display of the adjustment range in Y
5	Knurled knob for adjustment in Y direction	6	Mounting hole to get access to the clamping screw
7	Knurled screw for locking the rotation, 360° rotation possible	8	Angle scale
9	Spring lever		

4.9.8 Reflector Inserts

4.9.8.1 Reflector Turret with 4x or 6x Coded Positions

Purpose The reflector turret is used to hold the push-and-click (P&C) reflector modules and to swivel the desired reflector module into the beam path.

Position The reflector turret is mounted above the nosepiece.

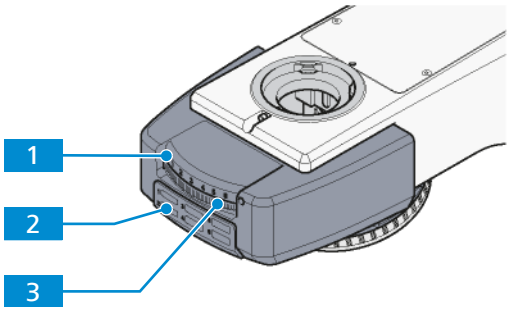


Fig. 35: Reflector turret

1 Display indicates which reflector module is in the beam path

2 Field for the supplied stickers, the stickers can be labeled with the filter combination data of the reflector module and pasted on the corresponding field

3 Knurled ring to swivel the desired reflector module into the beam path

4.9.8.2 Reflector Slider with Two Coded Positions

The reflector slider with two coded positions is equipped with two individually loadable reflector positions for P&C modules which can be slid into the beam path.

Purpose The reflector slider is used to hold two push-and-click (P&C) reflector modules and to slid the desired reflector module into the beam path.

Position The reflector turret is mounted on the upper part of the stand above the nosepiece.

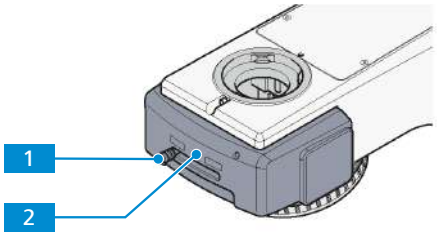


Fig. 36: Reflector slider

1 Slider to slid the desired reflector module into the beam path

2 Field for the supplied stickers, the stickers can be labeled with the filter combination data of the reflector module and pasted on the corresponding field

4.10 Light Manager Function

The Light Manager (LM) function allows users to save the favorable light intensity of specific objective and turret combinations. Afterwards, when switching between different objectives or reflector turrets, the saved light intensity will be automatically applied. Restarting the microscope will not vanish the saved value.

This value can be overwritten among different users with unlimited times.

Dazzle protection (ON by default) is used to switch off the light when switching objectives or reflector turrets such that the field of view is dark after first objective or turret leaves the position and before the second arrives in. Users can manually turn it off, so the field of view remains the brightness of the first objective or turret until the second one arrives in the position.

4.11 Microscopy and Contrast Methods

4.11.1 Transmitted Light Brightfield Contrast Using the KÖHLER Method

Transmitted light brightfield contrast is the most common of all optical contrast methods, since it can be used to quickly and easily examine high-contrast or stained samples (e.g. blood smears).

In order to obtain an image as close as possible to the object, not only the so-called direct beam bundles but also the indirect ones, i.e. the beam bundles diffracted and scattered at the preparation details, are of essential importance. According to ABBE, the larger the indirect beam components are, the more true to the object the microscopic image is.

The best performance of the microscope, and especially its objective, is achieved when the condenser, field stop and aperture stop are adjusted in accordance with the KÖHLER illumination principles.

4.11.2 Transmitted Light Darkfield Contrast Using the KÖHLER Method

In the transmitted light darkfield contrast method you basically illuminate the sample with an illumination aperture which is higher than the one of the objective you are using.

In darkfield microscopy, only the diffracted and scattered light portions which are important for the imaging procedure get into the objective, whereas the indirect unaffected light beams are directed past the objective. Thus a resolution of fine structures can be achieved which is below the resolution capacity of a light microscope. The fine structures now appear bright and incandescent on a dark background.

Darkfield samples need to be kept impeccably clean, more so than samples for any other method. A fingerprint, dust or any dirt particle can have a negative effect, as they brighten the background and reduce the contrast of the object image.

4.11.3 Transmitted Light Phase Contrast

The phase contrast method is ideal for examining thin uncolored samples, e.g. individual cells of cell cultures. Generally, the human eye cannot detect phase differences (variations in refractive index or thickness) within the different cell components.

The phase contrast method uses the optical modulators "annular phase diaphragm" and "phase ring" to convert the small phase differences in intensity differences which are visible to the human eye. The interference of different beams in the intermediate image is important for the generation of such images.

With the aid of the optically defined ring channel "annular phase diaphragm and phase ring", the bright direct light portions are attenuated and provided with a constant phase shift. The indirect light portions, however, which are diffracted by different cell particles, bypass this optical channel and their phase is affected by the difference in the sample’s refractive index and thickness.

In the intermediate image plane, the partial beams are thus differently affected and achieve interference and strengthen or weaken each other (constructive and destructive interference) – depending on their phase. As a result, these interferences create image contents with intensity differences visible to the human eye.

4.11.4 Transmitted Light Differential Interference Contrast

The transmitted light DIC contrast method allows for a high-contrast vivid display of transparent sample details.

The light is linearly polarized by a polarizer and is separated into two beams in a birefringent prism. These pass through two neighboring sample locations at a short distance and experience different path differences there due to differences in refractive index and sample thickness. Both beams are then combined in a second birefringent prism and have the same polarization after passing the analyzer. Therefore both beams can interfere in the intermediate image and the path differences are thus converted into intensity differences represented by a gray scale. A compensator, e.g. λ-plate, may be used for a consecutive conversion of the gray scale in a color scale.

4.11.5 Transmitted Light PlasDIC Microscopy

PlasDIC can be used independently from the material of the sample holder.

The contrast method gives a relief-like image and is especially well suited for thicker objects. The contrast is adjustable. It is possible to contrast the cavities of microtiter plates up to the edge. It is not necessary to use cultivation holders with a glass base.

4.11.6 Transmitted Light Polarization Contrast

The transmitted light polarization contrast method is used for samples which change the polarization of the light. Such samples are called birefringent. Examples include crystals, minerals or polymers. If such birefringent substances are observed between crossed polarizers, the birefringent portion of the sample appears bright while its surroundings remain dark.

4.11.6.1 Detecting Birefringence

A birefringent substance can be recognized by turning the sample by 360° between crossed polarizers. The sample should show four bright and four dark appearances during the turning procedure. During the turning procedure, interference colors appear that range from gray (mostly for biological samples) through white, yellow and red until blue, depending on birefringence, thickness as well as sample orientation. The interference colors may be of the first or of a higher order.

4.11.6.2 Determination of the Polarization Direction

The determination of the polarization direction of n_γ or $n_{\gamma'}$ respectively (polarization direction with the absolute or relative largest index of refraction) and n_α or $n_{\alpha'}$ respectively (polarization direction with the absolute or relative smallest index of refraction) relative to the morphological directions, e.g. of crystal surfaces, crystal needles or fibers, provide an important signature of the material. This method is also used in the diagnosis of bio-crystals (e.g. gout and pseudo-gout).

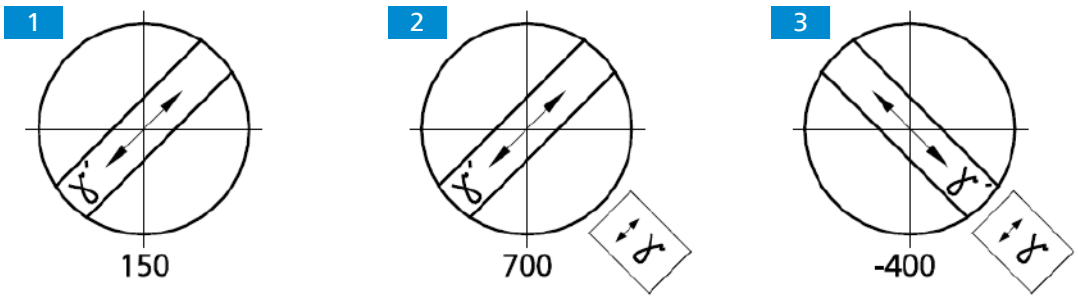


Fig. 37: Determining the polarization direction $n_{\gamma'}$ using a synthetic fiber as an example

When the lambda compensator is put in, the sample changes its color depending on its orientation (northeast-southwest or northwest-southeast). Like the sample, the lambda compensator is a birefringent object, but it has a defined path difference of 550 nm and a maximum oscillation direction n_γ pointing strongly to northeast-southwest.

The changes in color are based on optical interference. It is necessary to compare the interference colors (path differences) in both diagonal positions (northeast-southwest and northwest-southeast).

The path difference results from the interference of the polarization of the sample and the polarization of the lambda compensator.

The largest path difference occurs when the polarization direction of the sample or the absolute or relative largest index of refraction (n_γ or $n_{\gamma'}$) is parallel to the largest polarization direction of the lambda compensator. The sample appears then e.g. in blue-green 2.

The smallest path difference occurs when the direction of polarization of the sample with the absolute or relative smallest index of refraction (n_α or $n_{\alpha'}$) is perpendicular to the polarization direction of the lambda compensator. The sample then appears e.g. yellow 3.

The gray-white color appearing first in the bright position in the above example 1 corresponds to a path difference of 150 nm (according to the Michel-Lévy color chart).

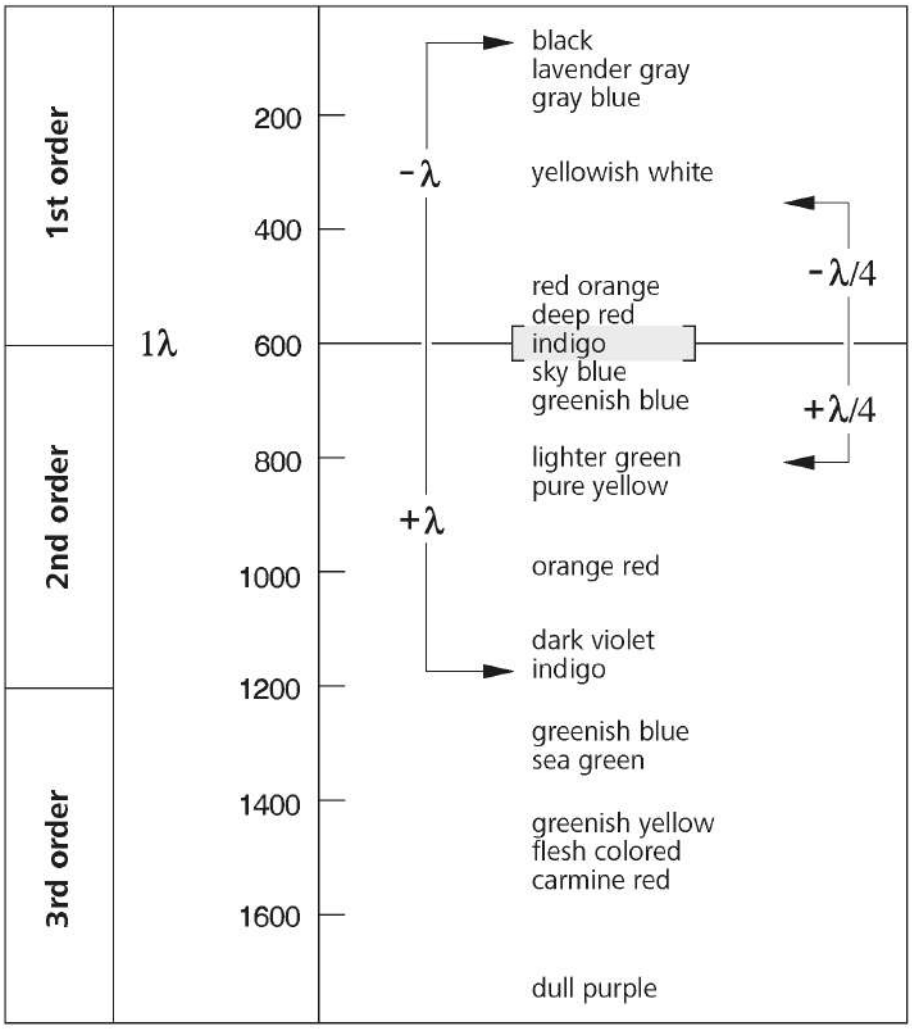


Fig. 38: Schematic diagram of the color charts developed by Michel-Lévy

When the lambda compensator is brought into the beam path, the non-birefringent "surroundings" of the synthetic fiber appear dark red, which corresponds to the path difference of the compensator of 550 nm (1st order interference color for the path difference of 550 nm corresponds to 1 λ).

If the polarization direction (n_y or $n_{y'}$) of the birefringent sample to be examined is parallel to the principal polarization direction (n_y) of the lambda compensator, i.e. in the northeast-southwest direction, the path difference of the sample (e.g. gray-white: 150 nm) and the path difference of the lambda compensator (red: 550 nm) add up. This results in a color change of the sample from grayish white to greenish-blue (resulting path difference = 700 nm).

If the polarization direction of the birefringent sample to be examined is perpendicular to the principal polarization direction of the lambda compensator, i.e. in the northwest-southeast direction, the path difference of the sample (e.g. gray-white: 150 nm) is subtracted from the path difference of the compensator (red: 550 nm). In this case, the interference color of the sample visibly changes from gray-white to orange (resulting path difference = 400 nm).

4.11.6.3 Measuring Path Differences

Measuring compensators are required for the accurate measurement of path differences,. These compensators reset, i.e. compensate the path difference produced by the sample to zero (first order black). While the addition position as well as the subtraction position are of interest for the methods described above, only the subtraction position is relevant for measurements. Path differences in the sample can assume very small values (1/50 λ or 10 nm) and very large values (greater than 10 λ or approx. 5500 nm and more) and thus determine the compensator appropriate for the measurement.

The suitable compensator is determined as follows:

- If more or less strong interference colors appear on the sample, the path difference ranges approximately between 1/2 λ and 5 λ.
  The suitable compensator is:
  B 0-5 λ tilting compensator
- If the sample-side color changes from light gray/white to a strong interference color, when a lambda compensator (473704-0000-000) is inserted in the compensator slot, the path difference is (1/4 - 1/2) λ.
  NOTICE **A prerequisite for the occurrence of the color change effect may be the evaluation in two sample positions rotated at an angle of 90° from one another. For this purpose, rotate the centered stage (by 2 click stops).**
  The suitable compensator is:
  B 0-5 λ tilting compensator
  or the DE SENARMONT compensation method up to 1 λ using the 546/4 nm SENARMONT compensator.
  NOTICE **The DE SENARMONT compensation method requires the use of the rotatable analyzer.**
- After insertion of the lambda compensator and rotation of the sample by 90°, the interference color remains white; in this case, however, it is a "higher-order white" and thus the path difference is > 5 λ.
  The suitable compensator is:
  K 0-30 λ tilting compensator
- A dark gray appearing as the interference color indicates a very small path difference (λ/10 or 54.6 nm).

4.11.6.4 Circular Polarization Contrast

Unlike standard polarization contrast, circular polarization contrast does not show any dark (extinction) positions that depend on the angle of rotation (azimuth) of the sample relative to polarizer or analyzer. This means that, while you are rotating the stage, the image will always look the same, as there are no bright and dark positions. With optical anisotropy all transparent samples show the interference colors that are characteristic to them.

4.11.6.5 Transmitted Light Polarization for Coniscopic Observation

The determination of the optical character of transparent and weakly absorbent crystals is used to diagnose crystals. This method is also termed conoscopy. Its main application is classical mineral microscopy. However, it also facilitates the identification and characterization of synthetic crystals, industrial minerals and plastics (e.g. films).

For the classification (and thus identification) of crystalline matter, the examination of the interference image in the objective pupil delivers more valuable information than that obtained by viewing the sample itself. The interference image becomes visible in the eyepiece if an additional optical system (fixed or focusing Bertrand lens or, in the basic version, the auxiliary microscope or diopter) is used.

In contrast to orthoscopy, this technique is called conoscopy, because here the sample is ideally illuminated through a wide-open cone. In practical microscopic work, this means that the condenser front lens (0.9) must be in the light path, the aperture stop fully open, and the objective, too, should be a high-aperture type.

4.11.7 Reflected Light Brightfield Contrast Using the KÖHLER Method

Reflected light brightfield contrast is the easiest and most commonly used RL contrast method. It is used to examine optically opaque samples or samples as e.g. cut, polished, etched metal or ores.

In order to obtain an image as close as possible to the object, not only the so-called direct beam bundles but also the indirect ones, i.e. the beam bundles diffracted and scattered at the preparation details, are of essential importance. According to ABBE, the larger the indirect beam components are, the more true to the object the microscopic image is.

The cone of light emerging from the reflected light light source is reflected on a color-neutral beam splitter before it passes through the objective which is focused on the sample surface (so-called condenser function). The objective collects the light reflected on the sample and creates, with the tube lens, the microscopic intermediate image. This image can then be examined visually or documented using a camera.

4.11.8 Reflected Light Darkfield Contrast Using the KÖHLER Method

The reflected light darkfield contrast method is applied when samples are examined, which do not have areas with different reflectivity (ideal brightfield samples), but which show deflections (as scratches, cracks, dust particles etc.) on the plane surface. All such light-scattering details appear bright in the darkfield, while the reflective plane areas remain dark.

4.11.9 Reflected Light DIC and C-DIC Contrast

The reflected light DIC and the reflected light C-DIC contrast methods (DIC = Differential Interference Contrast; C-DIC = Circular polarized light–differential interference contrast) are used for the high-contrast imaging of small height differences on the surface of opaque samples.

C–DIC is a polarization–optical differential interference contrast method where, unlike conventional DIC according to Nomarski, the DIC prism is arranged in circular, not linear, polarized light. Consequently, the interference contrast generated is invariant in relation to the oscillation orientation of the DIC prism, and so the latter can be rotated directionally in accordance with the characteristics of the object. This means that the stage does not need to be rotated while the relationship with the object is preserved. For the user, this means more information and an increase in sample throughput.

4.11.10 Reflected Light TIC Contrast

The reflected light TIC contrast method (Micro-interferometry; TIC = Total Interference Contrast in the circular polarized light) is used in imaging and measuring sample structures that exist in different azimuths.

Evaluation of the measured values

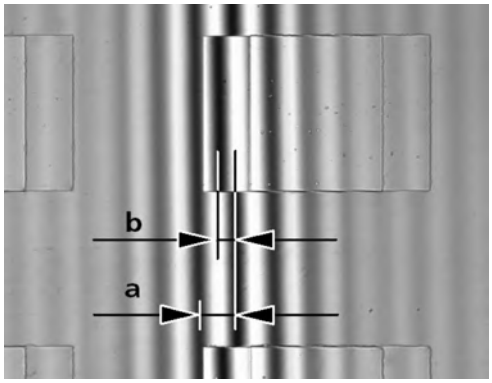


Fig. 39: Interference stripes

The values **a** (distance between interference stripes) and **b** (offset of the interference stripes along the step) are determined with the aid of an eyepiece reticle micrometer or with a micrometer eyepiece.

If working with white light (without an interference filter), set λ = 550 nm. When interference filters are used, it is important to apply the focal point of their wave lengths.

The measured path difference depends on the aperture and increases with the illumination aperture.

The step height SH is determined with the following formula:

$$SH = \frac{n\Delta}{2} = \frac{\lambda b}{2a}$$

Where

SH = step height in nm

n = refractive index of the environment, mostly air (n = 1)

Δ = phase difference

a = distance between interference stripes

b = offset of the interference stripes along the step

λ = wave length of the illumination in nm

The following correction values must be considered depending on the objective used:

Objective	Correction factor k
5x/0.15	1.0057
10x/0.25	1.0161
10x/0.30	1.0236
20x/0.4	1.0436
20x/0.50 and 50x/0.75	1.0718
50x/0.60	1.1111
50x/0.75 and 100x/0.75	1.2038
50x/0.80	1.2500
50x/0.90 and 100x/0.90	1.3929
100x/0.95	1.5241

Tab. 1: Correction depending on aperture

Example

a = 11 mm; b = 5 mm; λ = 550 nm; objective 20x/0.50

$$SH = \frac{\lambda \cdot b \cdot k}{2a} = \frac{550\ nm \cdot 5\ mm \cdot 1.0718}{22\ mm} = 134\ nm$$

Attention:

- If the step and its surroundings are made from different materials, the phase jumps characteristic for the material must be considered. For all non-conducting materials, the phase jump is 180°, and for all semi-conductors only slightly different from 180°. Consequently, errors in the step-height determination may be neglected. However, if metals on top of glass are investigated, the results may become erroneous. The phase jumps given in table 2 were calculated for vertical light incidence and compact materials. They can serve as approximate values, since the phase jumps depend on the layerthickness and the angle of incidence of the light. An accurate determination of the layer thickness is possible only when the complete sample is covered with a homogeneous layer and the path differences are measured.
- If the layers and the steps are transparent, as with silicon dioxide on silicon, for example, the interference stripes can change their colors, so that the determination of the order of the interference may become problematic. This complication can be avoided if the sample is covered with a homogeneous layer.

Material	Phase jump Φ
Copper	140.0°
Gold	142.5°
Silver	151.0°
Bismuth	151.0°
Nickel	157.0°
Iron	157.5°
Zinc	159.0°
Platinum	160.0°
Aluminum	160.0°
Tin	160.5°
Chrome	165.0°
Coal	160.0°
Graphite	165.0°
Silicon	177.0°
Glass	180.0°

Tab. 2: Calculated phase jumps for compact material and vertical incidence of light

For a thickness measurement (step height), half the difference of the phase jump at the respective interface must be considered:

$$SH = \frac{\Delta}{2} - \frac{\delta\phi}{2}$$

Example: extreme case of copper on glass

$\Phi_{copper} = 140°$, $\Phi_{glass} = 180°$,

consequently, for the additional thickness due to the phase jump we obtain

$$\frac{\delta\phi}{2} = 20°$$

or

$$\frac{\lambda}{18} = 30\ nm$$

Without consideration of the phase jump at the respective interfaces, the thickness value would be too large by 30 nm.

4.11.11 Reflected Light Polarization Contrast

Reflected light polarization contrast is a contrast method suited for cut, polished surfaces of mineral ore, coal, ceramics, special metals, and alloys. Depending on the orientation of the crystals and the sample details, the cut surfaces often react differently when reflected in linearly polarized light.

The illumination light is polarized by the polarizer before passing through the objective onto the sample surface where it is reflected. Then the beam parts experience path differences depending on the structure and polarization of optical rotations which, when passing through the analyzer, are represented by different shades of gray. With the aid of a compensator with a λ-plate the gray contrast can be converted into a color contrast.

Even when examining "dark" sample surfaces, a rotatable λ/4 plate in front of the objective (antireflective cap) helps eliminate the reflections which are inevitable when working with objectives with very low magnification.

A sample is bireflectant when the sample details show differences in brightness and color which change when the direction of vibration of the polarizer or the stage is rotated. For samples with low bireflectance using the analyzer with a rotatable lambda plate is recommended.

4.11.12 Reflected Light Fluorescence Contrast

The reflected light fluorescence contrast method is used to show fluorescent substances in typical fluorescent colors in high contrast. The light originating from a high-performance light source in a reflected light fluorescence microscope passes through a heat protection filter onto an excitation filter (bandpass). The filtered short-wave excitation radiation is reflected by a Dichroic Beam splitter and is focused on the sample through the objective. The sample absorbs the short-wave radiation before emitting longer-wave fluorescence radiation (Stokes' Law). This radiation is then captured from the image side by the objective and passes through the Dichroic Beam splitter. Last, the beams pass through a emission filter (longpass/bandpass) and only the long-wave radiation emitted by the sample passes.

The spectra of the excitation and the emission filter must match very closely. They must be inserted in a Reflector Module FL EC P&C reflector module together with the according Dichroic Beam splitter.

5 Installation

Perform only the installation work described in this document. All other installation work not described may only be carried out by an authorized ZEISS service representative.

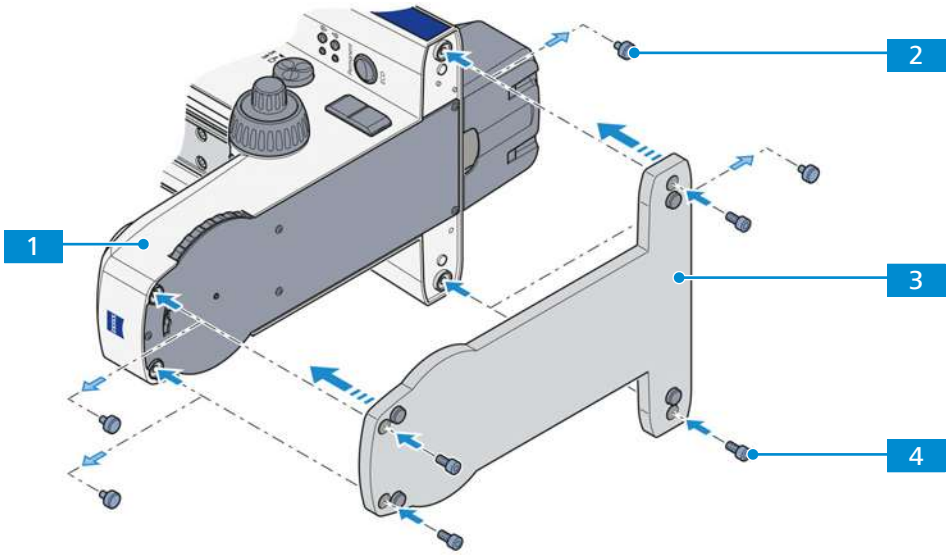
5.1 Unpacking and Setting up the Microscope

Procedure

1. Open the packaging.
2. Take the microscope, all assemblies, and accessories out of the packaging.
3. Check them for completeness as per delivery note.
4. Check all parts for damaging.
5. Place the microscope on a vibration-free, level, and non-inflammable surface.

It is recommended to keep the original packing and store it away for later use, e.g. for stowing the microscope during periods of non-use or for returning the microscope to the manufacturer for repair.

5.2 Assembling the Base Plate on the Stand



Parts and Tools

- Hex key, 6.0 mm

Procedure

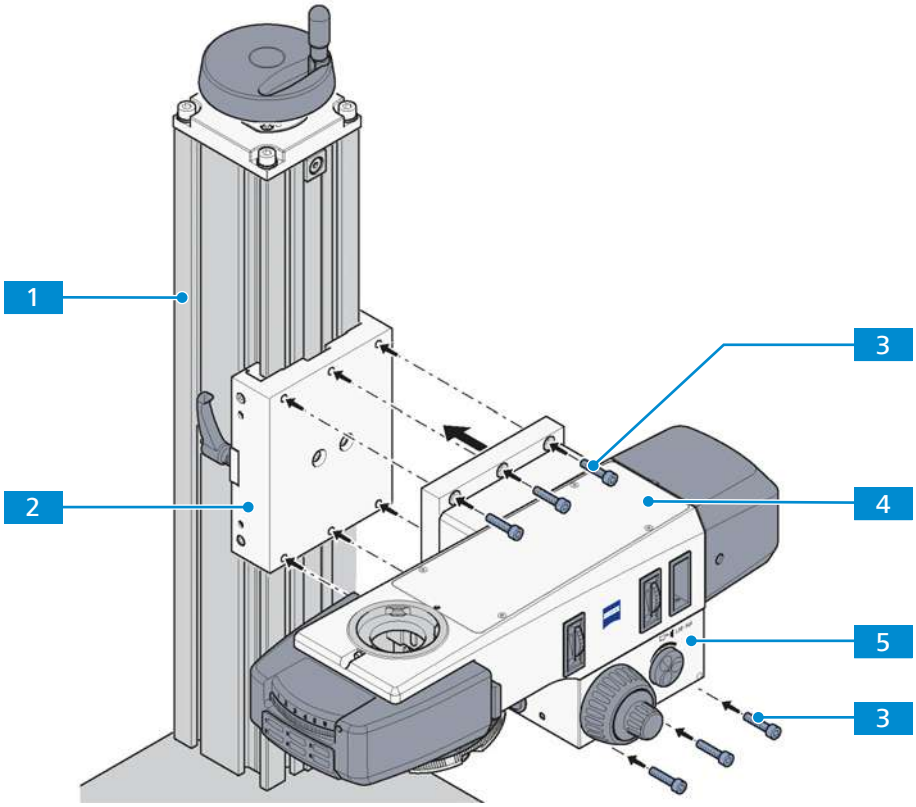
1. Remove the four rubber feet 2 from the base plate of the stand 1.
2. Align the base plate 3 with the stand.
3. Insert four hexagonal socket screws (M6) 4 into the holes in the base plate.
4. Tighten the screws.

Proceed in the reverse order for removal.

5.3 Assembling the Upper Part of the Stand on the Stand Column

The present section applies to the following microscope type:

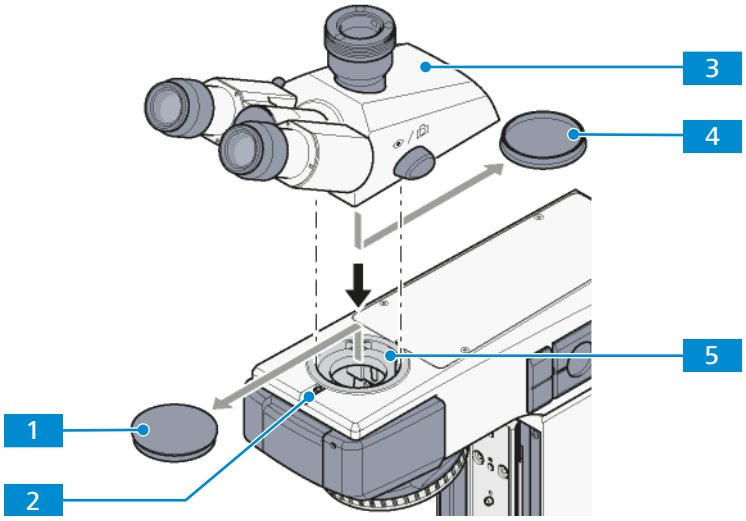
- Axioscope 5 Vario (430035-9150-000)



Procedure

1. Unpack the upper part of the stand 4 with gear box 5 and the stand column 1.
2. Position the upper part of the stand on the mounting plate 2 of the stand column.
3. Tighten the upper part of the stand with six hex screws 3.

5.4 Assembling the Binocular Tube



Parts and Tools

- Hex key, 3.0 mm

Procedure

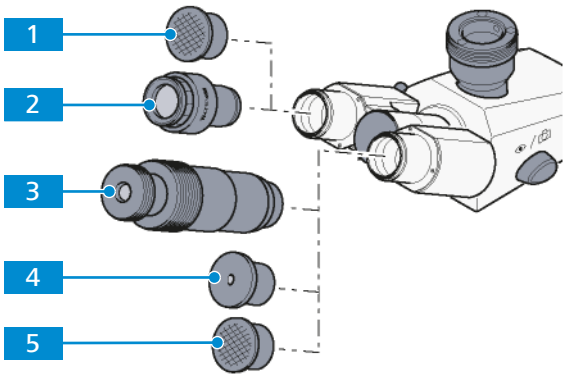
1. Loosen the clamping screw 2.
2. Remove the dust cap 1 from the dovetail ring mount on the stand side.
3. Remove the dust cap 4 from the underside of the tube 3.
4. Hold the tube at an angle, insert it with the dovetail ring into the stand mount 5 and turn into a horizontal position.
5. Rotate the tube into the desired observation position.
6. Re-tighten the clamping screw with the hex key.

Proceed in the reverse order for removal.

5.5 Assembling Components into the Binocular Tube

The following components can be inserted into the tube:

- eyepieces
- auxiliary microscope
- pinhole diaphragm

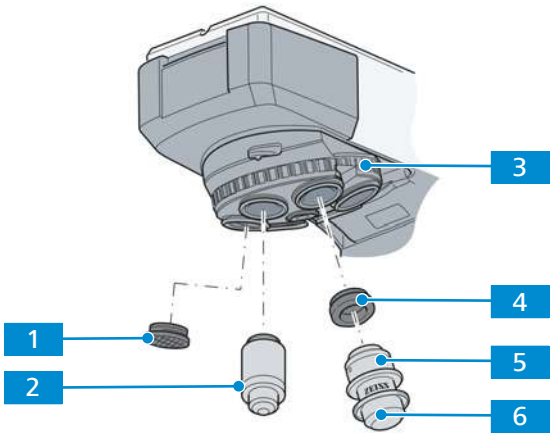


Procedure

1. Remove both dust caps 1 / 5 from the tube.
2. Remove both eyepieces 2 from the box and insert them into the eyepiece socket of the tube to the stop.
   NOTICE **Before inserting Pol eyepieces with tubes without upright reticles, the orientation screw on the reverse side of the eyepieces must be unscrewed. The eyepieces cannot otherwise be fully inserted.**
3. Instead of an eyepiece insert an auxiliary microscope 3 or pinhole diaphragm 4 in one eyepiece socket.

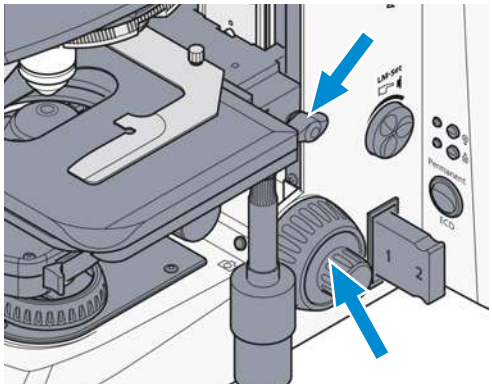
Proceed in the reverse order for removal.

5.6 Assembling the Objectives



Procedure

1. Use the focus drive to fully lower the mechanical stage or lower the stage carrier by loosen the clamping handle.



2. Remove the dust protection caps 1 from the appropriate openings in the nosepiece.
3. Remove objectives 2 from the case and screw them into the nosepiece 3.
4. Carefully screw the objective into the opening. Start with the smallest magnification factor (set up clockwise) in nosepiece position 1.
5. Make sure it engages properly in the nosepiece's thread.
6. Instead of an objective, the sample marker 5 with an adapter W0.8/M27 4 can be screwed on in any desired nosepiece position.
7. Apply the protective cap 6 to prevent sample marker from drying out.
8. Always replace the dust protection caps on any empty positions on the nosepiece.

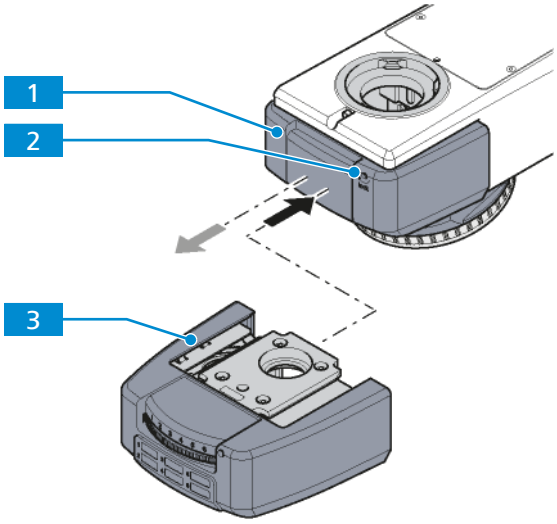
NOTICE

Dust-sensitive components

If dust-sensitive components e.g. unused nosepiece openings remain uncovered, particles may enter the microscope and may damage its optics and mechanics permanently.

- Always close unused nosepiece openings with blind caps.

5.7 Assembling the Reflector Turret



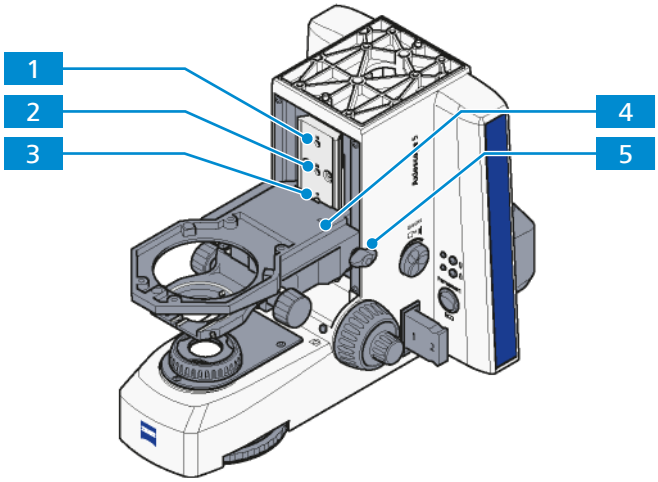
Parts and Tools Hex key, 3.0 mm

Procedure

1. Insert the hex key into the hole 2.
2. Turn the locking screw counterclockwise.
3. Remove the cover cap 1 to the front.
4. Push the reflector turret 3 with the reflector modules P&C (e.g. reflector turret with 6 coded positions) into the upper part of the stand until it stops.
5. Hold the reflector turret and tighten the locking screw.

Proceed in the reverse order for removal.

5.8 Assembling the Stage Carrier



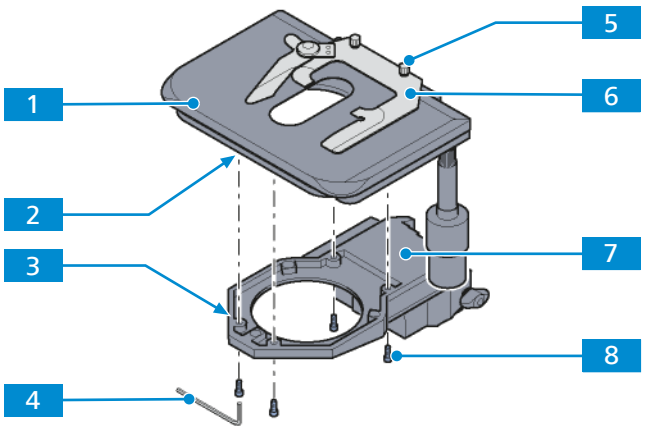
Procedure

1. Screw the shoulder screw 3 into the appropriate opening of the stand.
   - → Opening with mark **0** 3: **No** sample space extension is mounted.
   - → Opening with mark **30** 2: The sample space extension for **30 mm** is mounted.
   - → Opening with mark **60** 1: The sample space extension for **60 mm** is mounted.
2. Loosen the wing screw 5.
3. Insert the stage carrier 4 at a slight angle (beneath the shoulder screw) from the left into the guide.

4. Push the stage carrier straight in.
5. Tighten the wing screw 5 slightly.
6. Push the stage carrier along the guide upward until it engages in the shoulder screw.
7. Tighten the wing screw.
8. Check to ensure that the stage carrier is accurately positioned.

5.9 Assembling the Stage

5.9.1 Assembling the Stable Mechanical Stage and Specimen Holder



Parts and Tools

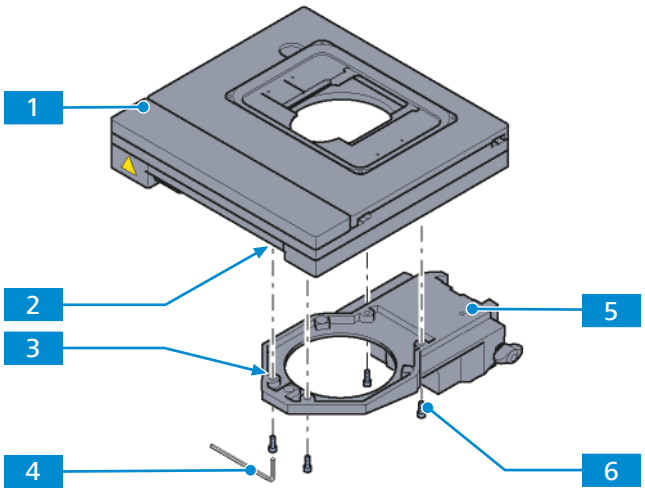
- Hex key, 3.0 mm

Procedure

1. Place the stage 1 on the stage carrier 7 so that the threaded holes 2 on the bottom of the stage are positioned above the stage carrier openings 3 and hold the stage.
2. Insert four fastening screws 8 through the stage carrier from below and screw them into the bottom of the stage. Use the 3 mm hex key 4.
3. Turn the stage to orient it in an XY direction and tighten the fastening screws.
4. Place the sample holder 6 on the stage and fasten the two clamping screws 5.

Proceed in the reverse order for removal.

5.9.2 Assembling the Motorized Mechanical Stage on the Axioscope 7 Motorized Material Stand

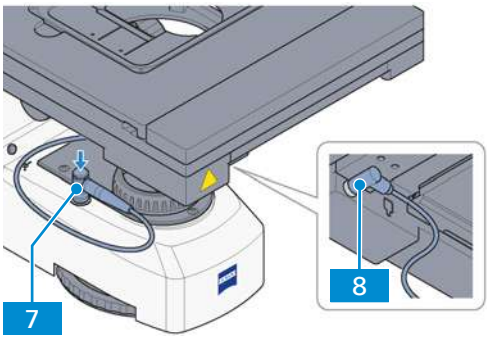


Parts and Tools Hex key, 3.0 mm

Prerequisite ✓ *The stage carrier is removed [▸ 68]* 5 from the stand.

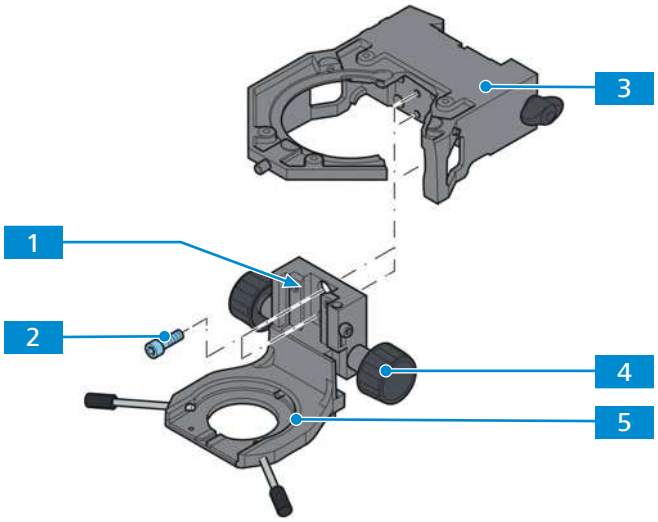
Procedure

1. Turn the stage 1 and the stage carrier upside down carefully.
2. Match the threaded holes 2 in the bottom of the stage to the corresponding holes 3 in the carrier.
3. Insert the four mounting screws 6 into the holes of the stage carrier.
4. Align the stage in XY-direction.
5. Tighten the screws. Use a 3 mm hex key 4.
6. Install the stage carrier together with the stage on the stand.
7. Plug the power cord connectors into the sockets on the stage 8 and on the stand 7.



Proceed in the reverse order for removal.

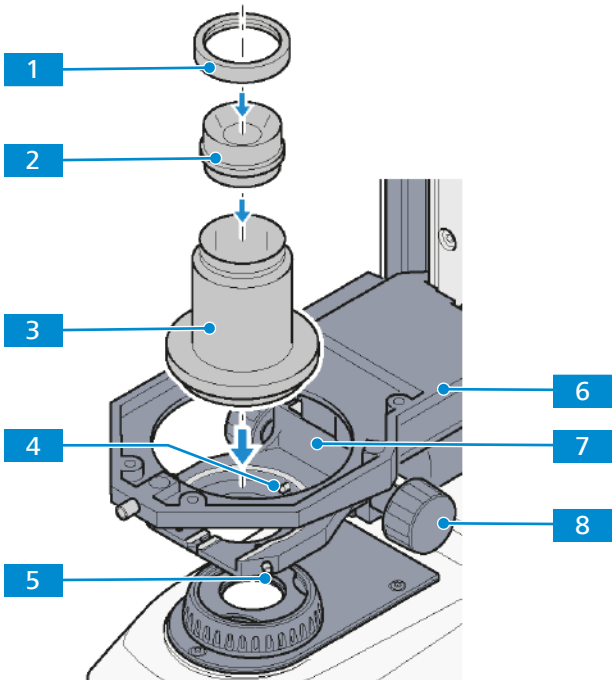
5.10 Installing the Condenser Carrier



Procedure

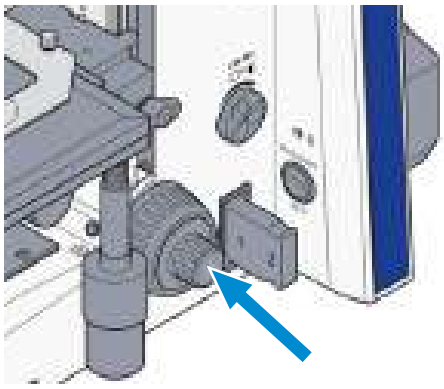
1. With the focus knob 4 slide the guide of the condenser carrier 5 until the two screws 2 in the mounting holes 1 become accessible.
2. Mount the condenser carrier on the stage carrier 3.
3. Tighten the screws.
4. Slide the condenser carrier firmly and straight up to the upper stop of the stage carrier.

5.11 Assembling the Dry Darkfield Condenser



Procedure

1. Carefully move the stage carrier 6 with the focusing drive to the upper stop position.
   NOTICE Damage due to collision. Make sure that the stage does not collide with the objective.



2. Using the knurled knob 8 for vertical adjustment, push the condenser carrier down as far as it will go.
   NOTICE Damage due to collision. If using a low-power system, make sure that this does not come to rest on the luminous-field diaphragm.
3. Unscrew both centering screws 5 on the condenser carrier 7 until their ends are no longer visible.
4. Insert the darkfield condenser 2 in the condenser holder Z 3.
5. Fix the darkfield condenser with the fastening ring 1.
6. Press the condenser holder Z with the dovetail ring against the mainspring 4 of the condenser carrier until the condenser holder Z sits horizontally on the condenser carrier.
7. Screw in the centering screws until they engage with the dovetail ring of the condenser holder Z.

5.12 Assembling the Transmitted Light Source

Different light sources can be mounted for transmitted light:

- *HAL 100 [▸ 133]*
- *LED 10 [▸ 145]*

5.13 Assembling the Reflected Light Source

Different light sources can be mounted for reflected light:

- *HAL 100 [▸ 134]*
- *LED 10 [▸ 145]*
- *HBO 100 [▸ 141]*
- *Colibri 3 [▸ 146]*
- *HXP 120 V [▸ 144]*

5.14 Connecting the Microscope to the Mains

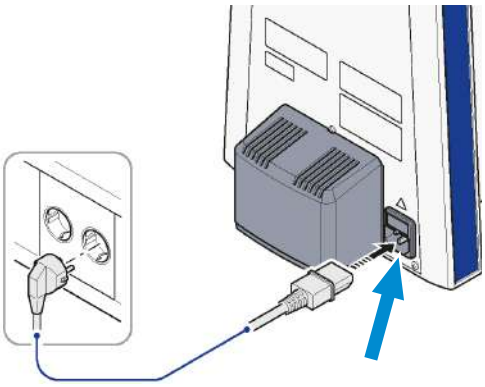
Prerequisite

✓ The microscope is switched off.

✓ The power cord is unplugged.

Procedure

1. Connect the power cord to the mains socket of the stand.



2. Connect the power cord to the mains.

Proceed in the reverse order for disconnecting the microscope from the mains.

6 Operation

This chapter describes switching on/off the microscope as well as the first operating steps with the microscope.

Info

For additional information and detailed descriptions, refer to further applicable documents or ask your ZEISS Sales & Service Partner.

Info

Further information on the software and its operation is available in the software's online help.

6.1 Prerequisites for Commissioning and Operation

The following basic prerequisites are necessary for commissioning and operation:

- This document was read prior to commissioning or operation and kept for further use.
- The chapter **Safety** was read and understood.
- The operator is acquainted with the general Windows-based programs.
- If required: Basic training and safety briefing were successfully completed.

6.2 Switching On the Microscope

Prerequisite

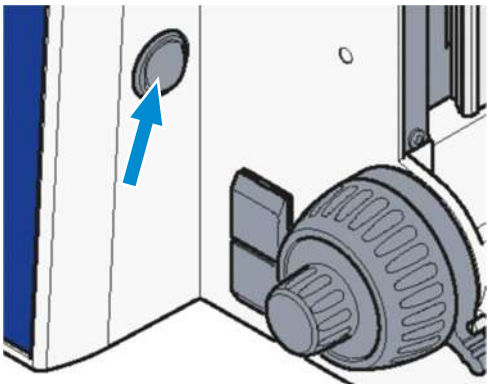
✓ The microscope is connected to the *mains [▸ 72]*.

✓ The required light source for transmitted light is *installed [▸ 72]*.

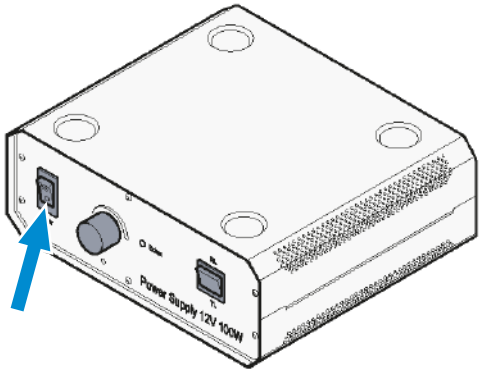
✓ The requiredlight source for reflected light is *installed [▸ 72]*.

Procedure

1. Switch the microscope on using the **power switch On/Off** on the left side.



2. If HAL 100 or HBO 100 light sources are used, switch on the external power supply for the light source.



3. If used, switch on the HXP 120 V light source. Consult the instruction manual supplied with the light source.

6.3 Adjusting

6.3.1 Adjusting the Position of the Eyepieces

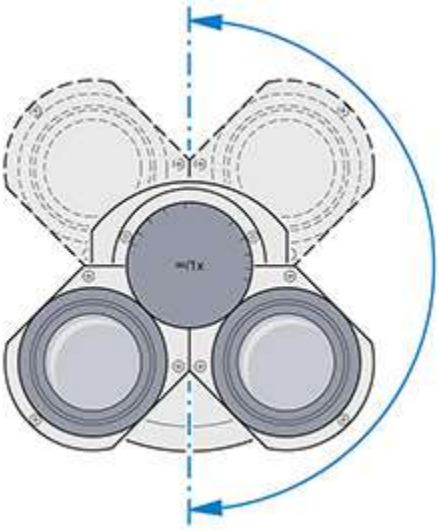
Info

The adjustment of the interpupillary distance is correct when you see only one round image while looking through the two eyepieces.

Procedure

1. Set the interpupillary distance by rotating the eyepiece tubes symmetrically toward or away from one another.

2. Set the viewing height by swivelling the whole eyepiece unit a full 180 ° upwards or downwards.



6.3.2 Focusing when Using Eyepiece Reticles

Prerequisite

- ✓ Two adjustable eyepieces are installed.
- ✓ One eyepiece with reticle is installed.
- ✓ A sample is positioned on the stage.

Procedure

1. Look through the eyepiece with the reticle. Focus the line of the reticle using the focusing ring of the eyepiece.
2. Look through the eyepiece with the reticle. Focus the sample with the focusing drive.
   → Both the microscopic image and the eyepiece reticle are in focus now.
3. Look through the eyepiece without reticle with your other eye. Focus the sample using the focusing ring of the eyepiece.

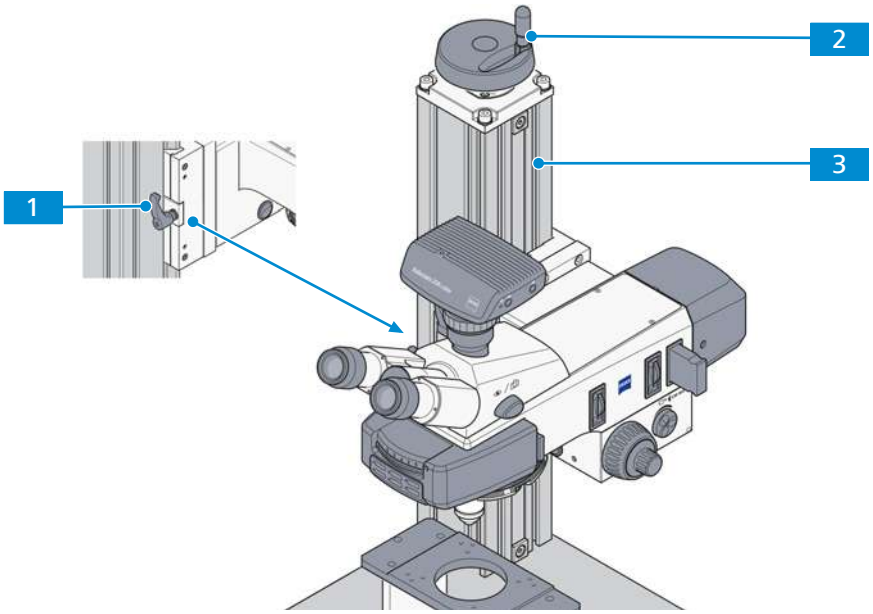
↳ Both microscopic images including the eyepiece reticle are in focus now.
From this point, use only the focusing drive for any subsequent focusing activity.

6.3.3 Adjusting the Upper Part of the Stand Vertically

The present section applies to the following microscope type:

- Axioscope 5 Vario (430035-9150-000)

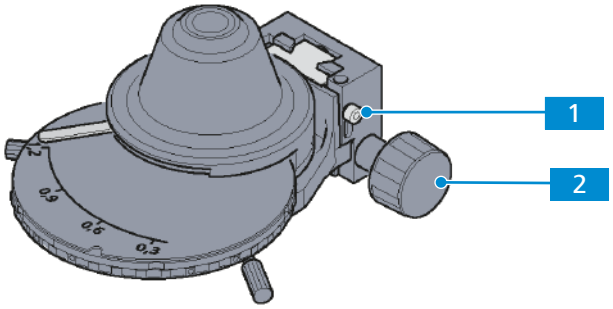
The height of the upper part of the stand can be adjusted according to the size of the sample.



Procedure

1. On the stand column 3, loosen the release lever 1.
2. Use the handwheel 2 to adjust the height.
3. Tighten the release lever.

6.3.4 Adjusting the Height Stop on the Condenser Carrier



Parts and Tools

- Hex key, 3.0 mm

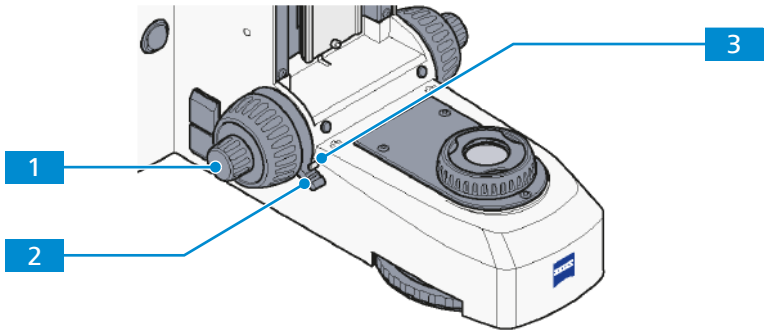
Prerequisite

- ✓ The microscope is operational.
- ✓ The condenser carrier is *installed [▸ 70]*.
- ✓ A sample is positioned on the stage.

Procedure

1. Loosen the set screw of the height stop 1.
2. Focus the sample.
3. Close the luminous-field diaphragm.
4. Adjust the condenser vertically 2 until you get a sharp image.
5. ***NOTICE*** **The sample and the objective can be damaged when the sample is lifted out.**
   Carefully raise the condenser by a small amount without lifting out the sample.
6. Tighten the set screw of the height stop.

6.3.5 Adjusting the Height Stop on the Focusing Drive



Prerequisite

✓ The microscope is operational.

✓ A sample is positioned on the stage.

Procedure

1. Turn the clamping lever of the height stop 2 counterclockwise, towards the pin stop 3.
2. Use the focusing drive 1 to move the stage to the highest position allowable without risking to collide with sample holder or objective.
3. By turning the clamping lever clockwise, clamp the stop again.

6.3.6 Using the Light Manager Function

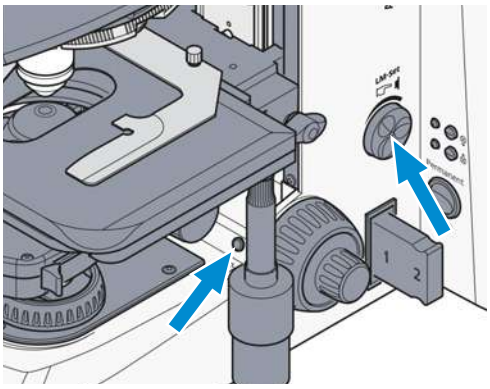
6.3.6.1 Enabling the Light Manager Function

Prerequisite

✓ The microscope is operational.

Procedure

1. Press one of the **Snap** button and the **Intensity/LM** knob simultaneously for at least 1.5 seconds.



→ The indicator light blinks in the following sequence: GREEN / GREEN / GREEN

6.3.6.2 Saving Light Intensity Values Using the Light Manager Function

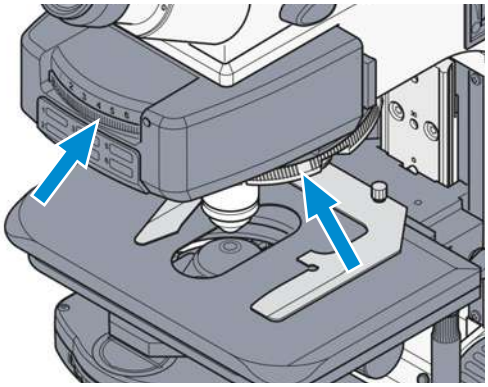
Prerequisite

✓ The microscope is operational.

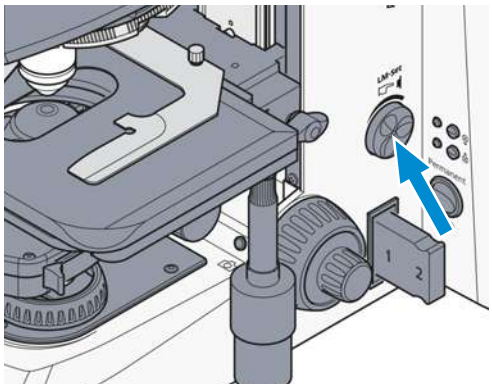
✓ The Light Manager function is *enabled [▸ 76]*.

Procedure

1. Switch to the first objective and/or reflector (if available) positions of interest using the knurled rings (or slider).



2. Set the desired light intensity by turning the **Intensity/LM** knob.



3. Press the **Intensity/LM** knob for at least 1.5 seconds.
   → The light intensity for this objective/reflector combination is saved.
   → When using LED as light source, the LED is switched off for 300 ms. This is visible through the eyepieces and serves as an indicator for the user.
4. Switch to the second objective/reflector position.
5. Press the **Intensity/LM** knob for at least 1.5 seconds.
   → Now a ratio between the first and the second objective/reflector combinations is established.
6. Repeat to set light intensity values for more objective/reflector combinations.

↳ After switching on the microscope, the previous setting of the Light Manager will be restored.

6.3.6.3 Enabling/Disabling the Dazzle Protection Function

By factory default, the dazzle protection function is enabled.

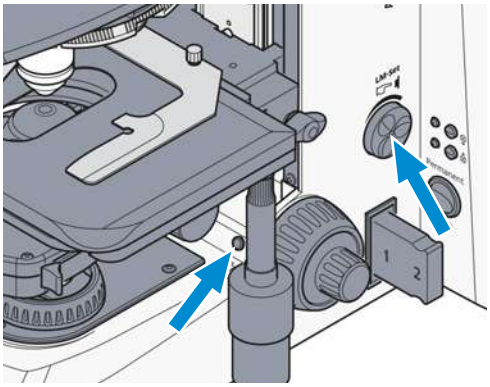
Procedure

1. Axioscope 5: Press the left **Snap** button and the right **Snap** button simultaneously for at least 1.5 seconds to switch between enabled and disabled dazzle protection function.
   Axioscope 7: Press the left **Stage control** button and the right **Snap** button simultaneously for at least 1.5 seconds to switch between enabled and disabled dazzle protection function.
   → Dazzle protection function disabled: The indicator light blinks ORANGE twice.
   → Dazzle protection function enabled: The indicator light blinks GREEN twice.

6.3.6.4 Disabling the Light Manager Function

Prerequisite
- ✓ The microscope is operational.
- ✓ The Light Manager function is *enabled [▸ 76]*.

Procedure
1. Press one of the **Snap** button and the **Intensity/LM** knob simultaneously for at least 1.5 seconds.

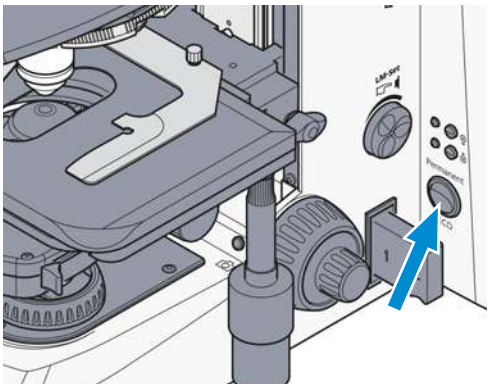


→ The indicator light blinks in the following sequence: GREEN / ORANGE / GREEN

6.3.7 Setting the ECO/Permanent Mode

Prerequisite
- ✓ The microscope is operational.

Procedure
1. Select the ECO or Permanent mode for microscope illumination using the **ECO/Permanent mode** switch.



6.4 Setting Up for Transmitted Light Contrast Techniques

6.4.1 Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method

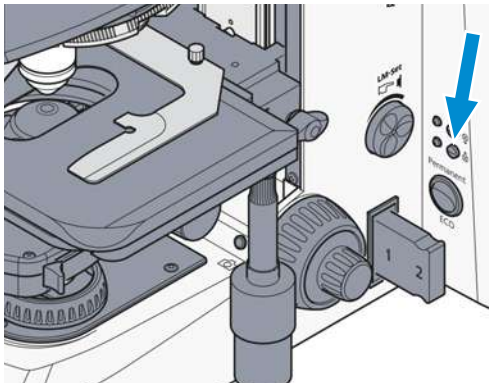
- High-contrast sample slide

Every microscope (except the one with the Vario stand column) is configured to work with the transmitted light brightfield method. All available condensers (except special condensers like darkfield condensers) can be used for the transmitted light brightfield method.

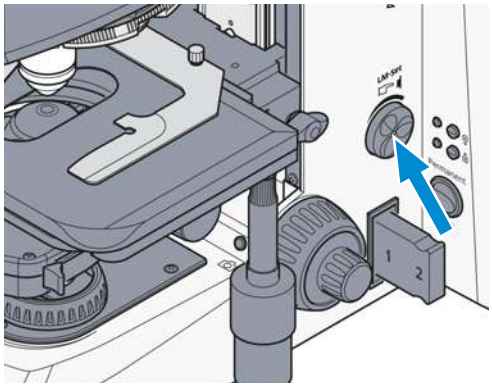
Prerequisite
- ✓ The microscope is operational.
- ✓ The height stop of the condenser carrier is *adjusted [▸ 75]*.
- ✓ The height stop of the focusing drive is *adjusted [▸ 76]*.
- ✓ A suitable condenser for TL brightfield microscopy is installed.

Procedure

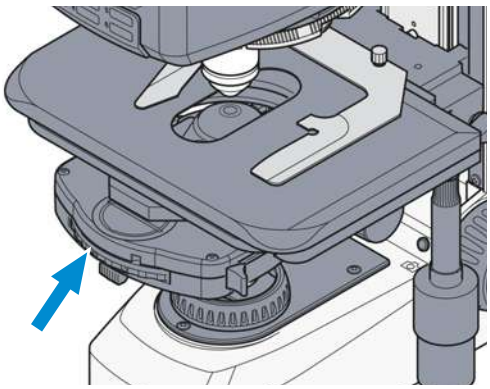
1. If required, push the **TL** button for transmitted light illumination.



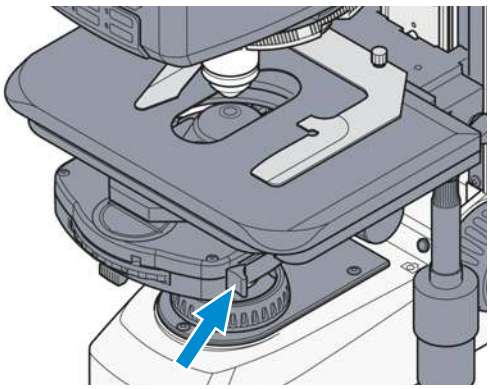
2. Adjust the image brightness using the **Intensity/LM** knob on the microscope stand.



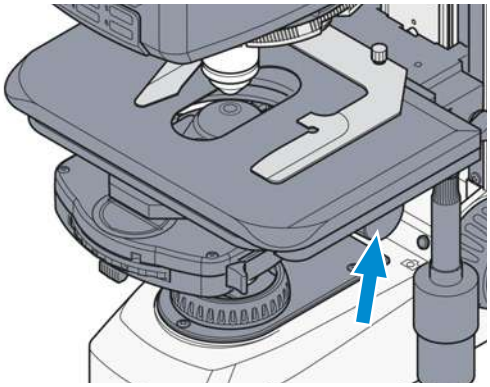
3. Insert the high-contrast sample into the sample holder of the stage.
4. Set position H (or B = brightfield), when using condensers with a turret/modulator disk and knurled ring.



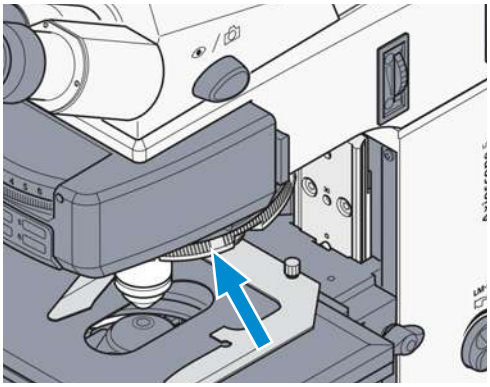
5. Swivel the front lens into the beam path with ≥ 10x objectives, if condensers with a swiveling front lens are used.



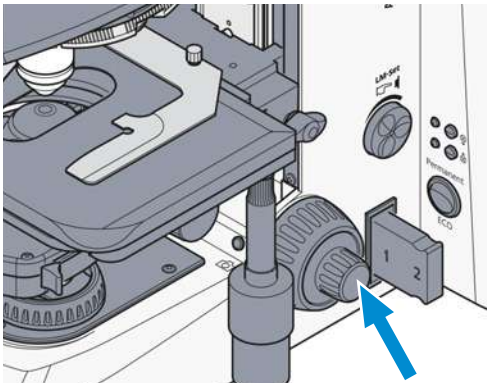
6. Set the condenser with the knurled knob for vertical adjustment to the upper stop.



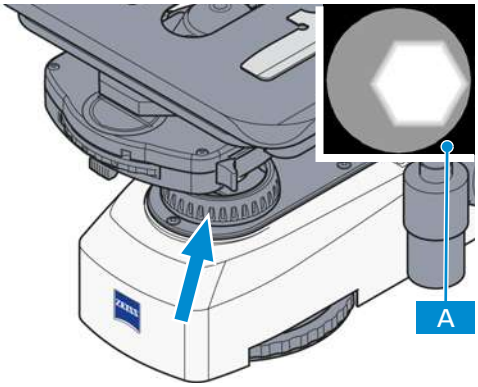
7. Swivel in the 10x objective on the nosepiece.



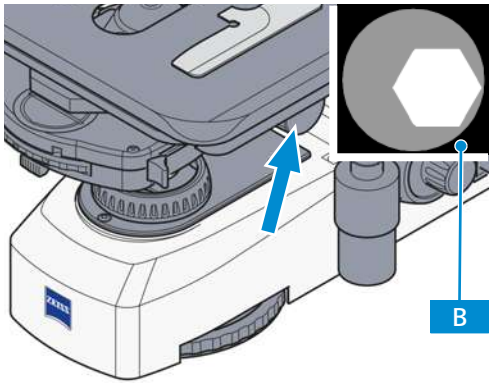
8. Focus the sample.



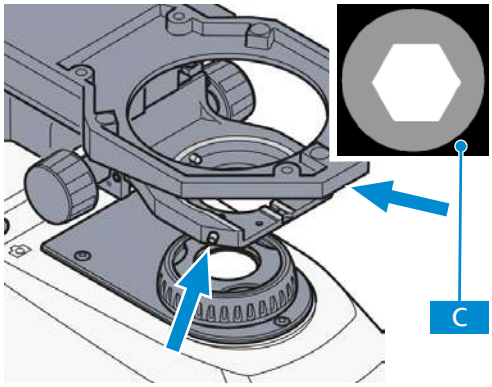
9. Close the luminous-field diaphragm until it is visible (even if not in focus) in the field of view A.



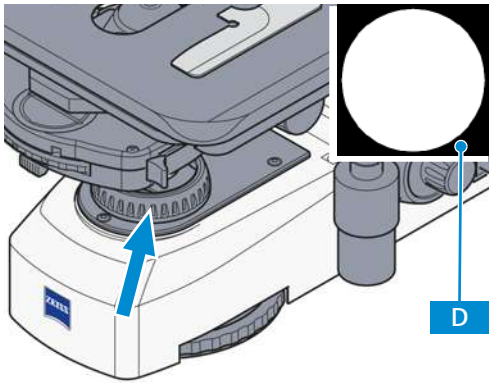
10. Turn the knurled knob for vertical adjustment to lower the condenser until the edge of the luminous-field diaphragm appears in focus B.



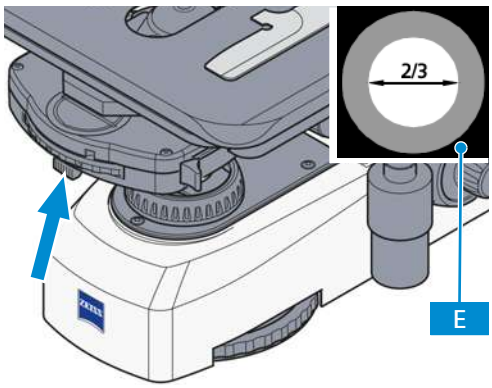
11. Center the luminous-field diaphragm using the two centering screws on the condenser carrier C.



12. Open the luminous-field diaphragm until the edge of the diaphragm just disappears from the field of view D.



13. Remove an eyepiece from the binocular tube to adjust the aperture diaphragm (contrast).
14. Look into the tube with the naked eye.
15. Set the aperture diaphragm with the adjusting lever to between 2/3 - 4/5 of the diameter of the exit pupil of the objective E.



→ In most applications, this aperture diaphragm setting provides optimal contrast at almost ideal resolution, and is therefore the best compromise for the human eye.

16. Reinsert the eyepiece into the binocular tube.
17. Remove the high-contrast sample.

Info

Every change of objective will result in a change in sample field size and objective aperture, together with a possible slight change in centering, so that for optimal results the field and aperture stop adjustments must be repeated.

With objectives < 10x, the front lens of the condenser (if swivelable) must be swivelled out of the beam path and the aperture stop completely opened. For better contrast with such large object fields, the field aperture should be closed to a certain extent. Overclosing should be avoided so as not to impair the uniformity of the illumination of the field of view.

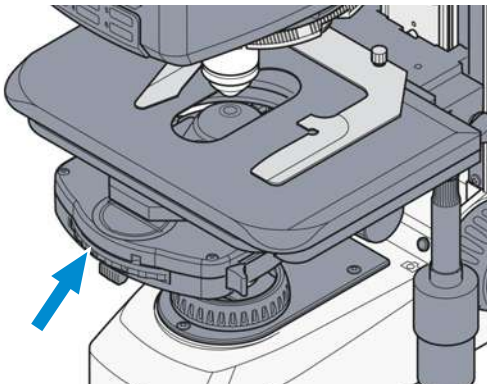
6.4.2 Setting Up for Transmitted Light Darkfield Microscopy Using the KÖHLER Method

Prerequisite

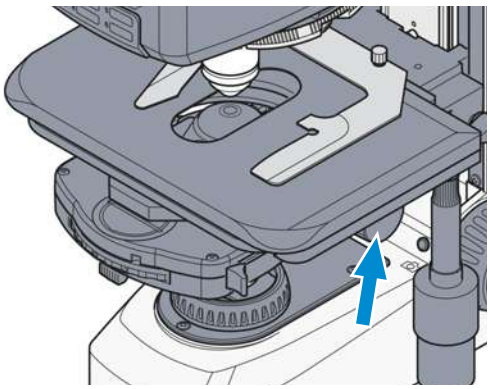
- ✓ The microscope is operational.
- ✓ The height stop of the condenser carrrier is *adjusted [▸ 75]*.
- ✓ The height stop of the focusing drive is *adjusted. [▸ 76]*
- ✓ A suitable condenser for transmitted light darkfield microscopy is *installed [▸ 71]*.
- ✓ The illumination is adjusted for *transmitted light brightfield microscopy [▸ 78]*.

Procedure

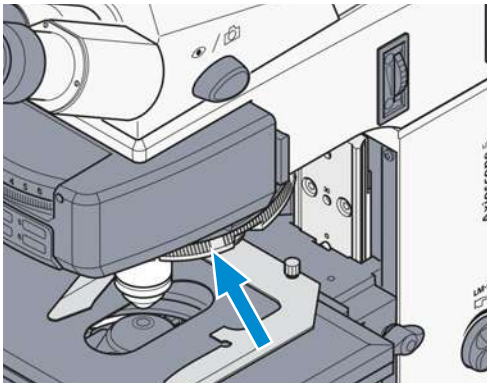
1. Set the modulator disk to position D (or DF = darkfield).



2. Turn the knurled knob for vertical adjustment of the condenser to the upper stop.

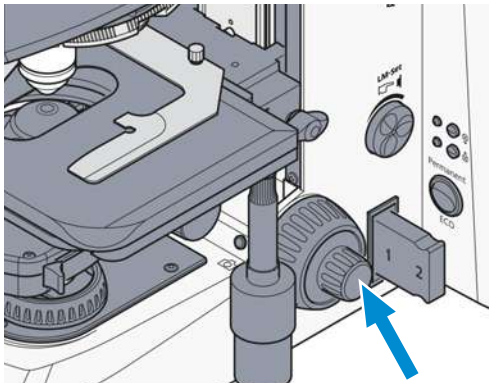


3. Swivel the objective with the highest possible aperture into position on the nosepiece.

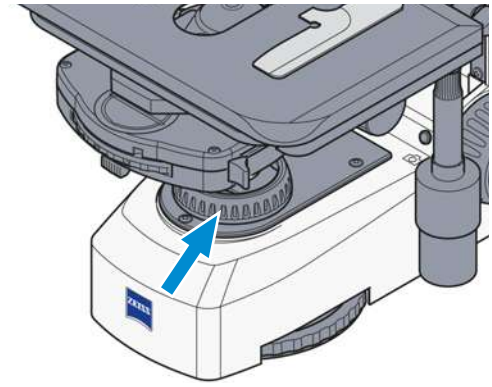


4. Place the sample on the stage.

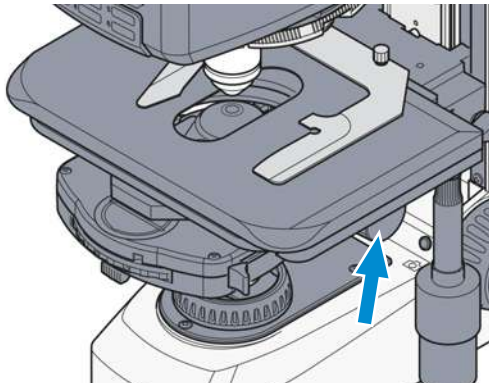
5. Focus the sample.



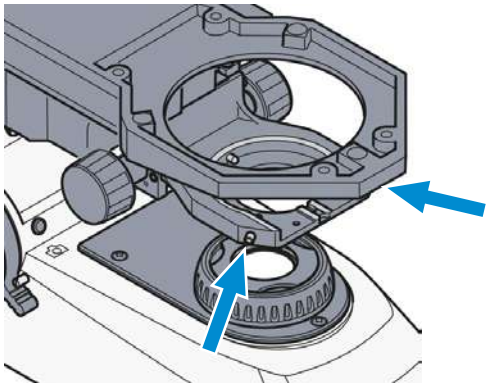
6. Close the luminous-field diaphragm enough to make it visible in the field of view (even if blurred).



7. Lower the condenser until the edge of the luminous-field diaphragm appears sharp using the knurled knob for vertical adjustment.



8. Center the luminous-field diaphragm on the condenser carrier using the adjustment screws.



9. Open the luminous-field diaphragm enough to make the edge of the diaphragm disappear from the field of view.
10. Remove one eyepiece or replace it with the auxiliary microscope.
11. Check the centering of the darkfield diaphragm in the objective exit pupil.
    → The objective exit pupil must appear homogeneously dark.
12. If necessary, *center [▸ 189]* the darkfield diaphragm.
13. If required, remove the auxiliary microscope.
14. Insert the eyepiece.

15. Adjust the condenser height using the knurled knob for vertical adjustment until no more lighter areas are visible in the field of view .
16. Adjust the luminous-field diaphragm diameter to the size of the field of view.

> **Info**
>
> Darkfield microscopy requires samples to be considerably cleaner than in other techniques. In particular, fingerprints, dirt or dust particles have a negative effect, as they brighten the background of the field of view and decrease the contrast of the object image.

6.4.3 Setting the Darkfield Contrast with a Dry Darkfield Condenser

Prerequisite

- ✓ The microscope is operational.
- ✓ The dry darkfield condenser is *installed [▸ 71]*.
- ✓ Low-power system, polarizer or Lambda plate are swivelled out of the beam path.

Procedure

1. Move the condenser up until the end stop.
2. Place the sample on the stage.
3. Adjust the illumination intensity sufficiently bright.
4. Swivel in an objective with small magnification (e.g. 5x or 10x)
5. Focus the sample.
6. Place a sample so that its details are evenly visible in the field of view.
   → The image of the field diaphragm is easier to identify.
7. Close the luminous-field diaphragm until the end stop.
8. Lower condenser until the edge of the field diaphragm appears sharp (luminous-field diaphragm focus level).
   → An increasing or decreasing light ring is visible, when moving the focus upwards or downwards from the field diaphragm focus level (so called circular "breathing" of the field diaphragm depiction).
9. Center the field diaphragm image with both centering screws on the condenser carrier.
10. Swivel in the desired objective.
11. If necessary, focus the sample.
12. Focus the luminous-field diaphragm with the knurled knob for vertical adjustment.
13. Open the luminous-field diaphragm enough to make the edge of the diaphragm disappear from the field of view.

6.4.4 Setting the Darkfield Contrast with an Immersion Oil Darkfield Condenser

Prerequisite

- ✓ The microscope is operational.
- ✓ An immersion oil darkfield condenser is *installed [▸ 71]*.
- ✓ An immersion oil objective is installed.
- ✓ Low-power system, polarizer or Lambda plate are swivelled out of the beam path.

Procedure

1. Move the condenser up until the end stop.
2. Place a drop of immersion oil (without bubbles, if possible) on the center of the condenser front lens.
3. Place the sample on the stage.
   → The immersion oil disperses between the condenser and the sample holder.
4. Slightly move the mechanical stage back and forth to dissipate any air bubbles in the immersion oil.
5. Adjust the illumination intensity sufficiently bright.
6. Open the luminous-field diaphragm completely.

7. Swivel in an objective with small magnification (e.g. 10x).
8. Focus the sample.
9. Center the luminous-field diaphragm on the condenser carrier with the adjustment screws.
10. Focus the sample.
11. Place a drop of immersion oil on the sample.
12. Swivel in an immersion oil objective.
13. Focus the sample.
14. Close the luminous-field diaphragm until the end stop.
15. Lower the condenser until the edge of the field diaphragm appears sharp (luminous-field diaphragm focus level).
16. Center the field diaphragm on the condenser carrier with the adjustment screws.
    → The luminous field diaphragm appears only as a circle segment on the edge of the viewing field due to the high magnification of the immersion oil objective. As a result, the focusing and centering of the field diaphragm must be repeated.
    The field diaphragm is centered properly, when the edge of the luminous field diaphragm is centered or equidistant from the viewing field edge.
17. If the light intensity is too low, open the luminous-field objective slightly.
18. For a sharply focused sample, open the sharply set field diaphragm enough to make the edge of the diaphragm disappear from the field of view.
19. Adjust the focus level of the condenser with the knurled knob for vertical adjustment to improve the contrast.
20. For immersion oil objectives with an iris diaphragm, the contrast can be further optimized by turning the adjustment of the iris diaphragm.

6.4.5 Setting Up for Transmitted Light Phase Contrast Microscopy

Prerequisite

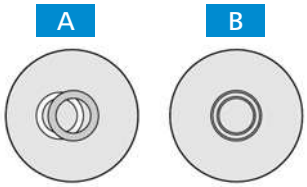
✓ The microscope is operational.

✓ Phase contrast objectives with the phase rings **PhC 1**, **PhC 2** or **PhC 3** are *installed [▸ 67]*.

✓ Condenser with modulator disk with centerable ring diaphragms **PhC 1**, **PhC 2** and **PhC 3** is *installed [▸ 163]*.

Procedure

1. Swivel the phase contrast objective into the beam path (e.g. **Ph1**).
2. Swivel in the annular phase diaphragm on the condenser's revolver disk with the same labeling as the objective (e.g. **Ph1**)
3. *Replace one eyepiece [▸ 66]* with an auxiliary microscope.
4. With the adjusting fixture on the auxiliary microscope, focus the annular phase diaphragm and the phase ring in the objective exit pupil.
5. Check the centering and the overlap of the lighter annular phase diaphragm (in the condenser) with the darker phase ring (in the objective).
   Both rings must be centered and overlapping B.



6. If the overlap is not exact A, *recenter [▸ 190]* the lighter annular phase diaphragm.
7. Remove the auxiliary microscope and replace the eyepiece.

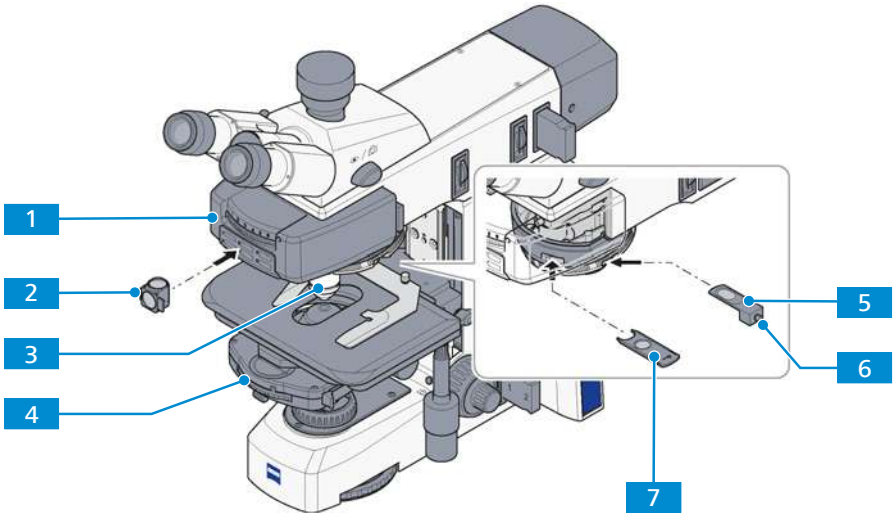
Info

To increase the image contrast, a green 32 x 4 interference broadband filter can be mounted on the field stop or inserted into the color glass carrier (if available).

6.4.6 Setting Up for Transmitted Light DIC Microscopy

Info

The DIC method works with polarized light. It is disturbed when birefringent elements, e.g. foils, are put between polarizer and analyzer, as is sometimes done when doing a histological incision. The same situation occurs with Petri dishes or sample holders which have a plastic base. In these cases we recommend using the PlasDIC method.



Prerequisite

- ✓ The microscope is operational.
- ✓ Objective equipped with DIC fixtures, e.g. EC Plan-NEOFLUAR, is *installed [▸ 67]*.
- ✓ Nosepiece with slot for DIC slider is installed.
- ✓ DIC slider, compatible with the objectives in use, is available.
- ✓ Condenser with turret disk containing DIC prisms (e.g. condenser, achromatic-aplanatic 0.9 H D PhC DIC) is installed.
- ✓ The analyzer module ACR P&C for transmitted light in the reflector turret/slider or the analyzer slider D/A fixed or rotatable in conjunction with a mounted intermediate plate for analyzer slider 12x46 is installed.

Procedure

1. Swivel the DIC compatible objective 3 into the beam path.
2. Slide the according DIC slider into the slit of the appropriate objective position.
3. Swing in the analyzer module 2 on the reflector turret 1 (or slide the analyzer slider 7 into the intermediate plate for analyzer sliders).
4. On the condenser 4, swing in the DIC prism (use position **DIC**).
5. Adjust field diaphragm and aperture diaphragm according to the *KÖHLER method [▸ 78]*.
6. With the knurled screw 6 on the DIC slider 5, adjust the optimal contrast. Symmetrical adjustment of the DIC slider along its middle position lets the sample details appear as if they were elevated or deepened.
7. Put the compensator λ into the opening above the nosepiece to create a chromatic DIC contrast, if required.

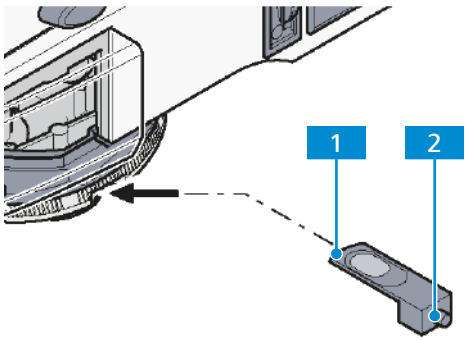
6.4.7 Setting Up for Transmitted Light PlasDIC Microscopy

Prerequisite

- ✓ The microscope is operational.
- ✓ Abbe condenser with modulator disk and objective-dependent 2 mm slit diaphragm for PlasDIC (A-Plan 10x and LD A-Plan 20x) or 4.5 mm slit diaphragm for PlasDIC (in all other cases) is installed.
- ✓ One of the following objectives is *installed [▸ 67]*:
  A-Plan 10x, 20x, 40x;
  LD A-Plan 20x, 32x, 40x;
  LD Plan-Neofluar 20x, 40x, 63x
- ✓ DIC slider, compatible with the objectives in use, is available.
- ✓ The analyzer module ACR P&C for transmitted light in the reflector turret/slider or the analyzer slider D/A fixed or rotatable in conjunction with a mounted intermediate plate for analyzer slider 12x46 is installed.

Procedure

1. Fully open the aperture diaphragm of the condenser.
2. Place the sample on the stage.
3. Swing the condenser position with the 2 or 4.5 mm slit diaphragm for PlasDIC into the beam path.
4. Increase the brightness.
5. Swing in the analyzer module on the reflector turret (or slide the analyzer slider into the intermediate plate for analyzer sliders).
6. Swivel the PlasDIC compatible objective into the beam path.
7. Slide the according DIC slider 1 into the slit of the appropriate objective position.



8. With the knurled screw 2 on the DIC slider, adjust the optimal contrast.
   → The structures are visible in relief or in pseudo-darkfield. The relief display provides the best contrast.

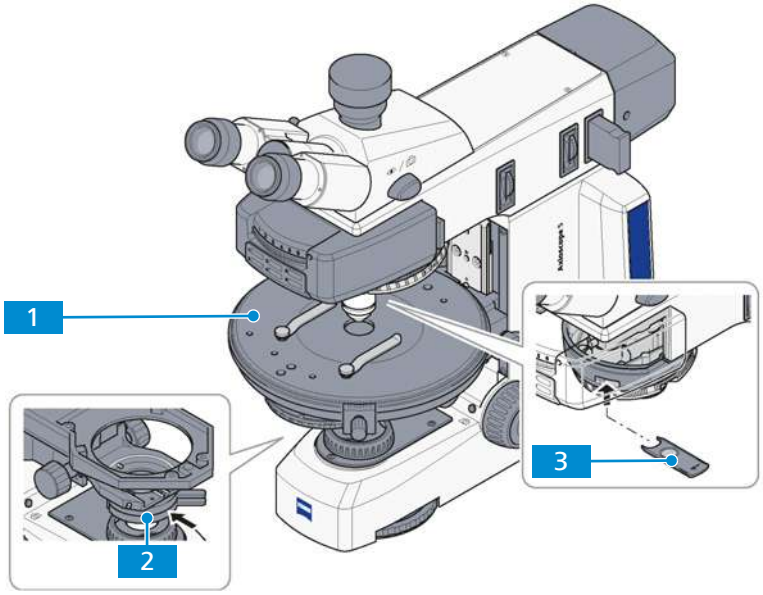
6.4.8 Setting Up for Transmitted Light Polarization

The following requirements must be fulfilled:

- The microscope is operational.
- Strain-free objectives are installed in the *nosepiece [▸ 67]*.
- The Pol rotary stage is *installed [▸ 155]*.
- A condenser with polarizer or the D Polarizer is *installed [▸ 174]*.
- The analyzer module Pol ACR P&C for transmitted light in the reflector turret/slider or the analyzer slider D fixed or with lambda plate is installed.
- A depolarizer for avoiding unwanted polarizing effects is installed.
- The microscope is adjusted for *transmitted light brightfield microscopy [▸ 78]*.
- The Pol rotary stage is *centered [▸ 156]*.
- The Pol objectives are *centered [▸ 179]*.

6.4.8.1 Detecting Birefringence

For more information about the method, see chapter *Detecting Birefringence [▸ 57]*.



Procedure

1. Swing the polarizer 2 into the beam path.
2. When using a rotatable polarizer, position it to 0°.
3. Put the analyzer 3 into the slit for the compensator.
   → The field of view appears dark.
4. Bring the sample into the field of view.
5. With the rotary stage 1, turn the sample.
   → Normally, birefringent (anisotropic) objects will now show the interference color and intensity variations during rotation between crossed polarizers.
   Optically anisotropic substances may remain dark when an isotropic direction, e.g. from optically single-axle or double-axle crystals, is oriented parallel to the observation direction.

6.4.8.2 Determination of the Polarization Direction

For more information about the method, see chapter *Determination of the Polarization Direction [▸ 57]*.

Prerequisite

✓ An eyepiece with cross hair reticle is *installed [▸ 66]*.

✓ The Pol adjustment sample for polarization microscopy is available.

Procedure

1. Swing the polarizer into the beam path.
2. When using a rotatable polarizer, position it to 0°.
3. Put the analyzer into the slit for the compensator or swing analyzer module on the reflector turret/slider.
   → The field of view appears dark.
4. Place the Pol adjustment sample on the microscope.
5. Turn the rotary stage until the adjustment sample appears dark.
6. Remove the analyzer from the beam path.
7. Align the reticle of the eyepiece along the split cracks of the adjusting sample.
8. Return the analyzer into the beam path.
9. Remove the adjustment sample.
   → The forward direction of the polarizer and analyzer is parallel to the cross hair in the reticle (polarizer east-west, analyzer north-south).
10. Turn the rotary stage with the sample, e.g. a synthetic fiber, until the sample reaches maximal darkness.
    → The fiber is parallel to one of the two lines in the cross hair orientation.
11. Turn the rotary stage by approx. 45° until the longitudinal axis of the fiber is pointing in northeast-southwest direction.
    → The sample shows the strongest brightness (diagonal position). It can have any color in this position.
12. Slide in the lambda compensator (possible only if used with screw-in analyzer in tube or intermediate plate).
    → The sample changes its color depending on its orientation (northeast-southwest or northwest-southeast).

6.4.8.3 Measuring the Path Differences

For more information about the method, see *Measuring Path Differences [▸ 59]*.

Prerequisite

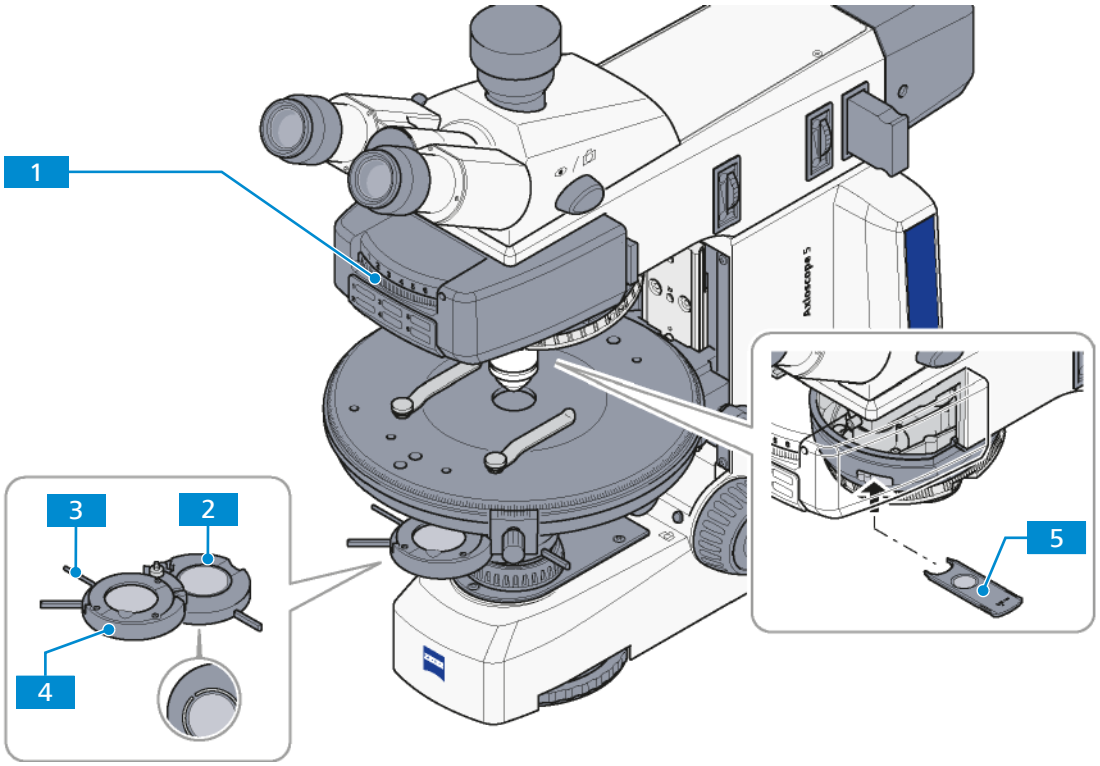
✓ The correct inter-pupillary distance in the binocular tube is set.

Procedure

1. Accurately position the sample to be examined on the center of the eyepiece reticle.
2. Limit the aperture to a value of about 0.2.
3. Turn the rotary stage until the sample is almost extinguished, i.e. **completely dark**, and set the 45° locking position.
4. Rotate the stage **once** (by 45°) so that the sample is in a diagonal position (sample becomes bright).
5. *Determine [▸ 59]* the suitable compensator.
6. Insert the determined compensator into the slot as far as it will go.
7. Use the enclosed operating instructions for measurement preparation and measurement procedure.

6.4.8.4 Circular Polarization Contrast

For more information about the method, see *Circular Polarization Contrast [▸ 59]*.



Prerequisite

- ✓ The circular polarizer D including the corresponding lambda/4 plate is installed.
- ✓ The analyzer module is installed in the reflector turret or the stand is equipped with the intermediate plate for analyzer slider and the analyzer slider is available.
- ✓ The lambda/4 compensator (6x20) is available.

Procedure

1. Remove the sample.
2. Swivel the lower part 2 of the circular polarizer into the light path up to the click stop.
3. Swing in the analyzer module on the reflector turret 1 or insert the analyzer slider into the intermediate plate.
4. At full light intensity, assess the extinction (darkening) of the field of view without sample.
5. Push the lambda/4 compensator 5 into the compensator slot above the nosepiece as far as it will go.
6. Swivel the upper part 4 of the circular polarizer into the light path.
7. Rotate the lever of the lambda/4 plate 3 of the D circular polarizer until the field of view appears dark gray.
   - → The lever points 45° to the right.
   - → The maximum extinction is obtained.
8. Place the sample on the stage.
   - → The samples appear constantly and independently of the stage rotation in their specific interference color, which depends on the material, sample thickness and orientation.

9. For the detection of gout or pseudo-gout, select crystal needles that are oriented in the gamma direction (see marking on the lambda plate).
   → If the crystal needles oriented parallel to the gamma direction of the lambda plate are yellow, and the crystal needles lying at a right angle to the gamma direction are blue, the crystals are monosodium urate crystals (gout).
   → If the crystal needles oriented parallel to the gamma direction of the lambda plate are blue, and the crystal needles lying at a right angle to the gamma direction are yellow, the crystals are calcium pyrophosphate crystals (pseudo-gout).

6.4.8.5 Transmitted Light Polarization for Conoscopic Observation

For more information about the conoscopic observation, see chapter *Transmitted Light Polarization for Coniscopic Observation [▸ 59]*.

6.4.8.5.1 Simple Conoscopy Using the Auxiliary Microscope or the Diopter

Prerequisite

- ✓ Strain-free objectives are installed in the *nosepiece [▸ 67]*.
  N-Achroplan 50x/0.9 Pol objective or EC Plan-Neofluar 40x/0.9 Pol objective
- ✓ The Pol rotary stage is *installed [▸ 155]*.
- ✓ Pol binocular photo tube is installed or eyepiece with crossline micrometer 14:140 and adjustment aid for polarization microscopy are available.
- ✓ The achromatic-aplanatic 0.9 H Pol condenser or 0.9 Pol condenser is installed.
- ✓ The D polarizer (rotatable or fixed) is installed.
- ✓ Analyzer slider or D Pol analyzer module in the reflector turret or reflector slider are available.
- ✓ The microscope is adjusted for *transmitted light brightfield microscopy [▸ 78]*.

Procedure

1. Place the sample on the stage.
2. Focus the sample.
3. Swivel the polarizer.
4. Move the analyzer into the light path.
5. If you do not use the Pol binocular photo tube, carry out the following two steps:
   – Align the crossline micrometer 14:140 or the eyepiece reticle to the vibration direction of the polarizer using the *adjustment aid [▸ 89]*.
   – Remove the Pol adjustment aid.
6. Move a selected crystal to the center of the reticle. Only crystals above a defined size can be observed.
7. Swivel in the front lens on the condenser, if necessary.
8. For conoscopy of small crystals, close the luminous-field diaphragm, if necessary, to prevent the axial figure of the examined crystal from being superimposed by the axial figures of adjacent crystals.
9. Swivel the 40x or 50x objective into the light path.
10. Focus the sample.
11. Remove an eyepiece from the tube to view the axial figure in the eyepiece tube.
12. For an improved assessment of the axial figure, insert a diopter or an auxiliary microscope (if available) in the eyepiece tube.

6.4.8.5.2 Conoscopy with Bertrand System Module

Prerequisite

- ✓ Strain-free objectives are installed in the *nosepiece [▸ 67]*.
  N-Achroplan 50x/0.9 Pol objective or EC Plan-Neofluar 40x/0.9 Pol objective
- ✓ The Pol rotary stage is *installed [▸ 155]*.
- ✓ Pol binocular photo tube is installed or eyepiece with crossline micrometer 14:140 and adjustment aid for polarization microscopy are available.
- ✓ The achromatic-aplanatic 0.9 H Pol condenser or 0.9 Pol condenser is installed.
- ✓ The Bertrand system module is inserted in reflector turret.
- ✓ The D polarizer (rotatable or fixed) is installed.
- ✓ Analyzer slider or D Pol analyzer module in the reflector turret or reflector slider are available.
- ✓ The microscope is adjusted for *transmitted light brightfield microscopy [▸ 78]*.

Procedure

1. Place the sample on the stage.
2. Focus the sample.
3. Swivel the polarizer.
4. If you do not use the Pol binocular photo tube, carry out the following two steps:
   – Align the crossline micrometer 14:140 or the eyepiece reticle to the vibration direction of the polarizer using the *adjustment aid [▸ 89]*.
   – Remove the Pol adjustment aid.
5. Move a selected crystal to the center of the reticle.
6. Swivel in the front lens on the condenser, if necessary.
7. Swivel the 40x or 50x objective into the light path.
8. Focus the sample.
9. Close the luminous-field diaphragm as much as is necessary to prevent the axial figure from being superimposed by the axial figures of adjacent crystals.
   → The smallest crystal extension that can be masked out is 4 µm.
10. Swivel in the Pol Bertrand system module on the reflector turret.
    → The axial figure appears in the field of view.

> **Info**
>
> In the case of uniaxial crystals, the most favorable orientation for conoscopic viewing is obtained with those sample features (e.g. of a thin section) that in orthoscopic viewing change the brightness as little as possible upon rotating the stage. In this case, the direction of viewing and the optical axis are nearly parallel. The same refers also to biaxial crystals, if they are viewed along or approximately in the direction of one of the two optical axes.

6.4.8.5.3 Conoscopy with Intermediate Plate and Bertrand Lens Slider

Prerequisite

- ✓ Strain-free objectives are installed in the *nosepiece [▸ 67]*.
  EC Plan-Neofluar 40x/0.9 Pol objective or EC Plan-Neofluar 100x/1.30 Oil Pol objective or EC Epiplan-Neofluar 50x/0.8 Pol objective or EC Epiplan-Neofluar 100x/0.9 Pol objective
- ✓ The Pol rotary stage is *installed [▸ 155]*.
- ✓ Pol binocular photo tube is installed or eyepiece with crossline micrometer 14:140 and adjustment aid for polarization microscopy are available.
- ✓ The achromatic-aplanatic 0.9 H Pol condenser or 0.9 Pol condenser is installed.
- ✓ Bertrand lens slider inserted in the intermediate plate.
- ✓ The D polarizer (rotatable or fixed) is installed.
- ✓ The D Pol analyzer module in the reflector turret or reflector slider are available.
- ✓ The microscope is adjusted for *transmitted light brightfield microscopy [▸ 78]*.

Procedure

1. Place the sample on the stage.
2. Focus the sample.
3. Swivel the polarizer.
4. Swivel the D Pol analyzer module into the light path.
5. If you do not use the Pol binocular photo tube, carry out the following two steps:
   – Align the crossline micrometer 14:140 or the eyepiece reticle to the vibration direction of the polarizer using the *adjustment aid [▸ 89]*.
   – Remove the Pol adjustment aid.
6. Move a selected crystal to the center of the reticle.
7. Swivel in the front lens on the condenser, if necessary.
8. Swivel the recommended objective into the light path.
9. Focus the sample.
10. Close the luminous-field diaphragm as much as is necessary to prevent the axial figure from being superimposed by the axial figures of adjacent crystals.
    → The smallest crystal extension that can be masked out is 4 µm.
11. Push the Bertrand lens slider incorporated in the intermediate plate into its active position.
    → The axial figure appears in the field of view.
12. Focus the axial figure by shifting the lever of the Bertrand lens slider.

6.5 Setting Up for Reflected Light Techniques

6.5.1 Setting Up for Reflected Light Brightfield Microscopy Using the KÖHLER Method

For more information about the method, see chapter *Reflected Light Brightfield Contrast Using the KÖHLER Method [▸ 60]*.

Prerequisite

✓ A reflected light light source is *installed [▸ 72]*.

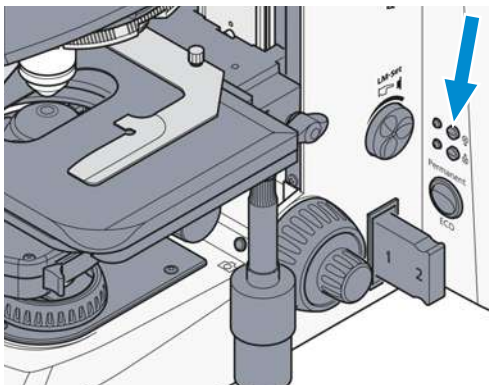
✓ In the reflector turret, an ACR P&C brightfield reflector module for reflected light is installed.

✓ The microscope is operational for reflected light microscopy.

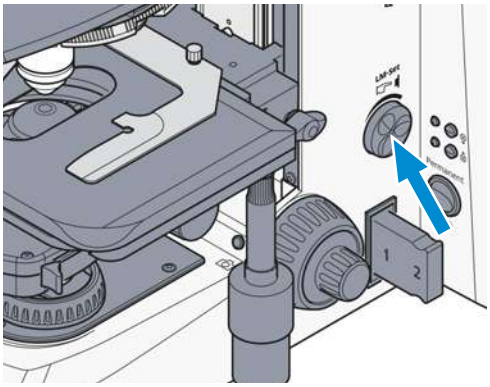
✓ The microscope is *adapted [▸ 74]* to the user.

Procedure

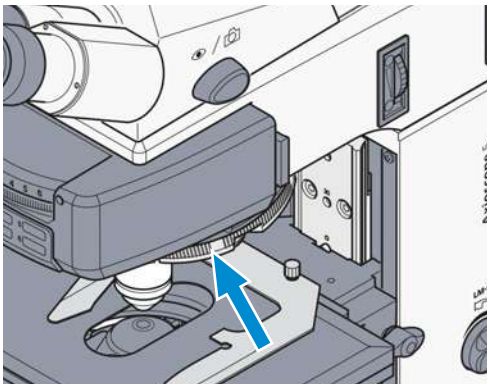
1. If required, push the **RL** button for reflected light illumination.



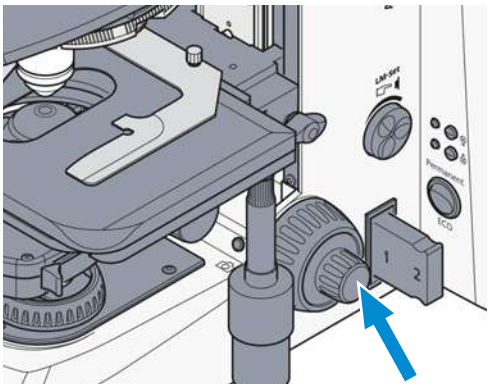
2. Adjust the image brightness using the **Intensity/LM** knob on the microscope stand.



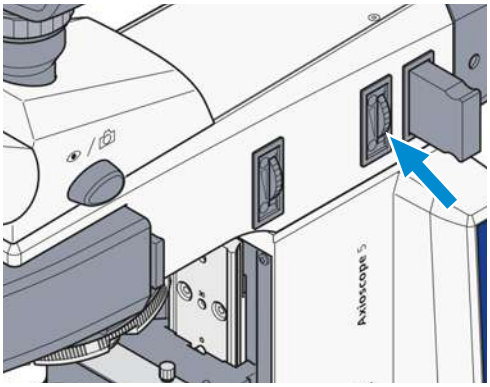
3. If required, move the toggle switch on the external power supply unit to the RL position for reflected light and use the **Intensity/LM** knob to adjust the light intensity.
4. Place a high-contrast reflected light sample into the sample holder of the mechanical stage.
5. Swivel the 10x objective into the beam path.



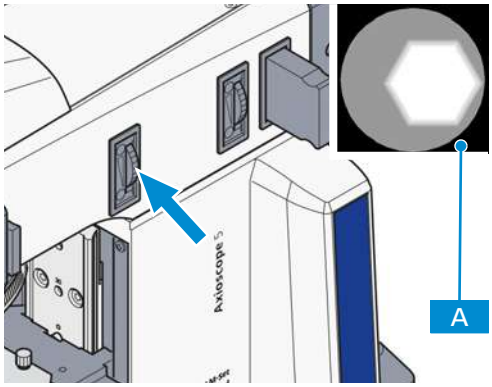
6. Focus the sample.
   Try to focus away from the sample to avoid any collision between the objective and sample.



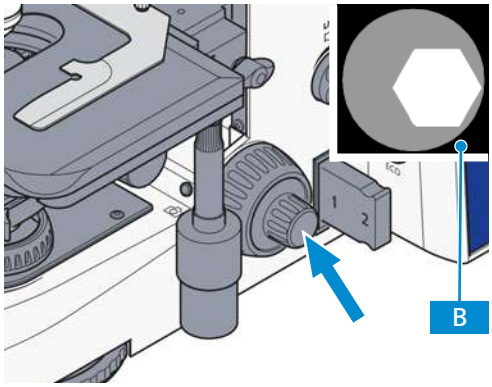
7. Turn the knurled button of the aperture diaphragm to a medium position.



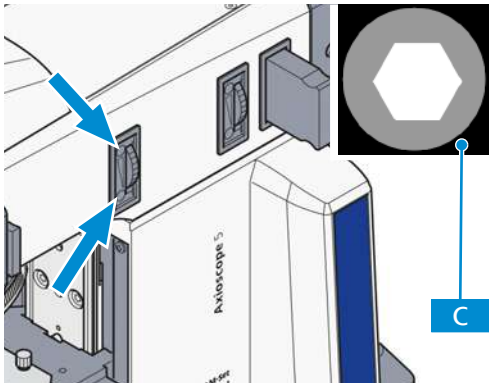
8. Adjust the knurled knob on the field diaphragm so that the field diaphragm becomes visible in the field of view A.



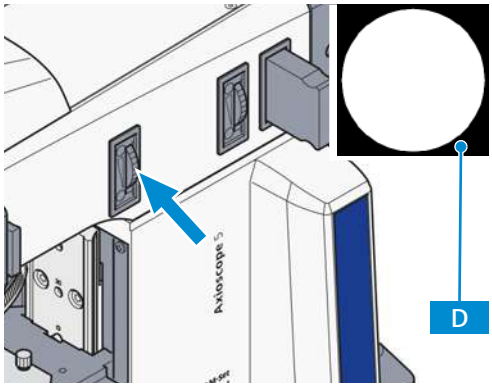
9. Use the focus drive to readjust the focus on the edge of the field diaphragm B.



10. Use the centering screws to center the field diaphragm on the edge of the field of view C.

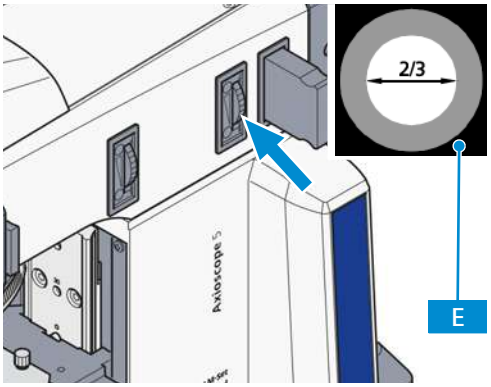


11. Open the field diaphragm enough to make the edge of the diaphragm disappear from the field of view D.



12. Remove one eyepiece from the tube.

13. Looking through the tube, adjust the aperture with the adjusting lever of the aperture diaphragm to the size of approx. 2/3 - 4/5 of the diameter of the objective exit pupil E.
In most cases this aperture gives the best contrast at almost full resolution and is thus the best compromise for the human eye.



14. Replace the eyepiece.
15. Re-adjust the focus using the coarse and fine focusing drives and set the image brightness according to the reflected light sample.
16. Readjust the aperture stop diameter after each objective change.

Info

Never use the aperture diaphragm for controlling image brightness. Use the **Intensity/LM** knob for illumination intensity!

6.5.2 Setting Up for Reflected Light Darkfield Microscopy Using the KÖHLER Method

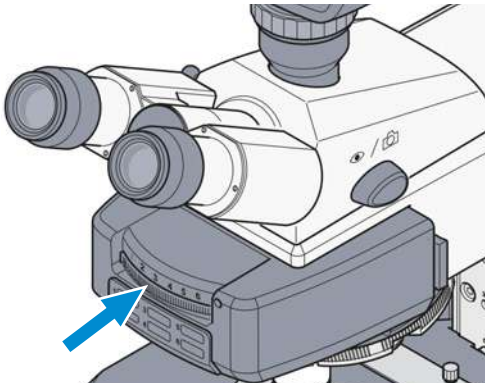
For more information about the method, see chapter *Reflected Light Brightfield Contrast Using the KÖHLER Method [▸ 60]*.

Prerequisite

- ✓ A reflected light light source is *installed [▸ 72]*.
- ✓ In the reflector turret, an ACR P&C reflector module for reflected light is installed.
- ✓ A suitable objective for RL darkfield microscopy is *installed [▸ 67]*, e.g. Epiplan-Neofluar HD, EC Epiplan-Neofluar HD, Epiplan HD.
- ✓ The microscope is operational.
- ✓ The illumination is adjusted for *reflected light brightfield microscopy [▸ 93]*.
The field diaphragm image should lie just barely outside of the edge of the field of view to avoid reflections.

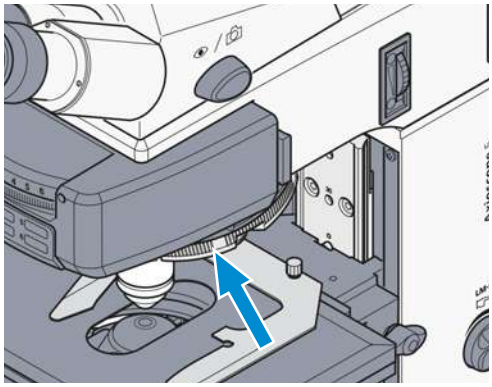
Procedure

1. Swing the darkfield ACR P&C reflector module for reflected light on the reflector turret into the beam path.

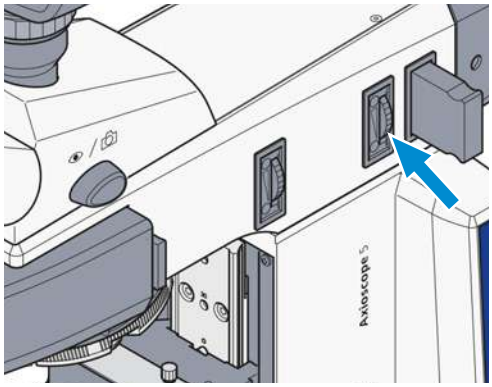


2. Remove the 6x20 mm compensator slider if inserted.

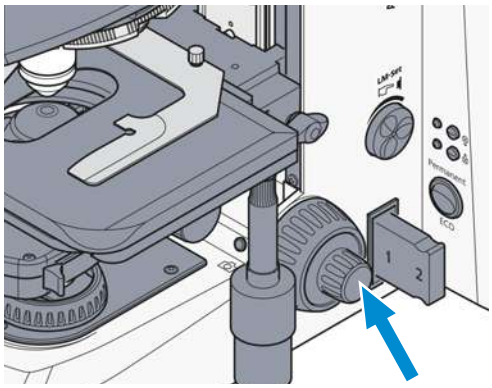
3. Swivel the objective position with the darkfield HD objective into the beam path.



4. Completely open the aperture diaphragm **A**.



5. Switch off or remove neutral filters if applicable.
6. Place the sample on the stage.
7. Focus the sample.



↳ The illumination is now adjusted for darkfield microscopy.

6.5.3 Setting Up for Reflected Light DIC Microscopy

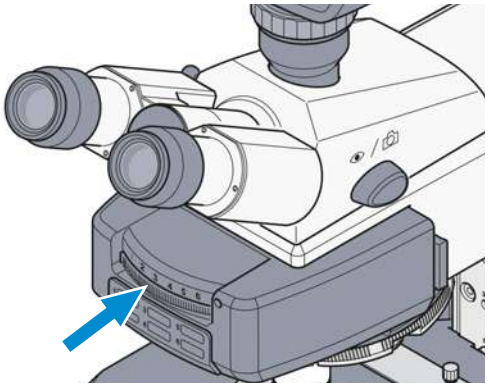
For more information about the method, see chapter *Reflected Light DIC and C-DIC Contrast [▸ 60]*.

Prerequisite

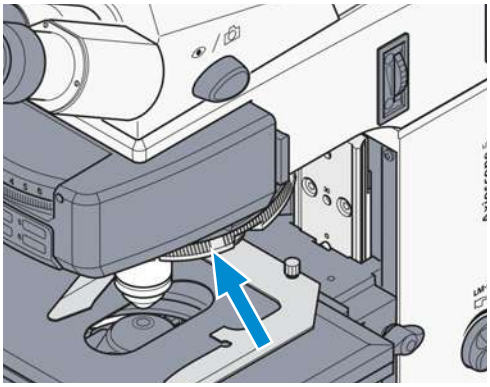
- ✓ A reflected light light source is *installed [▸ 72]*.
- ✓ The mechanical stage, 75x50/240° rotatable or the rotary stage Pol is *installed [▸ 69]*.
- ✓ The microscope is operational.
- ✓ DIC reflector module is installed.
- ✓ A suitable objective for DIC is *installed [▸ 67]*, e.g. EC Epiplan-Neofluar, Epiplan with the additional label "DIC" or "Pol".
- ✓ DIC slider compatible with the objectives in use, is available.
- ✓ The illumination is adjusted for *reflected light brightfield microscopy [▸ 93]*.

Procedure

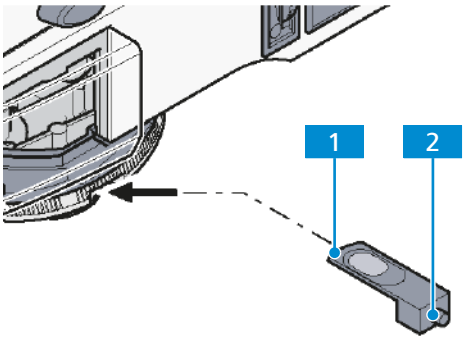
1. Swivel the DIC module on the reflector turret into the beam path.



2. Swivel the DIC compatible objective into the beam path.



3. Slide the according DIC slider 1 into the slot of the nosepiece.



4. Place the sample on the stage.
5. Focus the sample.
6. Turn the mechanical stage so the structure of interest is visible with maximum contrast.
7. Use the knurled screw 2 on the DIC slider to adjust the optimal contrast.

6.5.4 Setting Up for Reflected Light C-DIC Microscopy

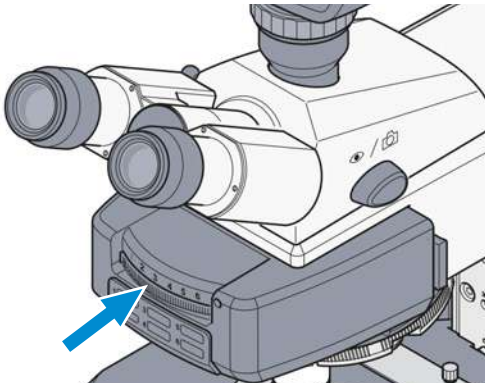
For more information about the method, see chapter *Reflected Light DIC and C-DIC Contrast [▸ 60]*.

Prerequisite

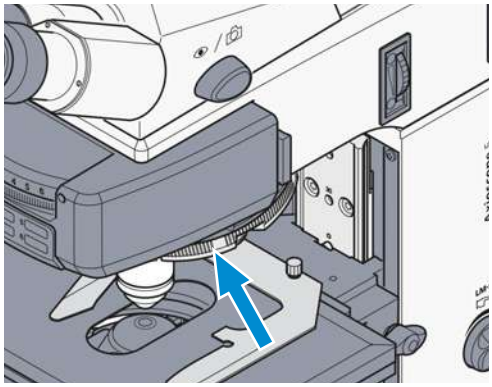
- ✓ A reflected light light source is *installed [▸ 72]*.
- ✓ The microscope is operational.
- ✓ C-DIC reflector module is installed.
- ✓ A suitable objective for DIC is *installed [▸ 67]*, e.g. EC Epiplan-Neofluar, Epiplan with the additional label "DIC" or "Pol".
- ✓ C-DIC slider compatible with the objectives in use, is available.
- ✓ The illumination is adjusted for *reflected light brightfield microscopy [▸ 93]*.

Procedure

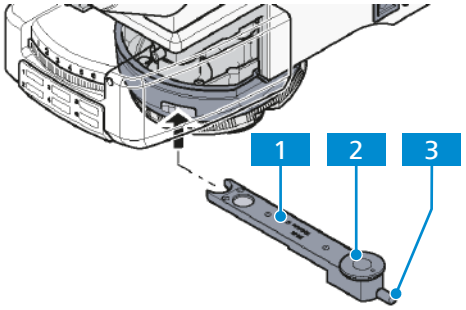
1. Swivel the C-DIC module on the reflector turret into the beam path.



2. Swivel the DIC compatible objective into the beam path.



3. Slide the C-DIC slider 1 into the 6x20 mm compensator slot.



4. Place the sample on the stage.
5. Focus the sample.
6. Turn the setting wheel 2 on the C-DIC slider so the structure of interest is visible with maximum contrast.
   → No further stage rotation is necessary.
7. Optimized the contrast by adjusting the setting screw 3.

6.5.5 Setting Up for Reflected Light TIC Microscopy

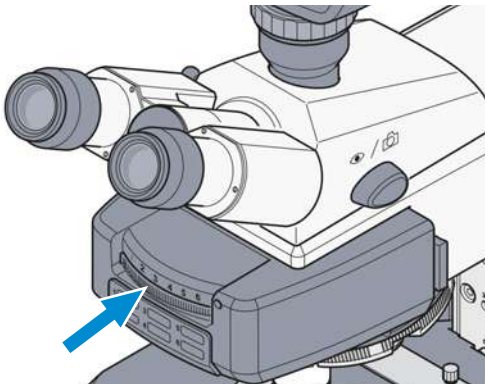
For more information about the method, see chapter *Reflected Light TIC Contrast [▸ 60]*.

Prerequisite

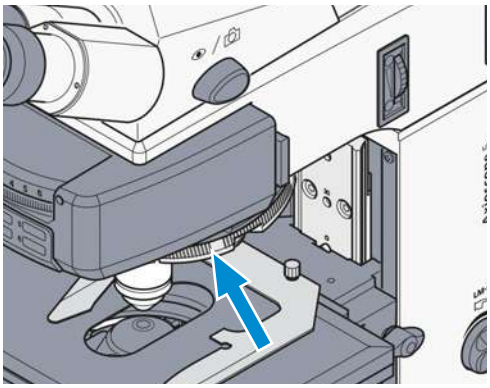
- ✓ The HAL 100 light source is *installed [▸ 72]*.
- ✓ The microscope is operational.
- ✓ A suitable objective for DIC is *installed [▸ 67]*, e.g. EC Epiplan-Neofluar, Epiplan with the additional label "DIC" or "Pol".
- ✓ TIC slider 6x20 mm with the appropriate C-DIC reflector module is available.
- ✓ The illumination is adjusted for *reflected light brightfield microscopy [▸ 93]*.

Procedure

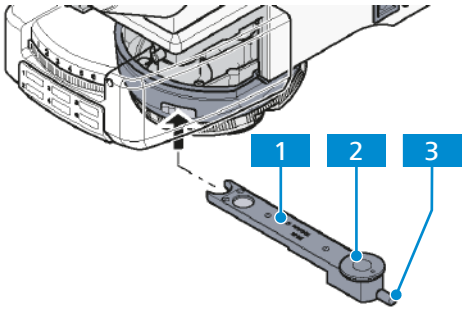
1. Place the sample on the stage.
2. Focus the sample.
3. Swivel the C-DIC module on the reflector turret into the beam path.



4. Swivel the DIC compatible objective into the beam path.

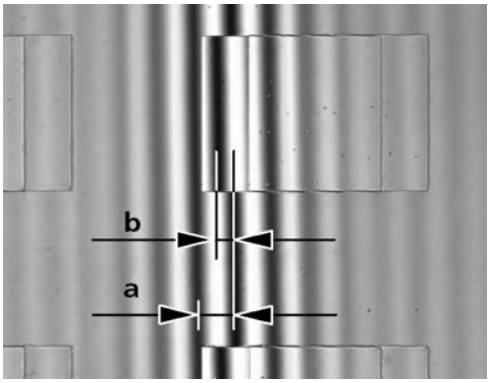


5. Slide the TIC slider 1 into the 6x20 mm compensator slot.



→ Chromatic interference stripes appear in the field of view.

6. Move the black interference stripe by sight to the middle of the field of view. Use the setting screw 3.
7. To choose the structure to be measured, turn the setting wheel 2 on the TIC slider until the interference stripes are vertical to the direction in which the sample is broken down.



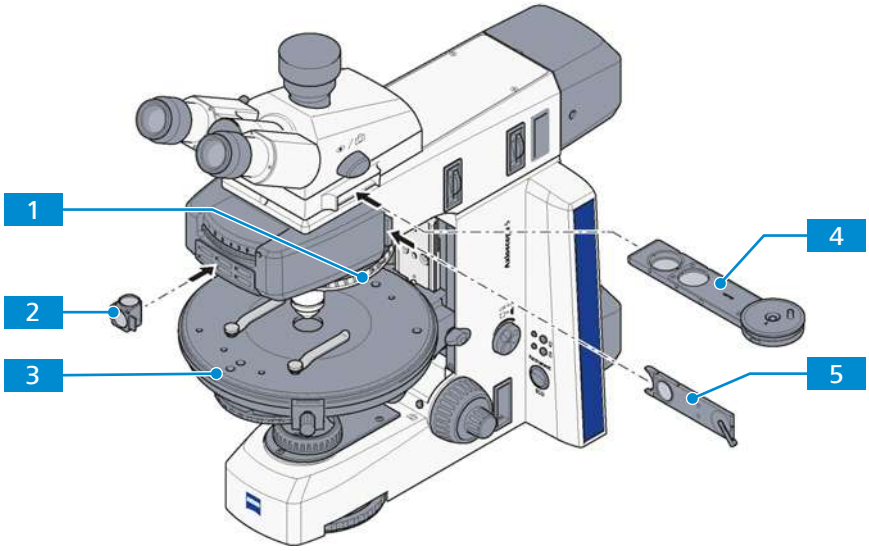
8. Determine the values for a (distance between the interference stripes) and b (offset of the interference stripes along the step) in the interference image. Use an eyepiece reticle micrometer or a micrometer eyepiece.

6.5.6 Setting Up for Reflected Light Polarization Microscopy – Proof of Bireflectance and Reflection

The present section applies to the following microscope type:

- Axioscope 5 TL/RL Pol (430035-9291-000)

For more information about the method, see chapter *Reflected Light Polarization Contrast [▸ 63]*.



Prerequisite

- ✓ A reflected light light source is *installed [▸ 72]*.
- ✓ The rotary stage Pol is *installed [▸ 69]*.
- ✓ The microscope is operational.
- ✓ The DIC reflector module or the DIC Rot I P&C reflector module is installed or the Pol P&C reflector module plus analyzer slider are available or analyzer slider plus polarizer slider are available.
- ✓ A suitable objective for Pol is *installed [▸ 67]*, e.g. Epiplan-Neofluar Pol, EC Epiplan-Neofluar Pol, Epiplan Pol.
- ✓ The illumination is adjusted for *reflected light brightfield microscopy [▸ 93]*.

Procedure

1. If using the objective position with a DIC position, remove the DIC slider, if necessary.
2. Swivel the Pol objective 1 into the beam path.
3. Swing the DIC P&C reflector module 2 or the Pol P&C reflector module into the beam path. Slide the analyzer slider 4 into the compartment.
4. Alternatively, slide the analyzer slider 4 and the polarizer slider 5 into their compartments, if applicable.
5. Place the sample on the rotary stage Pol 3.
6. Swivel in the objective with the desired magnification.
7. Focus the sample.
8. Turn the rotary stage Pol to examine the sample in the polarization contrast.
   → The sample appears in polarization contrast while turning the stage.

↳ A sample is bireflectant when the sample details show differences in brightness and color which change when the stage rotates. For samples with low bireflectance we recommend using the analyzer with a rotatable lambda plate.

↳ Pleochroism is present when the color of the sample changes as soon as the stage rotates (overhead polarizer is turned on, analyzer is turned off).

6.5.7 Setting Up for Reflected Light Fluorescence Microscopy

The present section applies to the following microscope types:

- Axioscope 5 TL/FL (430035-9061-000)
- Axioscope 7 TL/FL (430035-9320-000)

For more information about the method, see chapter *Reflected Light Fluorescence Contrast [▸ 63]*.

⚠ WARNING

Skin or eye injury due to hazardous light emission

The light source belongs to Risk Group 3 as specified in IEC 62471 and emits LED radiation and UV radiation. Skin or eye injury can result from the exposure.

- ▸ Avoid any eye and skin exposure to the light-emitting aperture of the light source.
- ▸ Avoid exposure of skin to the radiation. Use suitable protective equipment/protective clothing if required.
- ▸ Before installing or removing the light source always make sure it is switched off.

NOTICE

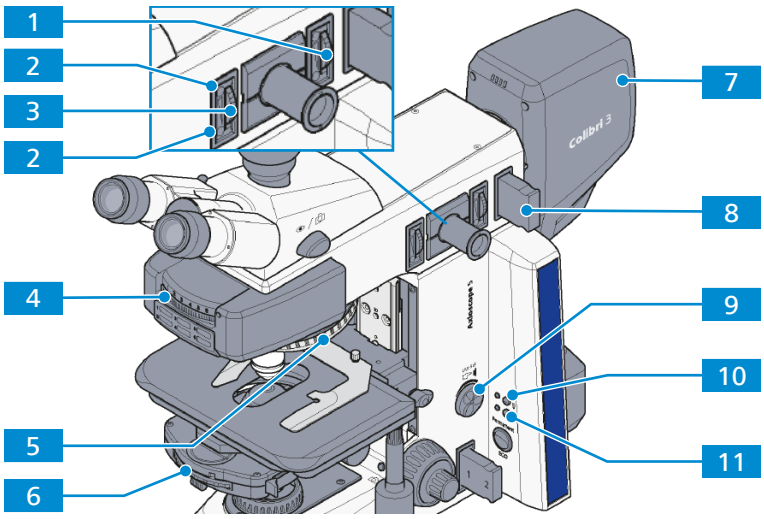
Property damage due to heat emission

Microscope lamps emit a lot of heat which could damage the heat-sensitive fluorescence filters.

- ▸ Do not remove the heat protection filter when using a fluorescence filter.

Info

The adjustment of reflected light fluorescence is facilitated by starting with an objective of average magnification, e.g. EC Plan-Neofluar 20x/0.50, and a sample of high fluorescence. Demonstration samples can also be used for the start-up.



Prerequisite

- ✓ If used, the mercury vapor short arc lamp of the HBO 100 light source is *adjusted [▸ 143]*.
- ✓ In the reflector turret, FL P&C reflector modules equipped with respective filter sets are installed.
- ✓ Fluorescence protection shield is available.
- ✓ A suitable objective for fluorescence microscopy is installed.
  e.g. EC Plan-Neofluar or Fluar (UV excitation)
- ✓ The microscope is operational.
- ✓ The microscope is adjusted for *reflected light brightfield microscopy [▸ 93]*.

Procedure

1. If necessary, remove the compensator from the 6x20 mm slot above the nosepiece.
2. Slide the fluorescence protection shield into the 6x20 mm slot.
3. Swivel in the EC Plan-Neofluar objective on the nosepiece 5.
4. Initially set transmitted light illumination by pushing the **TL** button 11.
5. If necessary, turn the condenser turret 6 to the **H** (B) position for transmitted light brightfield (or phase contrast if using a Ph objective).
6. Seek the sample detail to be examined.
7. Keep the light path in the reflected light light source blocked via the blocking position of the filter slider for reflected light.
8. Switch on the Colibri 3 light source 7 by pushing the **RL** button 10.
9. Press the **Intensity/LM** button 9 briefly for less than 1.5 seconds repeatedly to activate the required LED module or all LED modules of Colibri 3 together.
   → The indicator light of the respective LED module on the Colibri 3 lights up when this module is switched on.
10. If using the HBO 100 light source, switch on the external power supply and let it warm up to operational temperature for about 15 minutes.
11. Swivel it in the FL P&C reflector module 4 with the desired fluorescence filter combination (depending on the excitation mode).
12. Unblock the light path in the reflected light light source with the filter slider for reflected light 8.
13. If necessary, adjust the FL attenuator to 100% transmission in order to facilitate locating fluorescence signals.
    → Reduce the transmission later to preserve the sample.
14. Remove an eyepiece from the tube and adjust the aperture diaphragm 1 by sight.
15. Open the aperture diaphragm enough to see the whole objective exit pupil.
16. Replace the eyepiece in the tube.
17. Close the field diaphragm 3 enough to make it visible in the field of view.
18. Using both centering screws 2, center the field diaphragm on the edge of the field of view.
19. Open the field diaphragm enough to make it just disappear behind the edge of the field of view, or, if you are using a sample which might bleach out, reduce the field diaphragm for the field of view.
20. Focus the sample again.
21. If using the HBO 100 light source, optimize the collector position of the HBO 100 using the knurled knob.
    → Adjust the collector so that the reflector module of the short-wave excitation illuminates the field of view evenly.
    → A correction of the collector position is not necessary in modules with longer-wave excitation.

↳ The illumination is now adjusted for fluorescence microscopy.

6.6 Parfocality Function

Using the parfocality function as described here requires a firmware version 01.097 or higher. For questions how to identify the firmware version and how to update it, contact a ZEISS service representative.

6.6.1 Enabling/Disabling Parfocality

By factory default, the parfocality function is enabled.

Procedure

1. Press the **Stage control** button (left side) and the **Intensity/LM** knob simultaneously for at least 1.5 seconds to switch between enabled and disabled parfocality function.
   → Parfocality function disabled: The indicator light blinks ORANGE twice.
   → Parfocality function enabled: The indicator light blinks GREEN twice.

6.6.2 Using Parfocality

Prerequisite

✓ The parfocality function is *enabled [▸ 104]* and *calibrated [▸ 104]*.

✓ A sample is placed on the stage.

Procedure

1. Use the objective with the highest magnification to focus on the sample.

↳ As long as the focus settings are not changed, the sample will stay in focus with all objectives. Parfocality will only work for **all** objectives if the objective with the **highest** magnification was used for focussing.

6.6.3 Calibrating Parfocality

Axioscope 7 is calibrated by a ZEISS service representative upon installation. The microscope's parfocality function does not need to be recalibrated except for the following situations:

- Any objective change from the nosepiece, e.g., adding a new objective, replacing one objective, removing one objective.
- The system is moved horizontally or vertically, e.g., moving the system from one lab to another, moving the system from one bench to another in the same lab.
- Stand main board replacement or firmware upgrade.

Prerequisite

✓ A flat sample is placed on the stage.

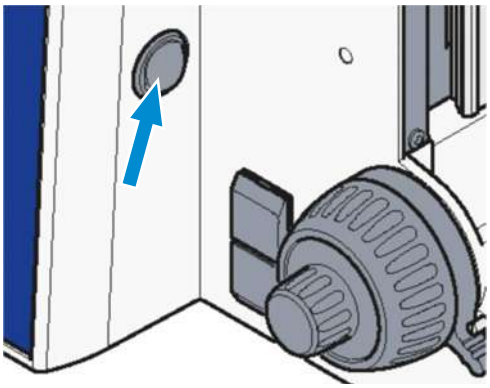
Procedure

1. Press the **Stage control** button (left side) for at least 8 seconds to *start the calibration process [▸ 41]*.
   → The indicator light lights RED.
2. Swivel in the dry objective with the highest magnification.
3. Focus on the sample.
4. Press the **Stage control** button for less than 1 second to save the focus position for this objective.
   → The indicator light blinks GREEN twice.
5. Swivel in all other objectives one by one and repeat steps 3 and 4 for each objective.
6. Press the **Stage control** button for at least 8 seconds to *finish the calibration process [▸ 41]*.
   → The indicator light lights GREEN.

6.7 Switching Off the Microscope

Procedure

1. Switch the microscope off using the power switch **On/Off**.



2. Cover the microscope with the dust cover.

7 Care and Maintenance

To ensure the best possible performance of the microscope and its components, maintenance must be performed on a regular basis. Keep the service logs of the microscope.

To maintain operational safety and reliability of the microscope, we recommend entering into a **ZEISS Protect Service Agreement**.

Info

For additional information and detailed descriptions, refer to further applicable documents or ask your ZEISS Sales & Service Partner.

Info

Contact the ZEISS service representative to learn more about the **ZEISS Predictive Service**.

7.1 Safety during Cleaning and Maintenance

Only conduct preventive measures described here. All tasks of maintenance and cleaning not described may only be performed by an authorized ZEISS service representative.

Any unauthorized intervention or any operation outside the scope of the intended use can lead to injuries and property damage and voids all rights to warranty claims. Only original spare parts from ZEISS may be used.

⚠ DANGER

Electric injury due to live parts

Coming in contact with live parts can lead to electric shock or burn.

Prior to opening and cleaning:

- Pull the power plug for safe disconnection from the power supply.

NOTICE

Functional impairment due to dirt, dust and moisture

Dirt, dust, and moisture can impair the microscope and its components functionality and can cause short-circuits. Blocking or covering ventilation slots can lead to a build-up of heat that can damage the device and, in extreme cases, cause a fire.

- Use the dust protection cover if the microscope is not used.
- The ventilation slots must be unobstructed at all times and the heat sink (if available) must be unobstructed.
- Do not insert any objects or allow them to fall into the ventilation slots.
- Perform regular maintenance and cleaning according to the instructions in this document and according to the instructions in the applicable documents.
- Make sure that no cleaning liquid or moisture gets inside the microscope and its components.
- In case of damage, the affected parts of the microscope must be taken out of operation.

7.2 Maintenance Schedule

To maintain best possible performance of the microscope, it is essential to perform preventive maintenance on a regular basis. The recommended intervals depend on the total uptime of the microscope.

Interval	Part/Component	Activity
daily	Microscope	Check the power cable and the plug for possible damage. If any damage is observed, turn the instrument off and secure it against inadvertent restarts immediately. Call in a qualified professional to remedy the problem.
If LED modules are defective or used up.	Colibri 3 light source	Replace the LED modules.
If the travel range in X direction will gradually become smaller	Mechanical stage	*Recovering the stage travel range. [▸ 110]*

Tab. 3: Maintenance Plan

7.3 Maintenance Work

Repairs of mechanical, optical or electronic components inside the microscope and electrical components may be performed only an authorized ZEISS service representative or specially authorized personnel.

To ensure optimal configuration and trouble-free function of your microscope over a longer period of time, we recommend that you enter into a service/maintenance agreement with ZEISS. For subsequent orders or when service is required, please get in touch with your local ZEISS service representative.

7.3.1 Cleaning an Optical Surface

NOTICE

Damage of optical surfaces due to improper cleaning

- Remove dust from the optical surface slowly and carefully.
- Remove dust on optical surfaces with a natural-hair brush or blow it off with a dust blower.
- Avoid touching optical surfaces with fingers.
- Never use abrasive compounds or cleaners.

Parts and Tools

- Clean cloth
- Cotton swab
- Distilled water
- Optical cleaning solution (70 % ethanol)
- Lint-free cloth

Procedure

1. Moisten a cotton swab or a clean cloth with distilled water or, if necessary, with an optical cleaning solution.
2. Wipe optical surfaces in a circular motion towards the edge of the optics with slight pressure.

3. Dry with a lint-free cloth.

7.3.2 Removing Water-Soluble Contamination

Parts and Tools

- Clean cloth
- Lint-free cloth

Prerequisite

✓ The microscope and its components are switched off and disconnected from the power supply.

Procedure

1. Remove dust and loose dirt particles with a soft brush or clean lint-free cloth.
2. If necessary, moisten a clean cloth with water. **Info** **A mild detergent (no solvent!) may be added to the water for stubborn dirt.**
3. Wipe off the area with the moistened cloth. **Info** **Labels on the device may only be cleaned using a dry cloth.**
4. Dry with a lint-free cloth.

7.3.3 Exchanging the 12 V, 50 W Halogen lamp of the HAL 50 Halogen Illuminator

⚠ CAUTION

Burning hazard due to hot light sources

Light sources can become hot during processing.

- Avoid touching the hot light source housing.
- Let the light source cool down before touching it.

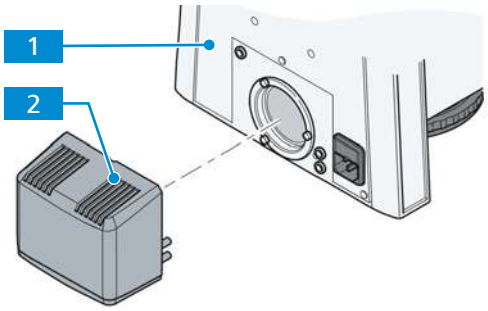
Prerequisite

✓ The microscope is switched off.

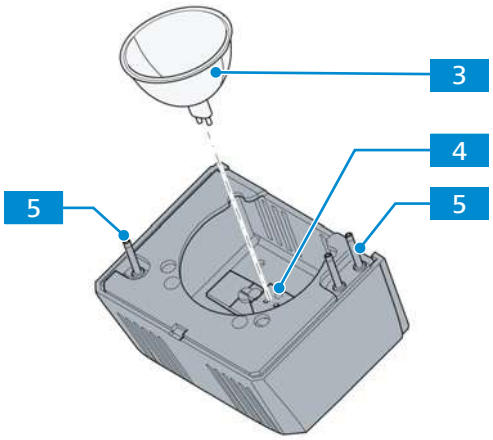
✓ The light source has cooled down for about 15 minutes.

Procedure

1. Remove the HAL 50 halogen light source 2 from the back of the stand 1.



2. Put it down with the open side facing up.
3. Remove the used lamp 3 in upward direction.



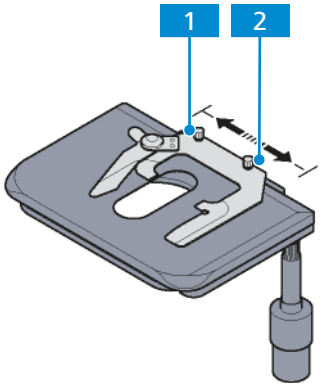
4. Push the new lamp with its two cap pins gently and carefully into the socket 4 of the HAL 50 halogen light source. Do not bend the cap pins.
5. Place the HAL 50 halogen light source with the connecting pins 5 into the back side of the microscope and push until the lamp engages securely.

7.3.4 Recovering the Stage Travel Range in X-Axis

After long hours of use, the X direction range will gradually become smaller. This is not a quality issue and can be easily reset.

Procedure

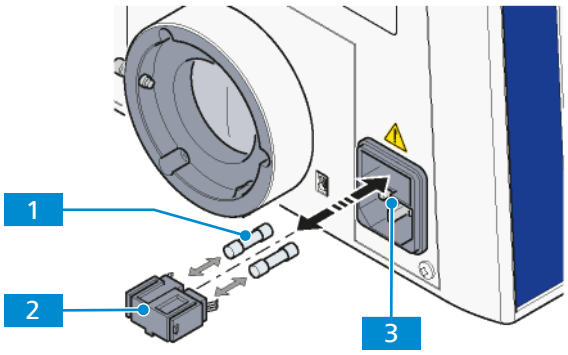
1. Hold the sample holder's two screws 1 / 2.



2. Move the stage to the left until it hits the end stop.
3. Move the stage to the right until it hits the end stop.

7.3.5 Exchanging the Fuses T 15A H 250V in the Stand

> **DANGER**
>
> **Electric injury due to live parts**
>
> When the microscope and its components are still switched on, coming in contact with live parts can lead to electric shock or burn.
>
> - Switch off the microscope and its components prior to opening or cleaning.
> - Disconnect the microscope and its components from the mains.



Parts and Tools

- 2x Fuse type T 15A H 250V

Prerequisite

- ✓ The microscope is switched off and disconnected from the mains.

Procedure

1. If the fuses fail, first check the cause and remedy technical problems properly.
2. Remove the fuse holder 2 on the rear side of the stand.
3. Remove fuses 1 from the fuse holder.
4. Insert new fuses.
5. Push the fuse holder back into the fuse compartment 3 until it locks in place.
6. Bring the microscope back into operation.

8 Troubleshooting

The following table provides information about solving common problems.

Info

If you cannot solve the problem or if you are unsure about a certain technical difficulty, contact your local ZEISS service representative.

Symptom	Cause	Measure
No illumination light after switching on the microscope.	Nosepiece and/or reflector turret are not engaged to defined positions.	Move the nosepiece and/or reflector turret to the left or right to engage the nosepiece and/or reflector turret to defined positions. Then restart the microscope.
Shading or brightness irregularities in the field of view of the microscope; the field of view is not fully visible.	The vis/phot push-pull rod/ shift knob on the photo tube is not in correct functional position (in-between position)	Move the vis/phot push-pull rod/shift knob to the correct functional position (end position).
	Nosepiece with objective is not fully engaged in its locking position.	Engage the nosepiece with the objective in its locking position.
	Condenser is not adjusted correctly.	Adjust the condenser correctly (adjustment, centering), see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Aperture diaphragm is not adjusted correctly.	Adjust the aperture diaphragm correctly (centering, opening), see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Field diaphragm is not adjusted correctly.	Adjust the field diaphragm correctly (centering, opening), see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Filter is not correctly inserted in its slot.	Insert the filter correctly.
Low resolution and poor contrast.	Opening of the aperture diaphragm is not adjusted correctly.	Adjust the opening of the aperture diaphragm according to the 2/3-rule and the texture of the sample you are using, see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.

Symptom	Cause	Measure
	Condenser is not focused correctly and front lens is not connected correctly.	Focus the condenser and turn the front lens correctly on or off, see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Wrong thickness of the frame glass when using a transmitted light objective with a frame glass thickness correction of 0.17 mm.	Use standardized frame glasses with a thickness of 0.17 mm.
	Specimen holder is not inserted correctly.	Turn the sample holder over, the sample side shows up.
	No immersion oil or an unspecified immersion oil is used with immersion objectives.	Use immersion oil 518 N or 518 F by ZEISS.
	Air bubbles in the immersion oil.	Repeat the oiling procedure with fresh oil.
	Immersion oil on the front lens of a dry objective.	Clean the lens.
	Correction setting is not set to the proper thickness of the frame glass.	Adjust the correction setting to the correct thickness of the frame glass.
	Dirt or dust on the optical surfaces of objectives, eyepieces, condensers or filters.	Clean the soiled optical component.
Parfocal performance not good on Axioscope 7	The focal plane was adjusted using the low-magnification objective which has a larger depth of focus than the high-magnification objective.	Determine the focal plane using the high-magnification objective.
	There is a backlash of Z-axis drive.	Adjust the focal plane from the same direction for all the objectives.
No light in eyepiece	The system is in ECO mode.	Turn the Intensity/LM knob clockwise to wake up the system.
	The light intensity is too low.	Turn the Intensity/LM knob clockwise to increase the light.
	The light was turned off by another pressing of the respective RL/TL button.	Press the RL or TL button according to the corresponding indicator in green color.
	LED connector is loose (when using builtin LED10 illumination).	Unmount the LED10 lamp case from the microscope stand, unplug and reinsert the connector to the socket. Check again.

Symptom	Cause	Measure
	The reflector module is incorrectly installed or absent.	Check the reflect turret and make sure the correct reflector is in use.
	The field diaphragm is closed.	Check and, if necessary, open the field diaphragm.
XY stage stops at wrong position after initialization on Axioscope 7	The XY stage initialization failed.	Restart the microscope, if the issue still exists please contact ZEISS Service.
Cannot focus on the sample under high-magnification nosepiece with Axioscope 7	The Z-axis resolution was not configured with the magnification of nosepiece.	Configure the system with correct nosepiece information with MTB Configuration.
Asymmetric image sharpness, e.g. one side is sharp, one side is blurred.	Condenser is not adjusted properly.	Re-adjust the condenser, see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Nosepiece is not engaged in its locking position.	Engage the nosepiece in its locking position (click-diaphragm).
	Sample is not fixed correctly on the mechanical stage.	Insert and fix the sample correctly in the sample holder.
Distinct focus differences when changing the objective.	Focusable eyepieces are not adjusted correctly.	Adjust the focusable eyepieces according to the user's vision defect, see *Focusing when Using Eyepiece Reticles [▸ 74]*.
	Objective is not screwed in all the way.	Screw the objective in to the stop.
	Tube lens is not mounted, or it is mounted unnecessarily.	Mount the tube lens or remove it, according to the situation.
The left and the right field of view cannot be brought together in one image.	Distance of the eyepiece (distance of the pupils) is not adjusted correctly.	Re-adjust the distance of the eyepiece, see *Adjusting the Position of the Eyepieces [▸ 74]*.
	Focusable eyepieces are not adjusted correctly.	Adjust the focusable eyepieces according to the user's vision defect, see *Focusing when Using Eyepiece Reticles [▸ 74]*.
Using the microscope fatigues the eyes.	Distance of the eyepiece (distance of the pupils) is not adjusted correctly.	Re-adjust the distance of the eyepiece, see *Adjusting the Position of the Eyepieces [▸ 74]*.
	Focusable eyepieces are not adjusted correctly.	Adjust the focusable eyepieces according to the user's vision defect, see *Focusing when Using Eyepiece Reticles [▸ 74]*.

Symptom	Cause	Measure
	Image brightness is unacceptable.	Adjust the lamp voltage or insert a conversion filter.
	Binocular tube is misaligned optically, mechanically.	Call in service personnel for check-up/ repair.
Dirt or dust in the field of view.	Condenser is not focused properly and front lens is not in the correct on or off mode.	Focus the condenser and turn the front lens either on or off appropriately, see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Opening of the aperture diaphragm is too small.	Adjust the opening of the aperture diaphragm according to the 2/3-rule or according to the texture of the sample, see *Setting Up for Transmitted Light Brightfield Microscopy Using the KÖHLER Method [▸ 78]*.
	Dirt of dust on optical surfaces of objectives, eyepieces, condensers, filters or samples.	Clean the optical surfaces of the soiled components, see *Cleaning an Optical Surface [▸ 108]*.
Halogen lamp 12 V, 50 W does not glow although the switch in the **On** position.	Power plug is not plugged into the outlet.	Insert the plug into the outlet. Make sure outlet and instrument are adjusted to the correct voltage.
	Halogen lamp 12 V, 50 W is not mounted.	Insert halogen lamp 12 V, 50 W, see *Exchanging the 12 V, 50 W Halogen lamp of the HAL 50 Halogen Illuminator [▸ 109]*.
	Halogen lamp 12 V, 50 W is defective.	Exchange the halogen lamp 12 V, 50 W, see *Exchanging the 12 V, 50 W Halogen lamp of the HAL 50 Halogen Illuminator [▸ 109]*.
	Fuses are defective.	Exchange the fuses, see *Exchanging the Fuses T 15A H 250V in the Stand [▸ 110]*.
	The installed electrical equipment may be defective.	Call in the service personnel to check or exchange the components, if necessary, see Contact.
	No voltage in the power socket.	Use another power socket.

Symptom	Cause	Measure
Halogen lamp 12 V, 50 W flickers, illumination intensity is not stable.	Halogen lamp 12 V, 50 W is reaching the end of its life span.	Exchange the halogen lamp 12 V, 50 W, see *Exchanging the 12 V, 50 W Halogen lamp of the HAL 50 Halogen Illuminator [▸ 109]*.
	power cord is not installed properly or is damaged.	Install the power cord properly or exchange it.
	The pins of the halogen lamp 12 V, 50 W are not properly inserted in the socket.	Insert the pins of the halogen lamp 12 V, 50 W correctly, see *Exchanging the 12 V, 50 W Halogen lamp of the HAL 50 Halogen Illuminator [▸ 109]*.

8.1 Resetting the Microscope to the Factory Settings

NOTICE

Use this function with caution as it will reset all existing configurations.

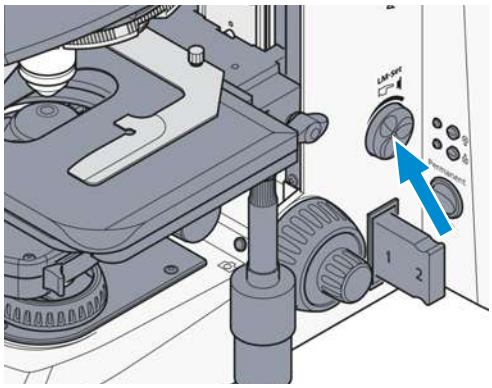
The default factory settings are:

- The Light Manager is enabled, but no light intensity values are saved.
- The light intensity is set to the initial minimum value.
- All stored configurations are cleared.

Prerequisite ✓ The microscope is operational.

Procedure

1. Press and hold down the **Intensity/LM** knob for 20 seconds.



→ While the knob is held down from 3 s to 20 s, the indicator light blinks in RED.

→ After 20 s the indicator light blinks green.

↳ When the indicator stops blinking and remains GREEN, the reset to the default factory setting is successful.

9 Decommissioning and Disposal

This chapter contains information on the decommissioning and disposal of the microscope and its expansions/components or accessories.

9.1 Decommissioning

If the microscope and its components are not used for an extended period of time such as several months, they should be shut down completely and secured against unauthorized access.

> **⚠ DANGER**
>
> **Electric injury due to live parts**
>
> When the microscope and its components are still switched on, coming in contact with live parts can lead to electric shock or burn.
>
> - Switch off the microscope and its components prior to opening or cleaning.
> - Disconnect the microscope and its components from the mains.

Procedure

1. Switch off the microscope.
2. Pull the power supply plug.
3. Protect microscope using a dust cover.

9.2 Transport and Storage

> **⚠ CAUTION**
>
> **Muscle strains and back injuries due to lifting heavy objects**
>
> The component is heavy. If lifted alone, the weight can cause muscle strains and back injuries.
>
> - Only handle this component with the help of a second person.

The following regulations must be observed before and during transport:

- The boxes must be secured during transport.
- Avoid rocking the boxes back and forth.
- Note the weight information on the package and on the shipping document.
- Where possible, the original packaging must be used for shipping or transport.

Maximum shock resistance

- Do not drop or bump the boxes during movement or storage. Acceleration must not exceed 10 g.
- Evaluate packaging shock and tilting sensors on delivery and after internal transport.

Allowable environmental conditions

Off-site transportation and storage in shipping packaging:

- Between -40 °C and +70 °C
- Relative humidity less than 95 % at +40 °C

On-site storage without packaging:

- Between +10 °C and +40 °C
- Relative humidity less than 75 % at +35 °C

> **Info**
>
> **24 hours before installation** of the microscope it is required that the boxes are at recommended room temperature to avoid ingress of humidity, which is harmful to optical paths, and to ensure effective stability of the microscope during installation and testing.

9.3 Disposal

The microscope and its components must not be disposed of as domestic waste or through municipal disposal companies. They must be disposed of in accordance with applicable regulations (WEEE Directive 2012/19/EU). ZEISS has implemented a system for the return and recycling of devices in member states of the European Union that ensures suitable reuse according to the EU Directives mentioned.

ZEISS introduced a procedure for the return and recycling of the instruments within the member states of the European Union which ensures suitable recycling procedures conforming to the EU directives.

For more information on disposal and recycling consult your ZEISS Sales & Service Partner. The microscope may not be disposed of in the household waste or through municipal waste disposal services. If the microscope is resold, the seller shall be obliged to inform the buyer that the microscope must be disposed of in accordance with the regulations.

The customer is responsible for decontamination.

9.4 Decontamination

A decontamination statement must be submitted before returning any used objects to the ZEISS location.

If reliable decontamination cannot be guaranteed, the hazard must be marked according to applicable regulations. In general, a well-visible warning sign must be affixed to the article itself and to the outside of the packaging, together with detailed information on the type of contamination.

10 Technical Data and Conformity

This chapter contains important technical data as well as information on the conformity.

10.1 Performance Data and Specifications

Weight and Sizes

Main Components	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)
Axioscope 5/7	240	293.5	367.5	14-20
Axioscope 5 Vario	458.5	129	700	32

Location requirements

The microscope may only be operated in closed rooms. The microscope should not be installed near radiators or windows with direct sunlight. The microscope must be placed securely on the table surface to prevent slipping and falling.

Compliance with the installation requirements of the microscope is the responsibility of the customer. The requested supplies have to be readily available at the time of installation.

Installation site	Exclusively inside buildings
Altitude	Max. 2000 m above sea level
Atmospheric pressure	Min. 800 hPa

Air Conditioning and Quality

Temperature for operation	+10 °C to + 40 °C
Relative humidity (without condensation)	< 75 %
Atmospheric pressure / altitude	800 to 1060 hPa / ≤ 2000 m above sea level
Pollution degree	2
Operational area	closed rooms

Mains connection Microscope stand

Protection class	I
Ingress protection rating	IP20 (IEC 60529)
Overvoltage category	II
Nominal AC voltage Axioscope 5/7 with internal power supply	100 to 240 V (AC), ±10 %
Nominal AC voltage Axioscope 5 Vario with external power supply	100 to 240 V (AC), ±10 %
Nominal frequency	50 to 60 Hz
Power consumption Axioscope 5 with internal power supply	120 VA
Power consumption Axioscope 7 with internal power supply	100 VA
Power consumption Axioscope 5 Vario with external power supply	30 VA

	Main power plug	Local mains plug will be supplied.
	Addition building PE	The system must be connected to a building earth point at all times. (not applicable for Axioscope 5 Vario)
	Fuses in the Axioscope 5/7 stand	2x T 3.15 A/H, 5x20 mm (in compliance with IEC 127)
	Fuses in the HBO 100 W power supply unit	T 2.0 A/H, 5x20 mm (in compliance with IEC 127)
	Fuses in the external power supply for HAL 100	2x T 5.0 A/H, 5x20 mm (in compliance with IEC 127)
Mains connection Dual observation	Protection class	II
	Overvoltage category	II
	Nominal AC voltage (power adapter)	100 to 240 V (AC), ±10 %
	Nominal frequency (power adapter)	50/60 Hz
	Nominal input current	0.2 A
	Power consumption (Dual observation)	5 VA (5 VDC, 1 A)
LED illumination TL/RL	Power consumption	max. 10 VA
	Adjustment of light source	continuous approx. 10 to 800 mA
Halogen illumination 12 V, 50 W	Adjustment of light source	continuous approx. 3 to 12 V
Halogen illumination 12 V, 100 W	Adjustment of light source	continuous approx. 3 to 12 V
HBO 100 illumination	Power consumption	100 VA V
LED illumination fluorescence	Wavelengths optional	385, 470, 505, 565, 590, 625 nm

Stand specifications

Focusing	manual/motorized stage focusing
Coarse focusing	approx. 4 mm/revolution
Fine focusing	approx. 0.4 mm/revolution; 2 µm scale interval
Lifting range	approx. 25 mm
Height stop	factory pre-set, mechanically variable
Objective change	manual
Reflector module change	manual

Tube specifications

Type	Viewing angle	Adjustment	Viewing height* in mm
Binocular tube 30°/23	30°	- None -	449/485
Binocular photo tube 30°/23 (50:50)	30°	- None -	449/485
Binocular photo tube 30°/23 (100:100)	30°	- None -	449/485
Binocular photo tube 20°/23 (100:100)	20°	- None -	442/481
Binocular ergo tube 15°/23 (50/50), telescopic, height, upright image	15°	height, telescopic	410/509
Binocular tube 20°/23	20°	- None -	442/481
Binocular photo tube 20°/23 Pol (100:100)	20°	- None -	442/481
Binocular ergo tube 20°/23 (100/100), reverse image, 44 mm height	20°	height	457/574
Binocular Ergo Photo Tube -2° to 28°/23 (50:50)	-2° to 28°	height	356/507
Binocular Ergo Photo Tube -2° to 28°/23 (50:50)	-2° to 28°	- None -	392/537

* Range between the lower and upper setting of the eyepieces, e.g. 442/481 → 442 mm to 481 mm

All specifications are for an inter-pupillary distance of 65 mm.

10.2 Applicable Standards and Regulations

Observe all general and country-specific safety regulations as well as applicable environmental protection laws and regulations.

The microscope is in compliance with the requirements of the following regulations and directives:

2011/65/EU and delegated directive (EU) 2015/863	Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), amended by Commission Delegated Directive (EU) 2015/863 of 31 March 2015
EN 61010-1:2019	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
EN IEC 61326-1:2021	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

Only applicable for Axioscope 5/7 MAT

2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility
2014/35/EU	Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

Applicable for all Axioscope microscopes except Axioscope 5/7 MAT

(EU) 2017/746	Regulation (EU) 2017/746 of the European Parliament and of the Council of 5 April 2017 on in vitro diagnostic medical devices and repealing Directive 98/79/EC and Commission Decision 2010/227/EU
EN IEC 61010-2-101:2022	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-101: Safety requirements for in vitro diagnostic (IVD) medical equipment
EN IEC 61326-2-6:2021	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-6: Particular requirements - In vitro diagnostic (IVD) medical equipment

According to directive 2011/65/EU (RoHS) the microscope and its accessories have been classified as instrument category 9 (Monitoring and control instruments including industrial monitoring and control instruments). They also fall under 2012/19/EU (WEEE).

European and International Directives / Standards: For more information on ISO and CSA certificates or CE Declarations of Conformity, contact your ZEISS Sales & Service Partner.

10.3 Usability of LED Modules for the Colibri 3 LED Light Source

Position	Slot 1	Slot 2	Slot 3	Slot 4
Wavelength range (nm)	450-480	350-415	594-660	508-565
LED module 385 nm (423052-9593-000)	X	O	X	X
LED module 470 nm (423052-9573-000)	O	X	X	X
LED module 505 nm (423052-9562-000)	X	X	X	O
LED module 565 nm (423052-9602-000)	X	X	X	O
LED module 590 nm (423052-9543-000)	X	X	O	X
LED module 625 nm (423052-9522-000)	X	X	O	X

O = usable
X = not usable

11 Accessories and System Expansions

Only the following accessories may be used with the microscope as their safe use has been confirmed by ZEISS. Only original parts from ZEISS may be used. Check in advance whether your microscope can be retrofitted with a system expansion or accessories.

After installation or conversion it must be carefully checked whether the microscope and its system expansions/accessories are in a safe operational state and whether unused ports are closed. For details and safety measures refer to the associated documents.

Info

For additional information and detailed descriptions, refer to further applicable documents or ask your ZEISS Sales & Service Partner.

Name	Description/Info
Objectives	The performance of the microscope objectives affects the image quality of your microscope like no other system component. Whether you work with histological samples, cell samples or entire organisms – the suitability of microscope objectives for your application depends on various factors. More detailed information on available and recommended objectives can be found at https://www.micro-shop.zeiss.com/de/de/shop/objectives or ask your ZEISS Sales & Service Partner.
Sliders	The following sliders are available: ▪ Analyzer slider D/A, with lambda plate, 360° rotatable ▪ Analyzer slider D/A, 360° fixed ▪ Analyzer slider D/A, with lambda plate, each rotatable +/- 10° ▪ Slider 12x46, with focusing Bertrand lens, for phase contrast and conoscopy
Polarizers	The following polarizers are available: ▪ Polarizer D, fixed, removable ▪ Polarizer, fixed, ±10° W-E adj. ▪ Polarizer D, 90°, rotatable, removable ▪ Polarizer, 90°, ±10° W-E adj. ▪ Polarizer, fixed, with lambda plate, rotatable ▪ Polarizer, rotatable, with color filter carrier ▪ Polarizer, 90°, ±10° W-E adj., with filter carrier ▪ Circular polarizer D ▪ 360-degree rotatable polarizer ▪ circular polarizing equipment D ACR, with rotatable lambda/4 plate ▪ Polarizer on field aperture ▪ Low-power system for objectives 2.5x/4x for condenser 0.9/1.25 H ▪ Color filter carrier 3x for filter d=32 mm
Eyepieces	The following eyepieces and accessories are available: ▪ Eyepiece E-PL 10x/23 GW, foc. ▪ Eyepiece PL 10x/23 GW, foc.

Name	Description/Info
	▪ Eyepiece PL 10x/23 GW, foc. POL with crossline graticule ▪ Auxiliary microscope ▪ Pinhole diaphragm D= 30 mm
Condensers	The following condensers are available: ▪ Ultra condenser 1.2/1.4 (0.75-1.0) ▪ Dry darkfield condenser 0.8/0.95 (0.6-0.75) ▪ Condenser 0.9/1.25 H ▪ Condenser 0.9 H Pol ▪ Condenser 0.8 BF WD=5.8mm ▪ Condenser, achrom.-aplan. 0.9 BF ▪ Condenser, achrom.-aplan. 0.9 BF DF PhC DIC ▪ Condenser, achrom.-aplan. 0.9 BF Pol
Stages	The following stages are available: ▪ Mechanical stage, 80x60, motorized ▪ Rotary stage, Pol, 360°, with clickstop ▪ Mechanical stage, 75x50/240° R ▪ Mechanical stage, 75x50 R ▪ Mechanical stage, 75x50 L ▪ Mechanical stage 75x50 R, with special surface for high load capacity ▪ Mechanical stage, 75x50 R for reflected light
Sample holders	The following sample holders are available: ▪ Specimen holder for reflected light ▪ Specimen holder for dual slides 76x26 ▪ Attachable object guide Pol, 28x48 mm
Light sources	The following light sources are available: ▪ LED module 385 nm for Axio ▪ LED module 470 nm for Axio ▪ LED module 505 nm for Axio ▪ LED module 565 nm for Axio ▪ LED module 590 nm for Axio ▪ LED module 625 nm for Axio ▪ Illuminator RL LED 10 Axioscope ▪ Illuminator TL LED 10 Axioscope ▪ HXP 120 V light source ▪ Colibri 3 light source ▪ HBO 100 light source ▪ HAL 50 light source ▪ HAL 100 light source ▪ Viluma 5/7 light source

Name	Description/Info
Tubes	The following tubes are available: ▪ Binocular ergophototube 20°/23 (100:0/0:100), reversed image ▪ Binocular ergophototube 20°/23 MAT (100:0/0:100), reversed image ▪ Binocular ergophototube 15°/23 (50:50), upright image ▪ Binocular ergophototube -2° to 28°/23 (50:50), reversed image ▪ Binocular ergophototube -2° to 28°/25 (50:50), reversed image ▪ Binocular tube 30°/23, reversed image ▪ Binocular tube 30°/23, upright image ▪ Binocular phototube, 30°/23 (50:50), reversed image ▪ Binocular phototube, 30°/23 (100:0/0:100), reversed image ▪ Binocular phototube, 20°/23 (100:0/0:100), upright image ▪ Binocular phototube, Pol, 20°/23 (100:0/0:100), upright image ▪ Binocular phototube, 30°/23 (98:2), reversed image ▪ Binocular phototube 30°/23 (100:0/30:70/0:100), reversed image
Reflector inserts	The following reflector inserts are available: ▪ Reflector slider, 2x encoded, changeable ▪ Reflector turret, 4x encoded, changeable ▪ Reflector turret, 6x encoded, changeable
Cameras	The following cameras and accessories are available: ▪ Axiocam 203 mono ▪ Axiocam 212 color ▪ Camera adapter 60N-C 2/3" 0.5x ▪ Camera adapter 60N-C 2/3" 0.63x ▪ Camera adapter 60N-C 1" 1.0x ▪ Video adapter 60 C 1/3" 0.4x

11.1 Binocular Tube

Various tubes with different inclination angles enable suitable eye levels to be selected for observation.

11.1.1 Binocular Tube 30°/23

Purpose Binocular tubes are used to observe the microscopic image by means of the eyepieces.

Position The binocular tubes are mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

The following features and controls are available:

- Optionally with upright or reversed image
- viewing angle 30°
- field of view 23 mm

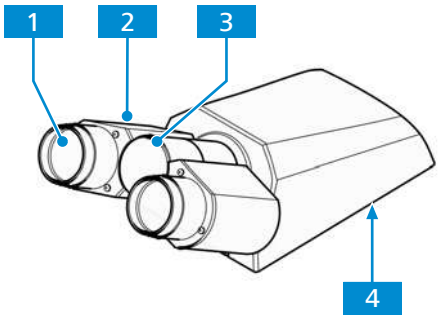


Fig. 40: Binocular Tube 30°/23

1	Eyepiece socket	2	Binocular section
3	Angle scale	4	Dovetail ring mount

11.1.2 Binocular Photo Tube Pol 20°/23 (100:0/0:100)

Purpose Binocular photo tubes are used to observe the microscopic image by means of the eyepieces and/or acquire images with a camera. Using the camera port, the microscopic image can be sent to a connected camera.

Position The binocular photo tube is mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

The following features and controls are available:

- upright image
- camera port with toggle graduation (100:0/0:100)
- viewing angle 20°
- field of view 23 mm

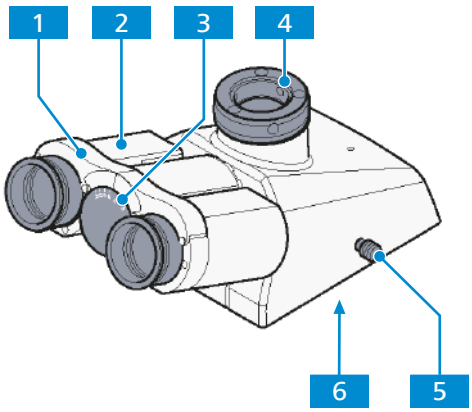


Fig. 41: Binocular Photo Tube Pol 20°/23 (100:0/0:100)

1	Eyepiece socket	2	Binocular section
3	Angle scale	4	Camera port
5	Slider for selecting the graduation ▪ Slider pushed in: 100% light to eyepieces ▪ Slider pulled out: 100% light to camera	6	Dovetail ring mount

11.1.3 Binocular Ergo Photo Tube 20°/23 (100:0/0:100)

Purpose Binocular photo tubes are used to observe the microscopic image by means of the eyepieces and/or acquire images with a camera. Using the camera port, the microscopic image can be sent to a connected camera.

Position The binocular photo tube is mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

The following features and controls are available:

- upright image
- camera port with toggle graduation (100:0/0:100)
- viewing angle 20°
- field of view 23 mm, usable 22 mm
- vertical adjustment of 44 mm with vertical scale

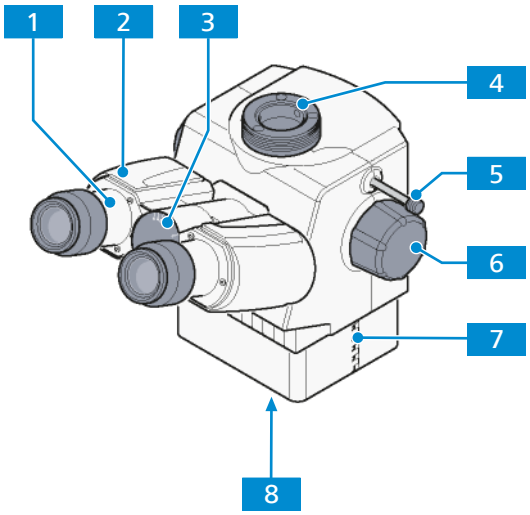


Fig. 42: Binocular Ergo Photo Tube 20°/23 (100:0/0:100)

1	Eyepiece socket	2	Binocular section
3	Angle scale	4	Camera port
5	Slider for selecting the graduation ▪ Slider pushed in: 100% light to eyepieces ▪ Slider pulled out: 100% light to camera	6	Rotary knob for vertical adjustment (right and left)
7	Vertical scale	8	Dovetail ring mount

11.1.4 Binocular Ergo Photo Tube 15°/23 (50:50)

Purpose Binocular tubes are used to visualize the microscopic image by means of the eyepieces.

Position The binocular tubes are mounted on the top of the stand.

Function The pupil distance and the viewing height can be adjusted with the aid of the binocular section.

Depending on the design, the following features and controls are available:

- upright image
- camera port with fixed light graduation (50:50)
- viewing angle 15°
- eyepiece shutter
- field of view 23 mm
- vertical adjustable and extendable

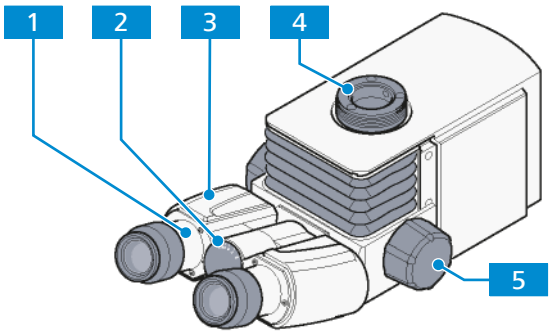


Fig. 43: Variants of binocular tubes

1	Eyepiece socket	2	Angle scale
3	Binocular section	4	Camera port
5	Rotary knob for vertical adjustment (right and left)		

11.1.5 Binocular Photo Tube 30°/23 (98:2), Reversed Image

Purpose Binocular photo tubes provide users with the convenience of accessing the sample images using eyepieces as well as monitors through camera at the same time. This specific splitting ratio allow users to look at the sample with naked eyes even though light intensity is set to maximum level.

Position The binocular photo tubes are mounted on the top of the stand.

Function The pupil distance and viewing height can be adjusted by bending the binocular device up or down.

The following features and controls are available:

- Reverse image
- Camera port with splitting ratio 98:2
- Viewing angle 30°
- Field of view 23 mm

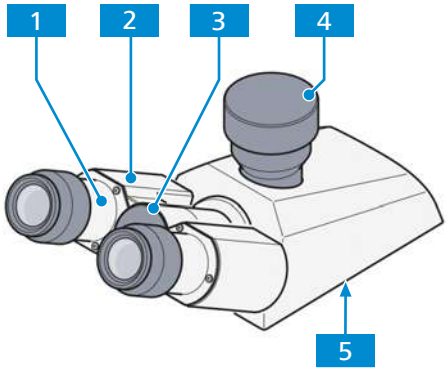


Fig. 44: Binocular photo tube 30°/23 (98:2), reversed image

1	Eyepiece socket	2	Binocular section
3	Angle scale	4	Camera port
5	Dovetail ring mount		

11.1.6 Binocular Photo Tube 30°/23 (100:0/30:70/0:100), Reversed Image

Purpose Binocular photo tubes provide users with the convenience of accessing the sample images using eyepieces as well as monitors through camera at the same time.This specific splitting ratio allow users to freely switch between looking at the sample with naked eyes or using monitors or at simultaneously.

Position The binocular photo tubes are mounted on the top of the stand.

Function The pupil distance and viewing height can be adjusted by bending the binocular device up or down.

The following features and controls are available:

- Reverse image
- Camera port with splitting ratio 100:0/30:70/0:100
- Viewing angle 30°
- Field of view 23 mm

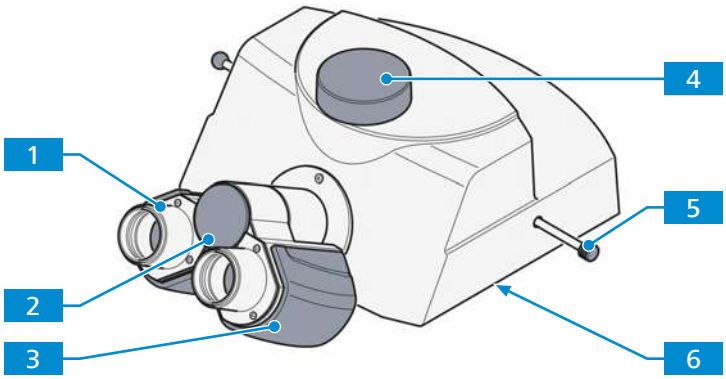


Fig. 45: Binocular photo tube 30°/23 (100:0/30:70/0:100), reversed image

1 Eyepiece socket

2 Angle scale

3 Binocular section

4 Camera port

5 Slider for selecting the graduation (right and left)

- Slider pushed in: 100% light to eyepieces
- Slider pushed in to the middle: 30% light to eyepieces, 70% light to camera
- Slider pulled out: 100% light to camera. 100% light to camera

6 Dovetail ring mount

11.2 Light Sources

11.2.1 HAL 100 Light Source

Position The HAL 100 light source can be mounted onto the transmitted or the reflected light path.

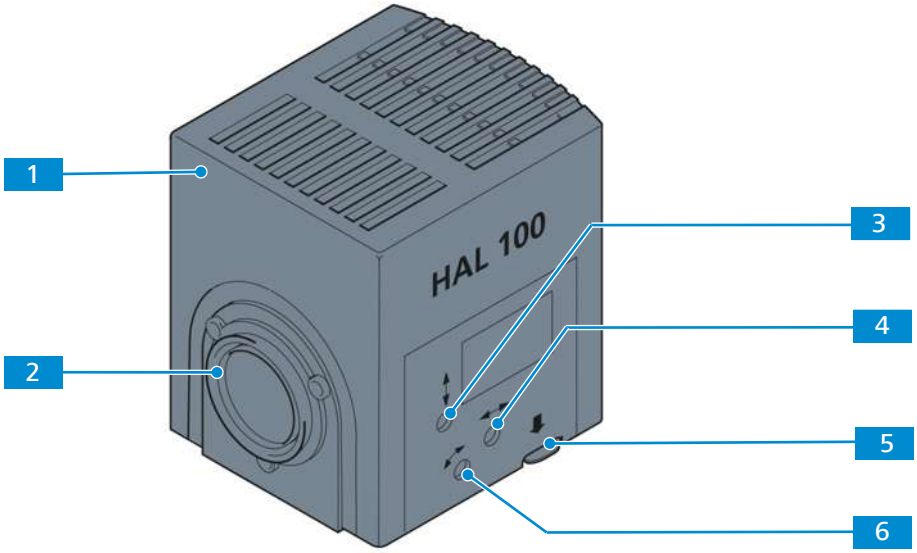


Fig. 46: HAL 100

1	Lamp housing	2	Dovetail ring
3	Vertical adjusting screw	4	Horizontal adjusting screw
5	Release latch	6	Adjusting screw

11.2.1.1 Labels on the Power Supply 12 V 100 W

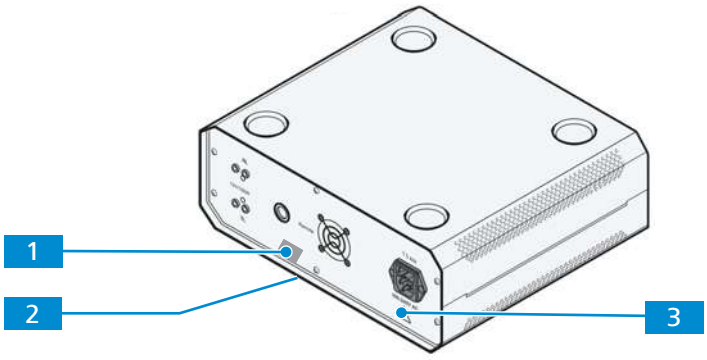
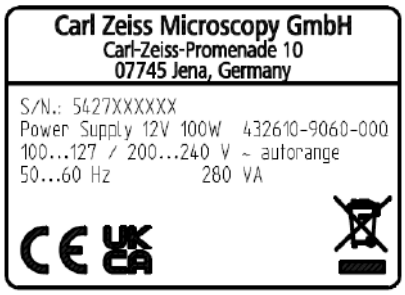


Fig. 47: Labels on the Power Supply 12 V 100 W

Pos.	Label or light	Explanation
1		Pull the power plug before opening.
2		Type label
3		Observe notes in the instruction manual and the supplied documents.

11.2.1.2 Controls and Functional Elements of Power Supply 12 V 100 W

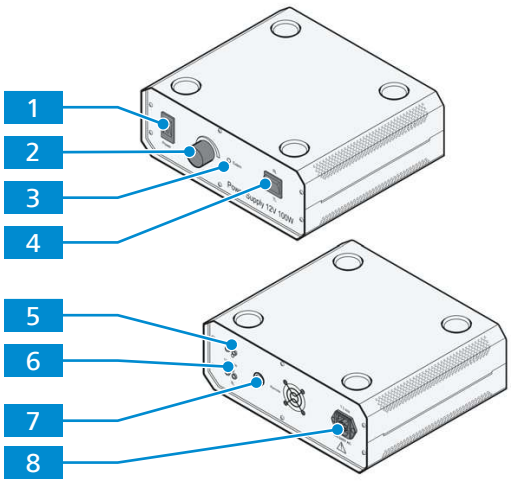


Fig. 48: Controls and Functional Elements of the Power Supply 12 V 100 W

1	**Power** switch	2	Dimmer
3	Indicator light for remote control operation	4	Toggle switch for **RL** and **TL**
5	Connection port for reflected light lamp **RL**	6	Connection port for transmitted light lamp **TL**
7	Connection port for illumination intensity control cable **Remote**	8	Mains socket

11.2.1.3 Assembling the HAL 100 Light Source for Transmitted Light Illumination

⚠ CAUTION

Eye damage or skin irritation due to hazardous light emission

The light source belongs to Risk Group 2 as specified in IEC 62471 and emits optical radiation and UV radiation. Eye damage or skin irritation may result from exposure.

- Never look directly into the light-emitting aperture of the light source.
- Avoid exposure of skin to the radiation. Use suitable protective equipment/protective clothing if required.
- Before installing or removing the light source always make sure it is switched off.

NOTICE

Heat damage

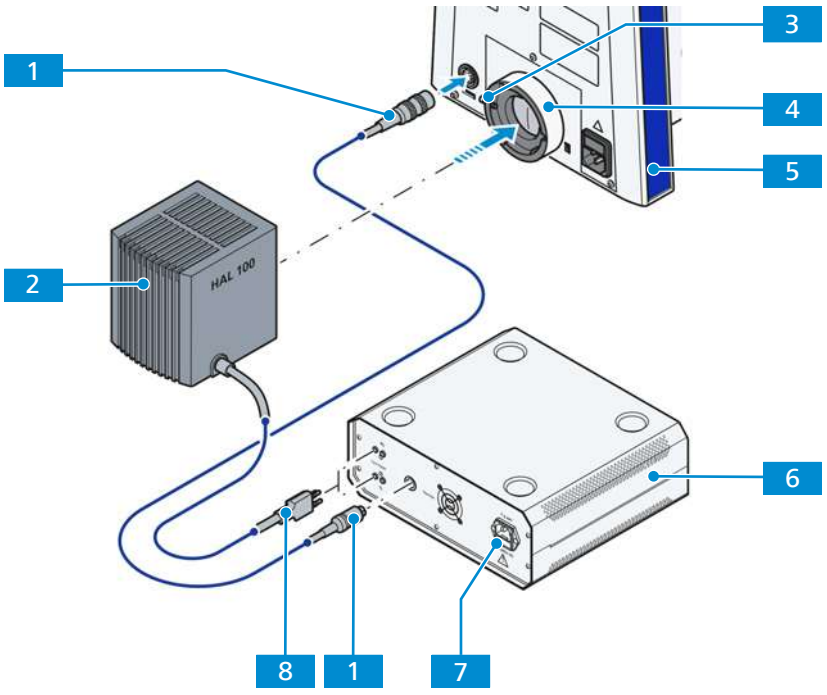
The HAL 100 bulb replacement tool might suffer damage from the emitted heat during the light source operation.

- Remove the bulb replacement tool from the HAL 100 housing before installing the light source.
- Do not operate the light source with the bulb replacement tool inside its housing.

Info

The light source cannot be mounted onto the standard stand.

When using the HAL or HBO light sources, a base plate for the Axioscope (000000-2202-526) is mandatory.



Parts and Tools

- Hex key, 3.0 mm

Prerequisite

- ✓ The microscope is switched off.
- ✓ The stand 5 is equipped with the illumination mount 4.
- ✓ The protective cap is removed from the illumination mount.
- ✓ *The base plate is installed. [▸ 64]*
- ✓ The external power supply for HAL 100 light source 6 is switched off.
- ✓ The bulb replacement tool is *removed [▸ 136]* from the light source housing.

Procedure

1. Loosen the clamping screw 3 on the illumination mount 4 of the carrier for transmitted-light illumination.
2. Insert the dovetail ring of the HAL 100 2 into the illumination mount.
3. Tighten the clamping screw 3.
4. At the external power supply, insert the plug of the light source's cable 8 into the **TL** port.
5. At the external power supply, insert the cable for illumination intensity control 1 into the **Remote** port.
6. At the back of the stand, insert the cable for illumination intensity control into the **Remote** port.
7. Switch the toggle switch for reflected or transmitted light to the **TL** position (transmitted light).
8. Connect the mains socket 7 of the external power supply to a mains. Use the power cord.

Proceed in the reverse order for removal.

11.2.1.4 Assembling the HAL 100 Light Source for Reflected Light Illumination

For assembling the HAL 100 light source for reflected light illumination, proceed in the same way as *transmitted light illumination [▸ 133]*.

11.2.1.5 Adjusting the HAL 100 Light Source

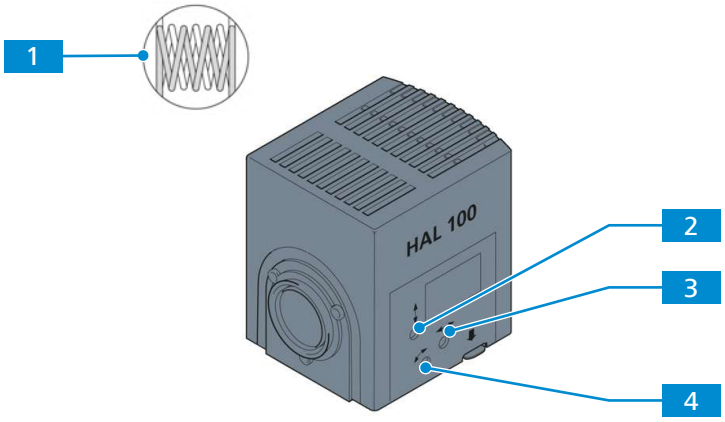
> **⚠ CAUTION**
>
> **Burning hazard due to hot light sources**
>
> Light sources can become hot during processing.
>
> ▸ Avoid touching the hot light source housing.
>
> ▸ Let the light source cool down before touching it.

> **⚠ CAUTION**
>
> **Eye injury due to light emission**
>
> Directly looking into emitted light can damage the eye.
>
> ▸ Do not look into the light exit aperture of the light source.

The following action comprises several action sequences. These sequences are to be carried out in the specified order.

- *Coarse Adjusting [▸ 135]*
- *Fine Adjusting [▸ 135]*

11.2.1.5.1 Coarse Adjusting



Parts and Tools

- Hex key, 3.0 mm

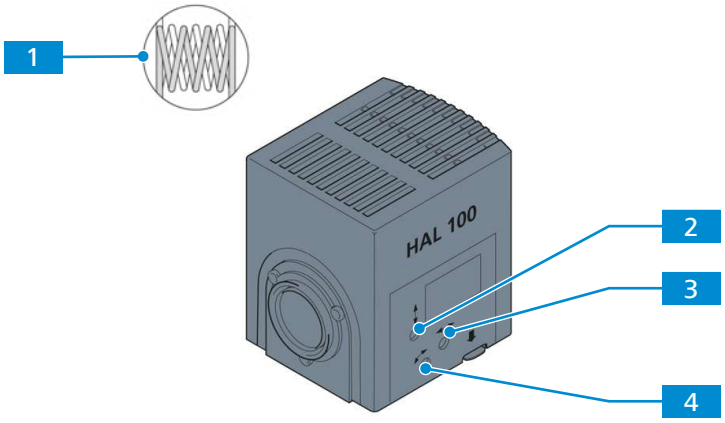
Prerequisite

- ✓ The microscope is switched off.
- ✓ The light source is installed on the microscope (see *Assembling the HAL 100 Light Source for Transmitted Light Illumination [▸ 133]* or *Assembling the HAL 100 Light Source for Reflected Light Illumination [▸ 134]*).
- ✓ The light source has cooled down.

Procedure

1. **NOTICE Make sure the light source does not fall when unfixing it.**
   Hold the light source and loosen the clamping screw at the light source mount of the stand.
2. Remove the light source and direct its aperture orthogonally to a projection surface in a distance of at least 3 m.
3. Switch on the external power supply of the HAL 100 light source.
   → The light switches on and two images of the lamp filament are projected onto the projection surface 1.
4. Adjust the adjusting screw 3 such that both images appear as sharp as possible.
5. Adjust the adjusting screws 2 and 4 so that the lamp filament of one image exactly fills the gaps of the reflected image.

11.2.1.5.2 Fine Adjusting



Parts and Tools

- Hex key, 3.0 mm

Prerequisite

- ✓ *The light source is coarsely adjusted. [▶ 135]*
- ✓ The light source is mounted to the microscope.
- ✓ The plug of the light source's cable is connected to the corresponding socket at the external power supply.
- ✓ All filters are removed from the beam path.

Procedure

1. Swivel in an objective with a magnification of 40x or lower.
2. Bring a free area of the sample into the beam path.
3. Remove the eyepiece from the tube.
4. While watching the two lamp filament images 1 through the tube, adjust the adjusting screws 2 and 4 to center the filaments in the eye pupil image.
5. Adjust the adjusting screw 3 such that the illumination of the image is as homogenous as possible.

11.2.1.6 Exchanging the Halogen Bulb 12 V, 100 W

⚠ CAUTION

Eye damage or skin irritation due to hazardous light emission

The light source belongs to Risk Group 2 as specified in IEC 62471 and emits optical radiation and UV radiation. Eye damage or skin irritation may result from exposure.

- ▸ Never look directly into the light-emitting aperture of the light source.
- ▸ Avoid exposure of skin to the radiation. Use suitable protective equipment/protective clothing if required.
- ▸ Before installing or removing the light source always make sure it is switched off.

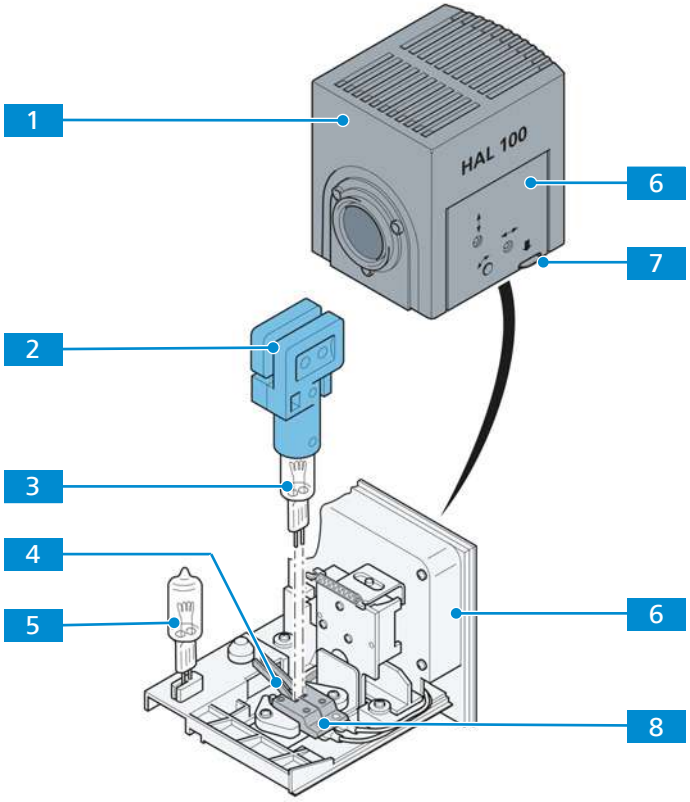
⚠ CAUTION

Burning hazard due to hot light sources

Light sources can become hot during processing.

- ▸ Avoid touching the hot light source housing.
- ▸ Let the light source cool down before touching it.

The light source does not have to be removed from the microscope for replacing the bulb.



Prerequisite

- ✓ The microscope is switched off.
- ✓ The plug of the light source's cable has been removed from the corresponding socket.
- ✓ The light source has cooled down for about 15 minutes.

Procedure

1. Press the release button 7 and pull the bulb carrier 6 completely out to the side.
2. Put the bulb replacement tool 2 onto the old bulb 3.
3. Press down the two spring levers 4 and remove the tool with the bulb in upward direction.
4. Remove the old bulb from the replacement tool.
5. ***NOTICE*** **Do not touch the new bulb with bare fingers! Even traces of grease can reduce its lifetime.**
   Put the bulb replacement tool onto the replacement bulb 5.
6. Press down the two spring levers and insert the new bulb into the bulb socket 8.
7. To center the bulb, briefly press the spring levers once more.
8. ***NOTICE*** **Do not leave the bulb replacement tool inside the light source.**
   Slide in the lamp carrier 7 into the housing 1 until it clicks into place.

Info

How To - Replace the HAL 100 Halogen Bulb

This video tutorial shows how to replace the halogen bulb in the HAL 100 light source. For service, support, and general contact visit www.zeiss.com/service-support.

youtu.be.PJYnvBRLdag

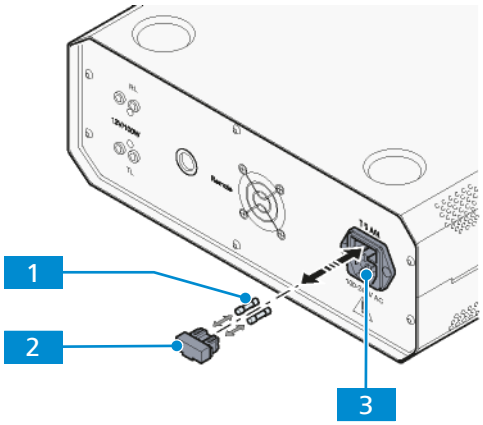
11.2.1.7 Exchanging the Fuses T 5.0A H 250V of the Power Supply 12 V 100 W

⚠ DANGER

Electric injury due to live parts

When an external power supply unit is still switched on, coming in contact with live parts can lead to electric shock or burn.

- Switch off the external power supply unit.
- Pull the power plug of the external power supply unit for safe disconnection from the power supply.



Parts and Tools

- 2x Fuse type T 5.0A H 250V 5x20mm

Prerequisite

- ✓ The microscope is switched off.
- ✓ The power supply is switched off.
- ✓ The power supply is disconnected from the mains.

Procedure

1. If the fuses fail, first check the cause and fix technical problems properly.
2. Remove the fuse holder 2 on the rear side of the stand.
3. Remove fuses 1 from the fuse holder.
4. Insert new fuses.
5. Push the fuse holder back into the fuse compartment 3 until it locks in place.
6. Connect and switch on the power supply.
7. Put the microscope back into operation.

11.2.2 HBO 100

Purpose The HBO 100 light source serves as a light source for the reflected light fluorescence process. The HBO 100 light source is available in two versions (manual and automatic adjustment).

Position The HBO 100 is installed on the illumination connector of the lower part of the stand.

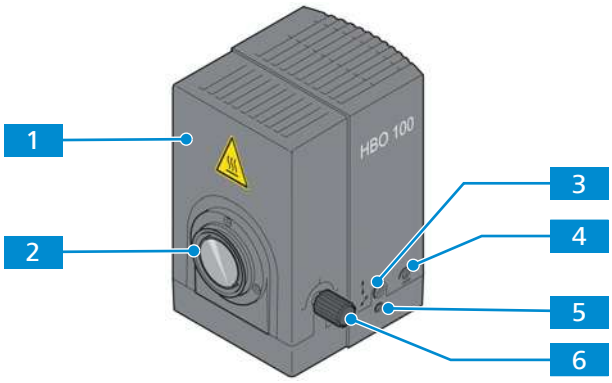


Fig. 49: HBO 100 light source

1	Lamp housing	2	Dovetail ring
3	Vertical adjusting screw	4	Locking screw
5	Horizontal adjusting screw	6	Knurled knob for collector adjustment

11.2.2.1 Labels on the HBO 100

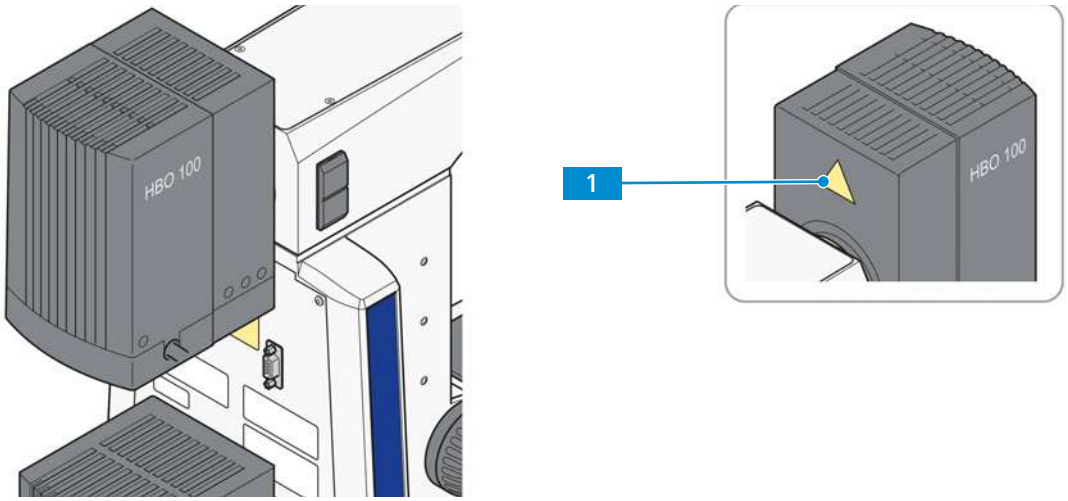


Fig. 50: Warning label on HBO 100 for reflected light

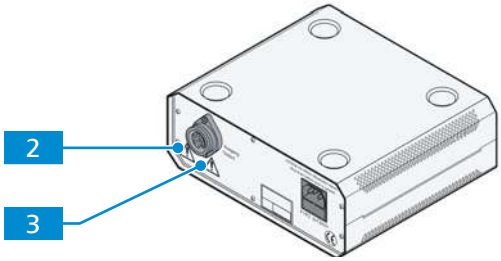


Fig. 51: Warning labels on the power supply unit for HBO 100

Pos.	Symbol	Description
1		Hot surface! Do not touch.
2		Observe notes in the instruction manual and the supplied documents.
3		High voltage! May only be opened by trained electrical engineering personnel.

11.2.2.2 Power Supply Unit for HBO 100

Purpose The power supply unit for HBO 100 is used to power the HBO 100 if it is used as a fluorescence illumination source.

Position The power supply unit can be placed beside the microscope.

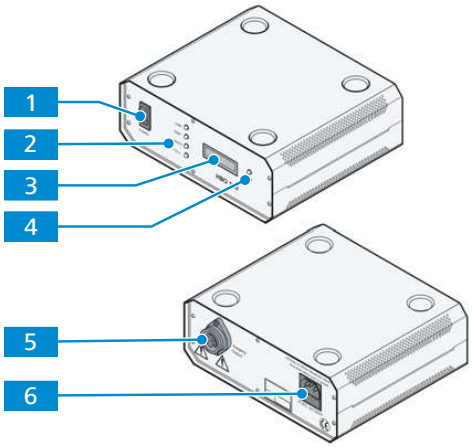


Fig. 52: Power supply unit for HBO 100 (front and rear side)

1 Power switch, lights when instrument is switched on

2 Indicator lights:

- **LAMP**, lights when the lamp has been ignited and is lighting
- **TEMP**, lights when the temperature inside the transformer is within the permissible range
- **SAFETY**, lights when the safety circuit of the lamp housing is closed
- **+12V**, lights when the additional voltage of the transformer is within the permissible range

3 Display of operating hour meter

4 **Reset** button, resets the operating hour meter to "0"

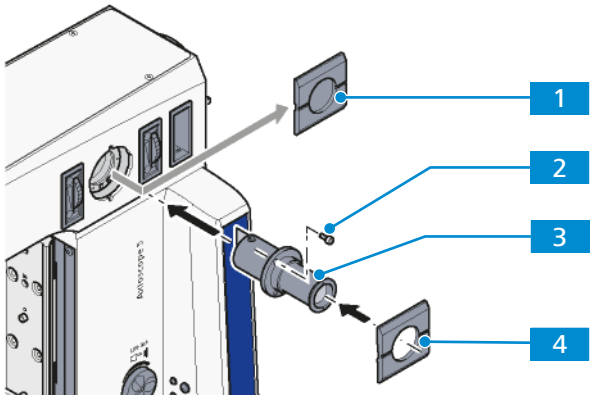
5 Connection port for HBO 100 light source

6 Mains socket

11.2.2.3 Assembling the Adjustment Tool of HBO 100

This procedure applies to the following stand type only:

- Axioscope 5 Bio-TL/RL



Prerequisite

✓ The microscope is switched off.

✓ The HBO 100 light source is installed.

Procedure

1. Remove the cover cap 1 from the mounting aperture of the stand.
2. Insert the adjustment tool 3.
3. Tighten the three included screws 2.
4. Attach the cover cap with opening 4 to the mounting aperture. Make sure it locks.
5. Slide in the movable connecting piece of the adjustment tool.

Proceed in the reverse order for removal.

11.2.2.4 Assembling the HBO 100 Light Source

⚠ CAUTION

Eye damage due to hazardous light emission

The light source belongs to Risk Group 2 as specified in IEC 62471 and emits optical radiation. Eye damage may result from exposure.

- Never look directly into the light-emitting aperture of the light source.
- Before installing or removing the light source always make sure it is switched off.

NOTICE

Risk of damage to the gray filter

The high light intensity of the light source can damage the gray filter for reflected light during prolonged use.

- Use an attenuator instead of a gray filter to change the light intensity in the reflected light path.

Info

The light source cannot be mounted onto the standard stand.

When using the HAL or HBO light sources, a base plate for the Axioscope (000000-2202-526) is mandatory.

Info

For installing or replacing the HBO 103 W/2 mercury vapor short-arc bulb at the HBO 100 light source, consult the operator manual supplied with the light source.

Parts and Tools

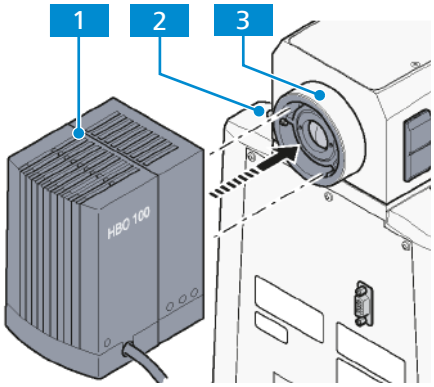
- Hex key, 3.0 mm

Prerequisite

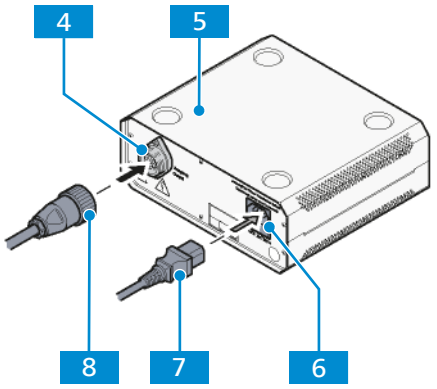
- ✓ The microscope is switched off.
- ✓ *The base plate is installed. [▸ 64]*
- ✓ The HBO 100 light source is switched off.
- ✓ The HBO 103 W/2 mercury vapor short-arc bulb is installed at the light source.
- ✓ The stand is equipped with the illumination mount.
- ✓ The protective cap is removed from the illumination mount of the stand.

Procedure

1. Loosen the clamping screw 2 on the illumination mount 3.



2. Insert the light source with the dovetail ring into the illumination mount.
3. Fasten the clamping screw.
4. Insert the multi-pin plug of the HBO 100 1 into the device connector 4 on the PSU 5.



5. Fasten the connector's coupling ring 8.
6. Connect the mains socket 6 of the PSU to the mains. Use the power cord 7.

Proceed in the reverse order for removal.

11.2.2.5 Adjusting the HBO 100 Light Source

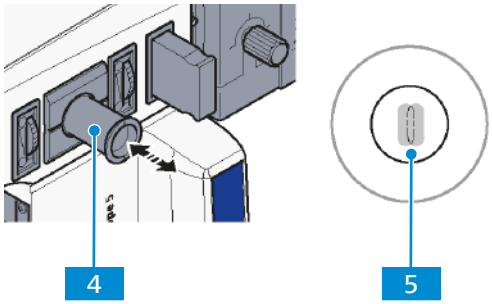
The self-adjusting HBO 100 light source does not require any adjustment procedure.

Prerequisite

- ✓ The light source is installed on the microscope.
- ✓ The light source is switched on and has reached operational temperature.
- ✓ If the FL attenuator is in the reflected light beam path, make sure that it is set to 100% transmission.

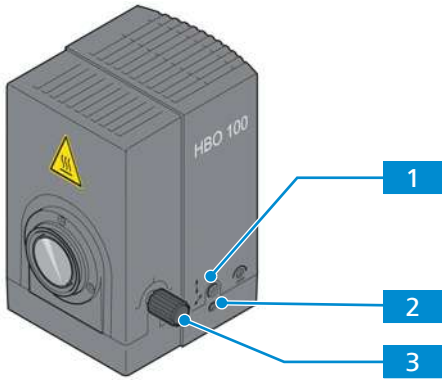
Procedure

1. Pull the adjustment tool 4 out of the microscope stand.



→ The lighter colored focal point of the HBO 103 W/2 lamp and its slightly darker reflection 5 become visible in the black glass window of the adjustment tool.

2. Use the knurled button for collector adjustment 3 to focus the brighter focal point.



3. Use the adjustment screws 1 and 2 to bring the two focal points as close together in the adjustment circle of the adjustment tool as possible.
4. Replace the adjustment tool in its original position.

11.2.3 HXP 120 V

The HXP 120 V is a compact light source for reflected-light fluorescence microscopy applications.

> **Info**
> For further information, refer to the instruction manual of the light source.

11.2.3.1 Assembling the HXP 120 V Light Source

Procedure

1. Place the light source on the table.
   → The front side with the operating and display elements must be freely accessible and visible. ***NOTICE*** **The ventilation slots on the sides and the rear panel of the device must not be covered; a free space of at least of at least 150 mm must be maintained in the area of the ventilation slots.**
2. Connect the plug-in power supply to the mains power supply.
3. Refer to the instruction manual of the HXP 120 V for further installation steps.

11.2.4 LED 10 Light Source

11.2.4.1 Labels on the LED light source

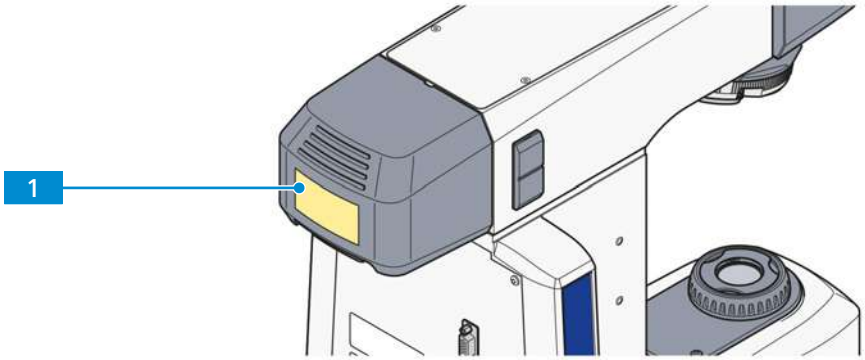


Fig. 53: Position of the warning label on microscopes with LED light source for reflected light

Pos.	Symbol	Description
1		CAUTION LED Radiation Do not stare at operating lamp. May be harmful to the eyes.

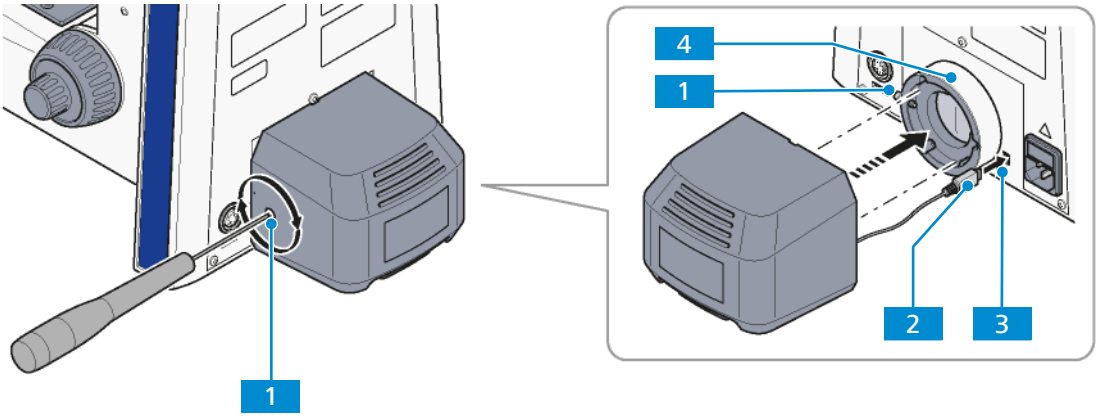
11.2.4.2 Assembling the LED10 Light Source for Transmitted Light Illumination

⚠ CAUTION

Eye damage or skin irritation due to hazardous light emission

The light source belongs to Risk Group 2 as specified in IEC 62471 and emits optical radiation and UV radiation. Eye damage or skin irritation may result from exposure.

- Never look directly into the light-emitting aperture of the light source.
- Avoid exposure of skin to the radiation. Use suitable protective equipment/protective clothing if required.
- Before installing or removing the light source always make sure it is switched off.



Parts and Tools

- Hex key, 3.0 mm

Prerequisite

- ✓ The microscope is switched off.
- ✓ The stand is equipped with the illumination mount.

Procedure

1. At the illumination mount on the rear side of the stand, loosen the clamping screw 1.
2. Insert the plug 2 of the light source's cable into the socket 3 for transmitted light illumination.
3. Insert the light source's dovetail ring into the illumination mount 4.
4. Ensure that the illumination cable is not being pinched or clamped.
5. Tighten the clamping screw 1.

Proceed in the reverse order for removal.

11.2.4.3 Assembling the LED10 Light Source for Reflected Light Illumination

For assembling the LED10 light source for reflected light illumination, proceed in the same way as for the *LED10 light source for transmitted light illumination [▸ 145]*.

11.2.5 Colibri 3 LED Light Source

11.2.5.1 Labels on the Colibri 3

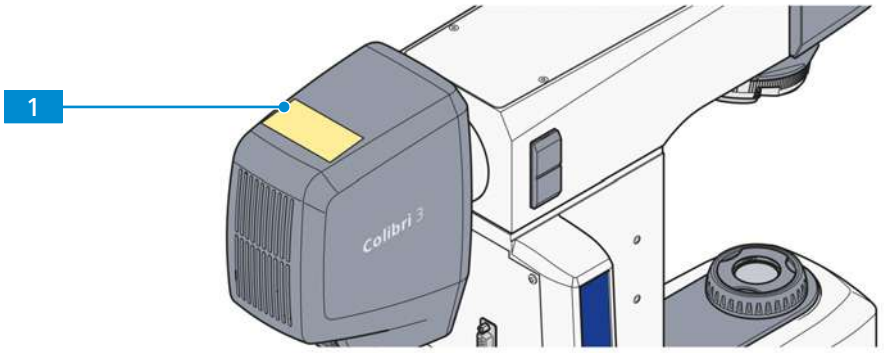


Fig. 54: Warning label on the Colibri 3 light source for reflected light

Pos.	Symbol	Description
1		Risk group 3 according to IEC 62471 WARNING: Possibly hazardous optical radiation emitted from this product. Do not look at operating lamp. Eye injury may result. WARNING: UV emitted from this product. Avoid eye and skin exposure to unshielded product.

11.2.5.2 Assembling the Colibri 3 LED Light Source

⚠ WARNING

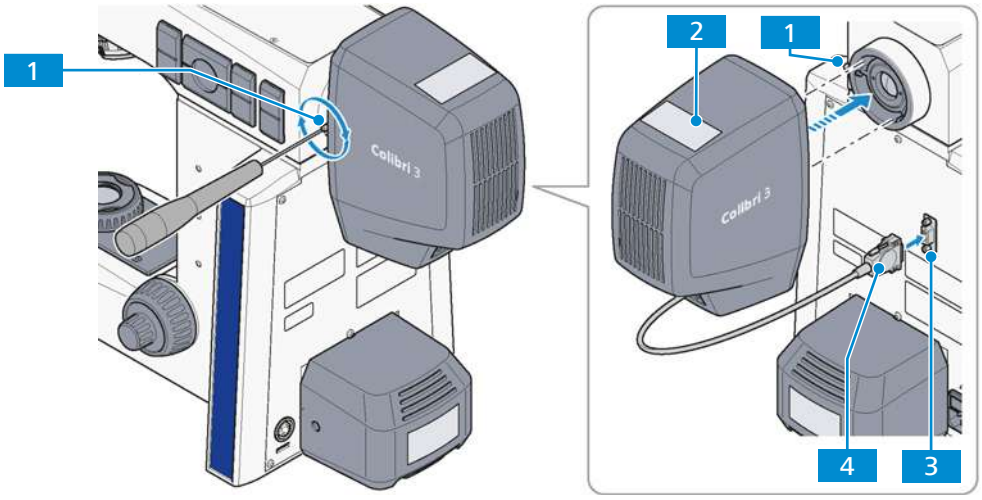
Skin or eye injury due to hazardous light emission

The light source belongs to Risk Group 3 as specified in IEC 62471 and emits LED radiation and UV radiation. Skin or eye injury can result from the exposure.

- Avoid any eye and skin exposure to the light-emitting aperture of the light source.
- Avoid exposure of skin to the radiation. Use suitable protective equipment/protective clothing if required.
- Before installing or removing the light source always make sure it is switched off.

Info

Further information on installing the light source is available in the supplied instruction manual.



Parts and Tools

- Hex key, 3.0 mm

Prerequisite

- ✓ The microscope is switched off.
- ✓ The Colibri 3 LED light source is switched off.
- ✓ The stand is equipped with the illumination mount.
- ✓ The protective cap is removed from the illumination mount.

Procedure

1. At the illumination mount on the rear side of the stand, loosen the clamping screw 1.
2. Insert the LED light source 2 with the dovetail ring into the illumination mount.
3. Tighten the clamping screw.
4. Connect the LED light source plug 4 to the stand socket 3.
5. Tighten the fixing screws on the plug.

Proceed in the reverse order for removal.

11.2.5.3 Exchanging the LED Modules of the Colibri 3 LED Light Source

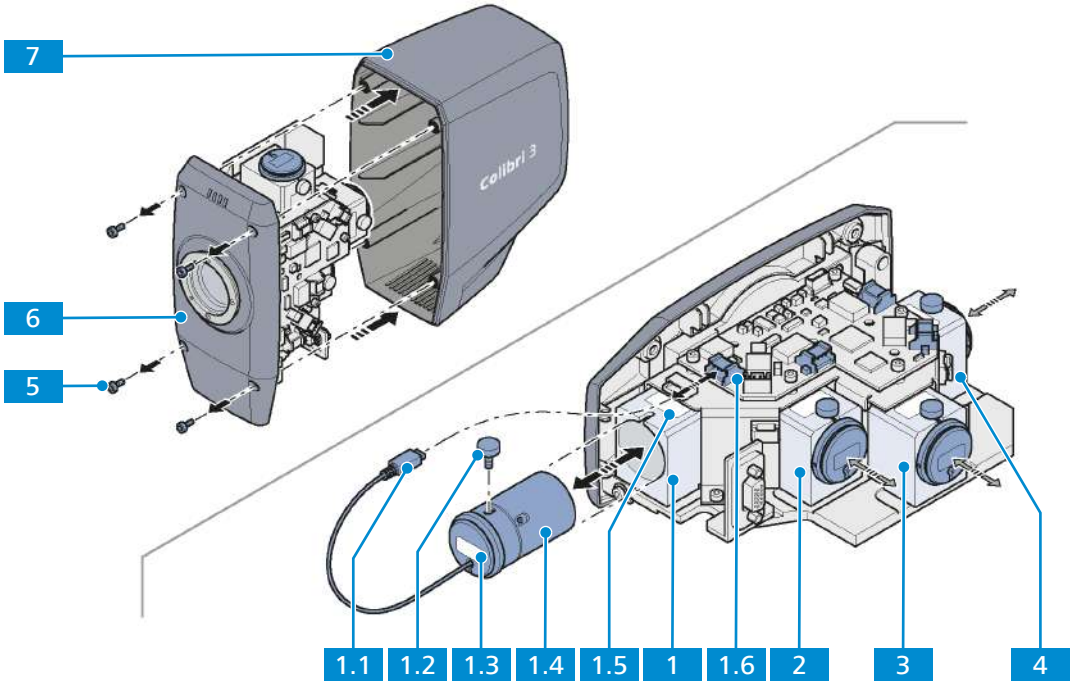
⚠ WARNING

Skin or eye injury due to hazardous light emission

The light source belongs to Risk Group 3 as specified in IEC 62471 and emits LED radiation and UV radiation. Skin or eye injury can result from the exposure.

- ▸ Avoid any eye and skin exposure to the light-emitting aperture of the light source.
- ▸ Avoid exposure of skin to the radiation. Use suitable protective equipment/protective clothing if required.
- ▸ Before installing or removing the light source always make sure it is switched off.

For more information about the usability of LED modules for Colibri 3, see *Usability of LED Modules for the Colibri 3 LED Light Source [▸ 122]*.



Parts and Tools

- Hex key, 3.0 mm

Prerequisite

- ✓ The microsope is switched off.
- ✓ The plug of the light source's cable has been removed from the corresponding socket.
- ✓ The Colibri 3 light source is removed from the microscope.

Procedure

1. Loosen the four captive screws 5 on the front side 6 of the light source.
2. Remove the housing 7.
3. Disconnect the LED module power cable connector 1.1 from the PCBA 1.6.
4. Loosen the knurled screw 1.2.
5. Remove the old LED module 1.4.
6. Select the LED module with matching LED-specific labels 1.3 and 1.5.
7. Insert the LED module in the correct slot.
8. Connect the LED module power cable connector to the PCBA.
9. If required, replace the LED modules of LED slots 2, 3, and 4 in the same way.
10. Re-mount the housing.

11.2.6 Viluma 5/7

The Viluma 5/7 is an LED-based light source for reflected-light fluorescence microscopy applications.

> **Info**
> For further information, refer to the instruction manual of the light source.

11.2.6.1 Labels on the Viluma 5 or Viluma 7

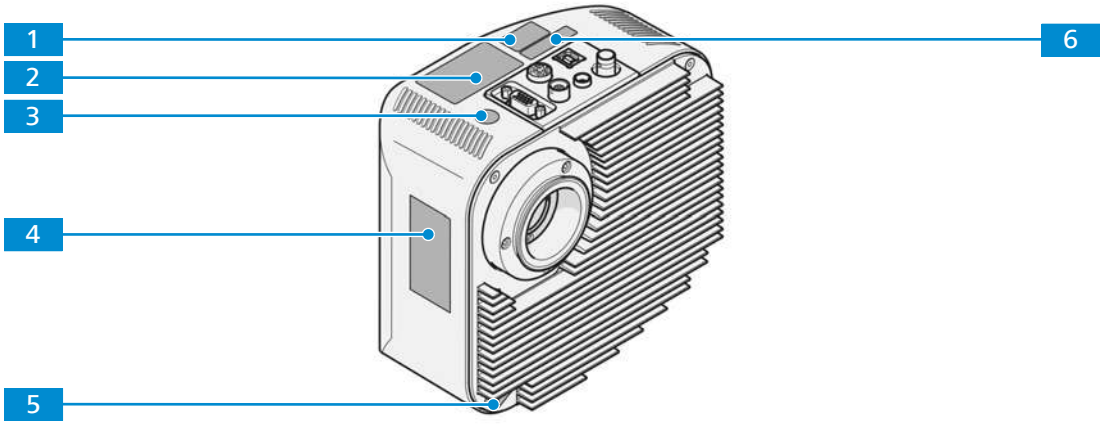
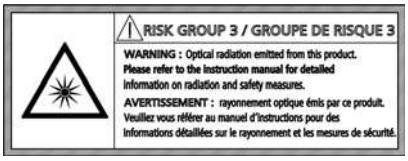
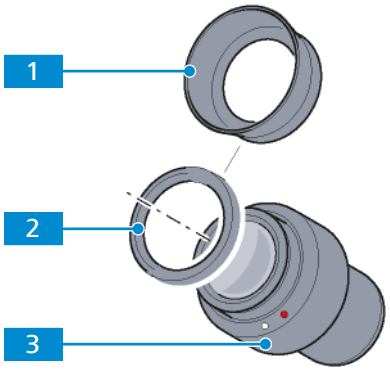


Fig. 55: Labels on the Viluma 5 or Viluma 7 LED light source

Pos.	Label	Explanation
1		CSA label
2		Type label
3		Observe instructions for use.

Pos.	Label	Explanation
4		Optical radiation warning label WARNING UV emitted from this product. Avoid eye and skin exposure to unshielded product. WARNING Possibly hazardous optical radiation emitted from this product. Do not look at operating lamp. Eye injury may result. CAUTION Possibly hazardous optical radiation emitted from this product. Do not stare at operating lamp. May be harmful to the eyes.
5		Hot surface! Do not touch.
6		Patent label (only valid for Viluma 7)

11.3 Assembling the Reversible Eyecups



Procedure

1. Remove the eyeglass protection ring 2 from the eyepiece 3.
2. Mount the reversible eyecup 1.

Sometimes the eyeglass protection rings are seated very tightly in the eyepiece groove, so you may need a blunt sample (wooden stick) to prod them off.

11.4 Analyzer Sliders

11.4.1 Analyzer Slider TL/RL, Fixed

Purpose The analyzer slider is used to set the polarization contrast technique.

Position The analyzer slider is inserted into the 12x46 slot of the intermediate plate for analyzer slider 12x46 mounted between stand and tube.

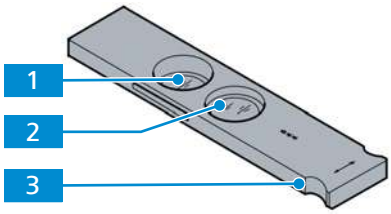


Fig. 56: Analyzer slider TL/RL, fixed

1	Empty position	2	Analyzer
3	Handle		

11.4.2 Analyzer Slider TL/RL, with Lambda Plate, 360° Rotatable

Purpose The analyzer slider is used to set the polarization contrast technique.

Position The analyzer slider is inserted into the 12x46 slot of the intermediate plate for analyzer slider 12x46 mounted between stand and tube.

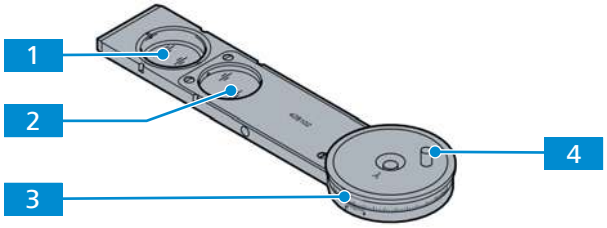


Fig. 57: Analyzer slider TL/RL, with lambda plate, 360° rotatable

1	Empty position	2	Analyzer and lambda plate
3	Angle scale	4	Handle to rotate the lambda plate

11.4.3 Analyzer Slider TL/RL with Lambda Plate, each Rotatable +/- 10°

Purpose The analyzer slider is used to set the polarization contrast technique.

Position The analyzer slider is inserted into the 12x46 slot of the intermediate plate for analyzer slider 12x46 mounted between stand and tube.

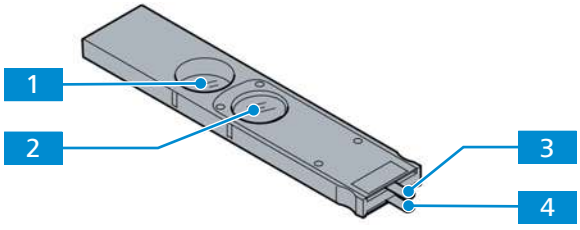


Fig. 58: Analyzer slider TL/RL with lambda plate, each rotatable +/- 10°

1	Empty position	2	Analyzer and lambda plate
3	Handle for adjusting the lambda plate	4	Handle for adjusting the analyzer

11.5 DIC Slider C 6x20

Purpose The DIC slider is used to set the DIC contrast technique.

Position The DIC slider is inserted into the 6x20 slot above the nosepiece.

The DIC slider is available in two versions:

- DIC Slider C 6x20 for objectives EC Epiplan 5x - 20x
- DIC Slider C 6x20 for objectives EC Epiplan 50x - 100x

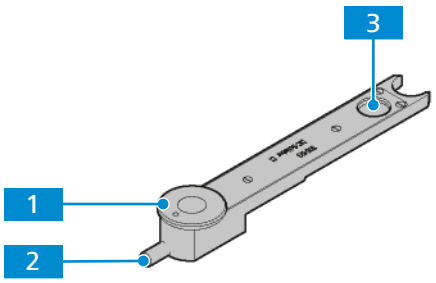


Fig. 59: DIC Slider C 6x20

1	Setting wheel	2	Setting screw
3	DIC prism		

11.6 Stop Sliders for Aperture and Luminous-Field Diaphragms

Purpose The stop sliders serve to adjust the reflected light beam path.

Position The stop sliders are mounted in the slots F and A of the upper part of the stand for reflected light.

Function One stop slider is required to function as a luminous-field diaphragm (F) and the other to function as the aperture diaphragm (A).

> **Info**
>
> When using fluorescent light, an FL attenuator (if not pre-installed) can be used instead of the aperture diaphragm to attenuate the excitation intensity.

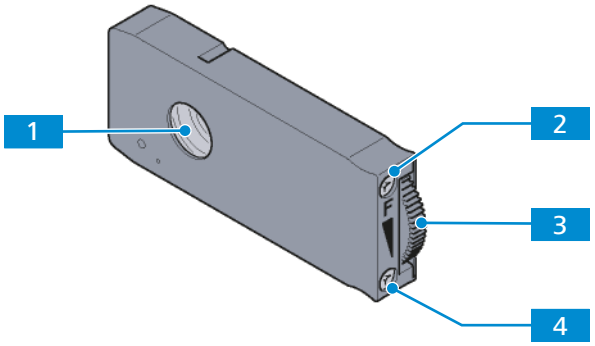


Fig. 60: 14x40 mm stop slider

1	Diaphragm	2	Centering screw
3	Knurled wheel to open/close the diaphragm	4	Centering screw

11.7 Stages

A stage is a platform at right angles to the optical axis of the microscope, which carries the sample and which is often fitted with mechanical movements (as in a mechanical stage) to allow easy positioning of the object in the x- and y-axis, and movement along, and rotation about the z-axis.

11.7.1 Mechanical Stage, 75x50/240° Rotatable

Purpose Mechanical stages are used for fixing and positioning the sample for examination.

Position The mechanical stages are mounted on the stage carrier of the stand.

Function The sample is fixed on the stage by means of the sample holder. For this purpose, the sample holder is equipped with a spring lever.

The sample is positioned in the beam path by means of the two coaxial drives in x and y direction. The adjustment range can be read off the respective vernier scale.

The following features and controls are available:

- 240° rotatable with clamping function
- coaxial drives in X and Y adjustment on the right, drive length 160 mm
- travel range 75 x 50mm
- with hardcoat anodized surface

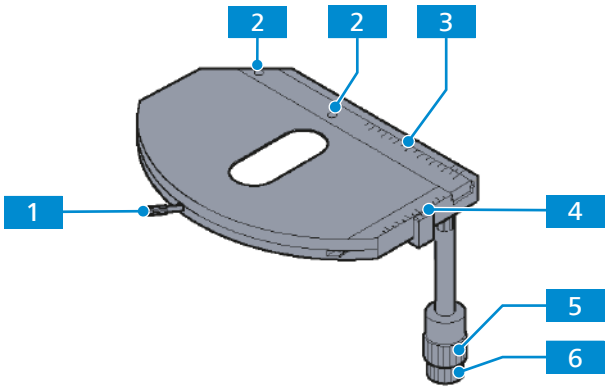
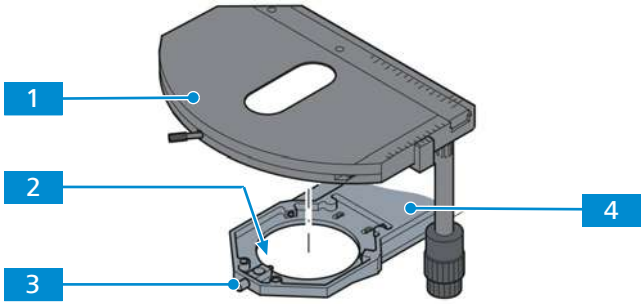


Fig. 61: Mechanical stage, 75x50/240° R

1	Knurled screw for clamping the stage rotation	2	Threaded holes (2x) for fixing the sample holder to the stage
3	Vernier scale for display of the adjustment range in X	4	Vernier scale for display of the adjustment range in Y
5	Coaxial knurled knob for Y adjustment	6	Coaxial knurled knob for X adjustment

11.7.1.1 Assembling the Rotatable Mechanical Stage

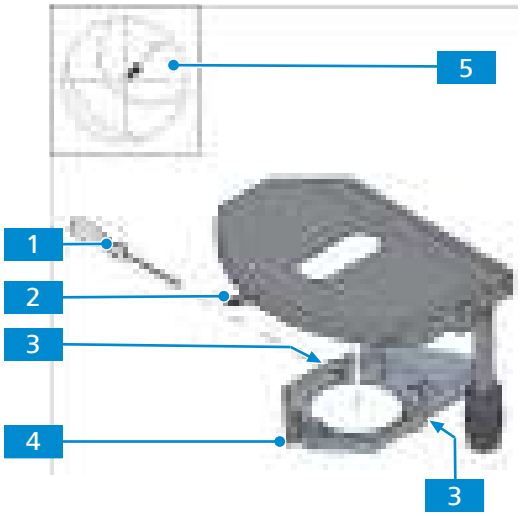


Procedure

1. Loosen the screw cap 3 of the spring-loaded pin 2 with approx. 3 turns.
2. Put the stage 1 with the dovetail ring notch onto the spring pin.
3. Press the stage forward against the spring-loaded pin and lower its back side into the stage carrier 4.
4. Tighten the screw cap.

Proceed in the reverse order for removal.

11.7.1.2 Centering the Rotatable Mechanical Stage



Parts and Tools

- Hex key, 1.5 mm

Prerequisite

- ✓ The rotary mechanical stage is installed in the stage carrier.
- ✓ A high-contrast sample and an eyepiece with a crossline reticle are available.
- ✓ The microscope is adjusted for *transmitted light brightfield microscopy [▸ 78]*.

Procedure

1. Loosen the clamping screw 2 of the stage.
2. Loosen the screw cap 4 of the stage carriers.
3. Turn the stage, until the maximum shift of the sample 5 (arrow point) to the reticle in the eyepiece is reached.
4. Turn the two centering screws 3 on the stage carrier, to shift the sample detail half the length of the arrow towards the center of the reticle. Use a 1.5 mm hex key 1.
5. Repeat the procedure if the sample detail shifts out of the center again when turning the stage.
6. Tighten the clamping screw and the screw cap.

11.7.2 Rotary Stage Pol 360° with Clamping Device

Purpose Rotary stages are used for fixing and positioning the sample for examination in polarized light.

Position The rotary stages are mounted on the stage carrier of the stand.

Function The sample is fixed on the stage by means of the clamping device.

The following features and controls are available:

- 360° rotation with lock
- click stop every 45°

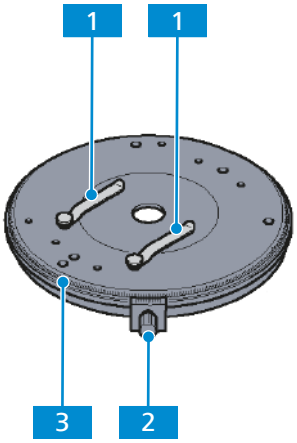
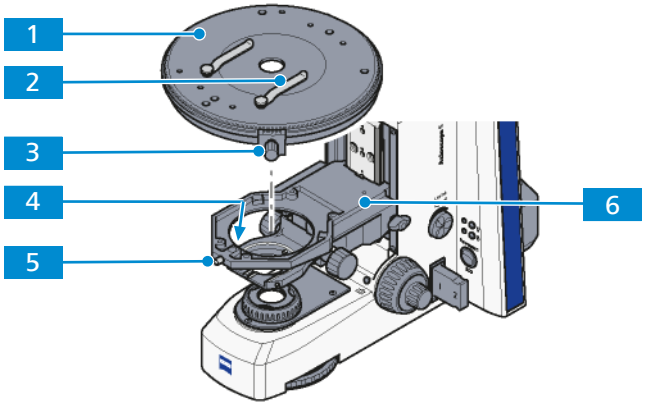


Fig. 62: Rotary Stage Pol 360° with clamping device

1	Clamping device	2	Knurled screw for locking the rotation, 360° rotation possible
3	Angle scale		

11.7.2.1 Assembling the Pol Rotary Stage



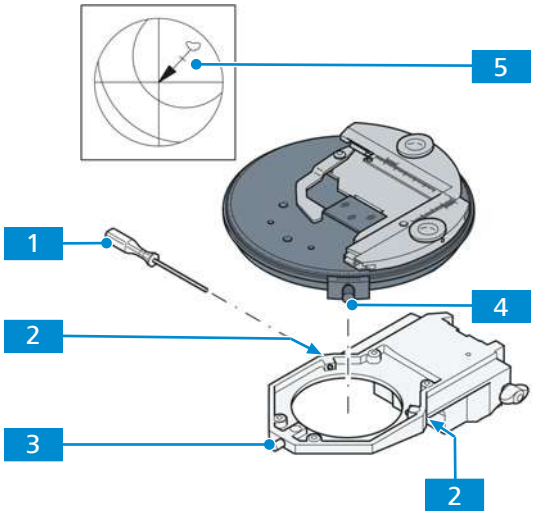
Procedure

1. Loosen the screw cap 5 of the spring box with approx. 3 turns.
2. Put the rotary 1 stage with the dovetail ring notch onto the spring-loaded pin 4. The knurled screw 3 must point to the front right.
3. Press the stage forward against the spring-loaded pin and lower it towards the back into the stage carrier 6.
4. Tighten the screw cap.
5. Insert the stage clips of the clamping device 2 into the holes on the stage provided for this purpose.

Proceed in the reverse order for removal.

11.7.2.2 Centering the Pol Rotary Stage

All stages are factory-pre-centered, i.e. when rotating the stage the sample feature set to the center of the field of view will remain in the center. If the sample feature moves off the center of the field of view while rotating the stage, the stage should be re-centered as follows.



Parts and Tools

- Hex key, 1.5 mm

Prerequisite

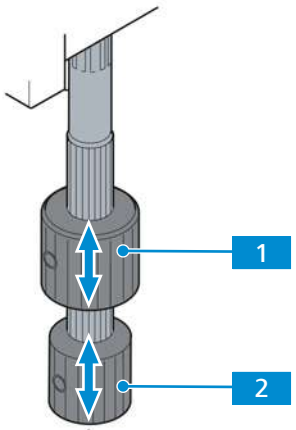
- ✓ The rotary stage is installed in the stage carrier.
- ✓ The *KÖHLER illumination [▸ 78]* is adjusted.
- ✓ A high-contrast sample and an eyepiece with a crossline reticle are available.

Procedure

1. Loosen the knurled screw for locking the rotation 4.
2. Unscrew the stage carrier cap 2.
3. Rotate the stage to determine the position of maximum offset of the sample feature from the center of the eyepiece reticle.
4. Turn the two centering screws 4 on the stage carrier to move the sample feature 5 by half the arrow length towards the reticle center. Use a 1.5 mm hex key 1.
5. Rotate the stage again to check if the sample feature moves off.
6. Repeat the centering procedure, if necessary.
7. Tighten the screw cap.

11.7.3 Adjusting the Drive Length on the Stage Drive

Purpose On mechanical stages with ergo-drive, the length of the x and y stage drive can be extended by max. 15 mm by axial movement of the drive knobs to further improve operating ease.



Procedure

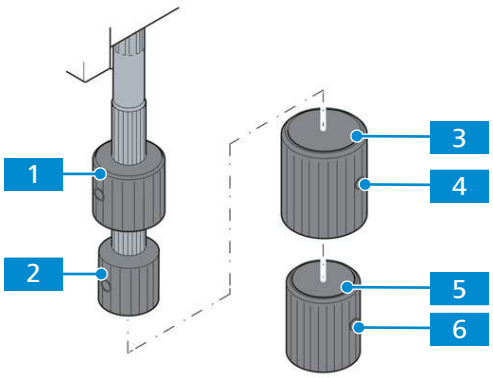
1. Shift or lower the coaxial knurled knob 1 for the y adjustment within a range of approx. 15 mm.
2. Shift or lower the coaxial knurled knob 2 for the x adjustment within a range of approx. 15 mm.

11.7.4 Removing the Additional Sleeves on the Ergonomic Stage Drive

Both coaxial knurled knobs for the stages are equipped with additional sleeves for an even more sensitive adjustment of the sample position. These sleeves can be removed when a faster sample movement is important.

Procedure

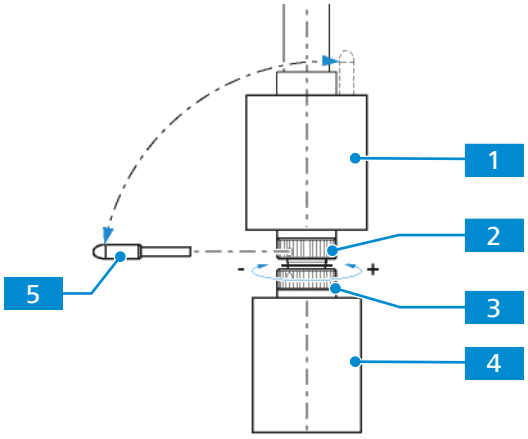
1. Loosen both clamping screws 6 on the lower additional sleeve 5.



2. Remove the lower additional sleeve 5 from the x coaxial knurled knob 2 by pulling it down.
3. Loosen both clamping screws 4 on the upper additional sleeve 3.
4. Remove the upper additional sleeve 3 from the y coaxial knurled knob 1 by pulling it down.

Proceed in the reverse order for installing.

11.7.5 Adjusting the Friction of the Coaxial Knurled Knobs on the Stage Drive



X drive

Procedure

1. Push the coaxial knurled knob for the X adjustment 4 all the way to the bottom.
2. Remove the supplied adjusting pin 5 from the coaxial knurled knob for the Y adjustment 1.
3. Insert it into one of the holes of the lower hole nut 3.
4. Hold the coaxial knurled knob for the X adjustment 4 and turn the hole nut with the adjusting pin clockwise or counter-clockwise until the desired freedom of movement has been achieved.
   → Small friction adjustment: – (clockwise)
   Large friction adjustment: + (counter-clockwise)
   It should not be shifted more than one revolution.

Y drive

Procedure

1. Push the coaxial knurled knob for the Y adjustment 1 all the way to the top.
2. Insert the supplied adjusting pin 5 into the hole of the upper hole nut 2.
3. Hold the coaxial knurled knob for the Y adjustment 1 and turn the hole nut with the adjusting pin clockwise or counter-clockwise until the desired freedom of movement has been achieved.
   → Small friction adjustment: – (clockwise)
   Large friction adjustment: + (counter-clockwise)
   It should not be shifted more than one revolution.
4. Re-insert the adjusting pin into the coaxial knurled knob for the Y adjustment.

11.7.6 Adjusting the Friction of the Coaxial Knurled Knobs on the Ergonomic Stage Drive

The smoothness of the ergonomic operation is factory pre-set to a medium level. Depending on the installed stage, the operator can change it as follows:

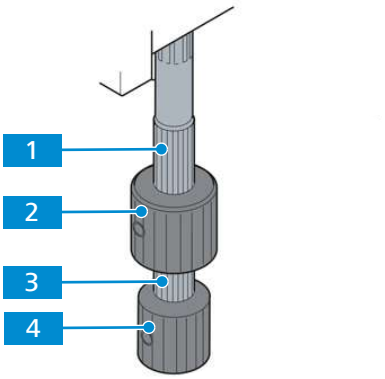
X drive

Prerequisite

✓ The additional sleeves are *removed [▸ 157]*.

Procedure

1. Shift the x coaxial knurled knob 4 downward and the y coaxial knurled knob 2 upward.



2. Hold the x coaxial knurled knob 4 and turn the light-colored knurled ring above it 3 to the right (increased smoothness) or left (decreased smoothness) until you reach the desired level.

Y drive

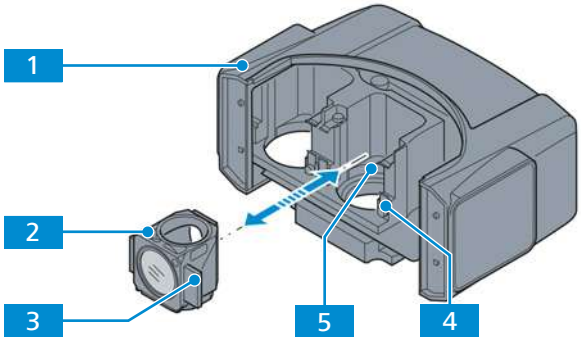
Procedure

1. Hold the y coaxial knurled knob 2 and turn the light-colored knurled sleeve above it 1 to the right (increased smoothness) or the left (decreased smoothness) until you reach the desired level.

11.8 Loading the Reflector Module

11.8.1 Assembling Reflector Modules

To ease the use and the recovery of reflector modules, the modules should be installed to defined positions. The insert positions' numeric markings can be used to identify the modules.



Procedure

1. Remove the *reflector insert [▸ 68]* 1 from the upper part of the stand.
2. Put the reflector insert aside with the top side facing down.
3. **NOTICE** **Avoid touching optical surfaces.**
   Carefully insert the module 2 (with the top side facing down) with the aid of its retaining brackets 3 at a slant from the top into the lower spring clips 4.
4. Press the module against the upper spring clips 5 of the reflector insert until it engages firmly.
5. Install the reflector insert.

Proceed in the reverse order for removal.

11.8.2 Exchanging the Filters of the Reflector Module FL P&C

NOTICE

Sensitive equipment

Changing the optical parts of a reflector module without damage requires considerable skills and utmost care.

- If possible, use fully equipped reflector modules provided by ZEISS.
- Take maximum care not to damage any optical or mechanical part when equipping a reflector module.

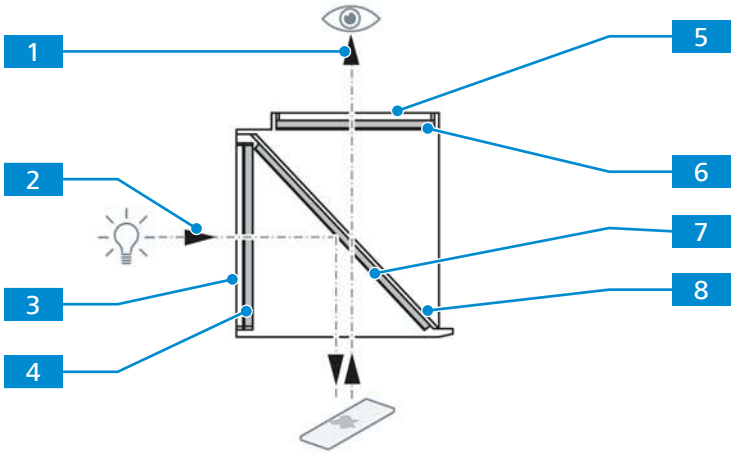


Fig. 63: Mounting the filters and the beam splitter

1	Path of the imaging beam	2	Path of the illumination beam
3	Reflective coating of the excitation filter	4	Excitation filter
5	Emission filter	6	Reflective coating of the emission filter
7	Reflective coating of the beam splitter	8	Beam splitter

Note the following orientation rules:

- **Emission filters** 5 should be installed with the reflective coating pointing to the inside of the reflector module.
- **Emission filters** 5 with a direction indicating arrow on their circumference must be installed with the arrow pointing to the inside of the reflector module.
- **Emission filters** 5 with a label indicating the wedge angle must be installed such that the label points to the reflector module's orientation notch.
- **Excitation filters** 4 should be installed with the reflective coating pointing to the outside of the reflector module.
- **Excitation filters** 4 with a direction indicating arrow on their circumference must be installed with the arrow pointing to the inside of the reflector module.

Parts and Tools

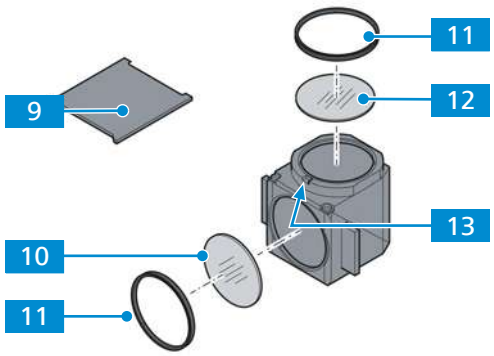
- Tool set for filter exchange
- Lint-free gloves

Prerequisite

- ✓ The reflector module is removed from the reflector insert.

Procedure

1. Unscrew the retaining ring 11 using the mounting plate 9 of the tool set .



2. **NOTICE Avoid contact of sensitive optical components to hard surfaces.**
   Turn the reflector module to let the filter slide out onto a soft surface.
3. Carefully grab the filter 10 / 12 to be installed at its circumference.
4. Set the filter into the corresponding position of the reflector module. Observe the correct orientation. Ensure that the coated surface points into the desired direction 13.
5. Screw in the retaining ring 11.

11.8.3 Exchanging the Beam Splitter of the Reflector Module FL P&C

NOTICE

Sensitive equipment

Possibility of damage to optical or mechanical parts during the exchange of the beam splitter.

- If possible, use fully equipped reflector modules provided by ZEISS.
- Take maximum care not to damage any optical or mechanical part when equipping a reflector module.

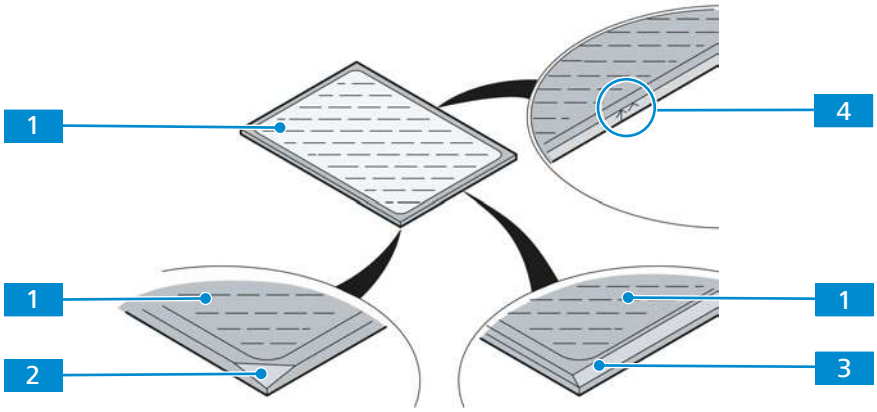


Fig. 64: Labeling of the beam splitter

1	Reflective coating of the beam splitter	2	Beveled corner
3	Beveled edge	4	Engraving

Note the following orientation rule:

The reflective coating of the beam splitter 1 should point in the direction of the sample.

The coated side of the beam splitter is marked either by a beveled edge 3, a beveled corner 2, or an engraving 4.

Parts and Tools

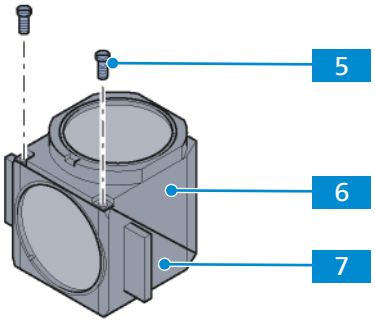
- Tweezers
- Screwdriver, flat head (small)

Prerequisite

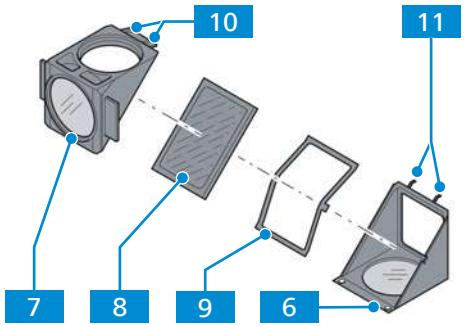
✓ The reflector module is removed from the reflector insert.

Procedure

1. Remove both fixation screws 5.



2. Hold both parts of the reflector module (the emission part 6 and the excitation part 7) together, and turn the entire reflector module upside down, so that the emission filter points downwards.
3. Tilt the excitation part 7 upwards and carefully move it to the module's back, so it is released from the retaining pins 11 of the emission part.

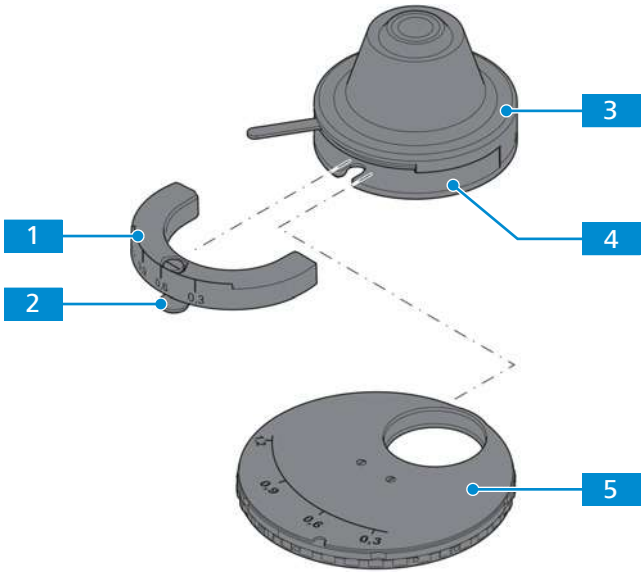


→ You are facing the beam splitter 8.

4. Remove the beam splitter and the spring-loaded frame 9 from the emission part.
5. Remove the beam splitter from the spring-loaded frame.
6. Position the new beam splitter on the spring-loaded frame with the coated side pointing upwards.
7. Place the frame with the beam splitter on the emission part of the reflector module. Make sure the lateral tab of the spring-loaded frame engages with the notch of the emission part.
8. Carefully place the excitation part on the emission part, hinging the eyelets 10 of the excitation part into the retaining pins 11 of the emission part.
9. Hold both parts of the reflector module together and turn the entire reflector module upside down, so that the emission filter points upwards.
10. Screw in the fixation screws.
11. Attach the adhesive label with the name of the filter combination to the reflector module's side wall.

11.9 Loading the Condenser

11.9.1 Assembling the Modulator Disk in the Condenser 0.9 BF Pol



Parts and Tools

- Hex key, 3.0 mm

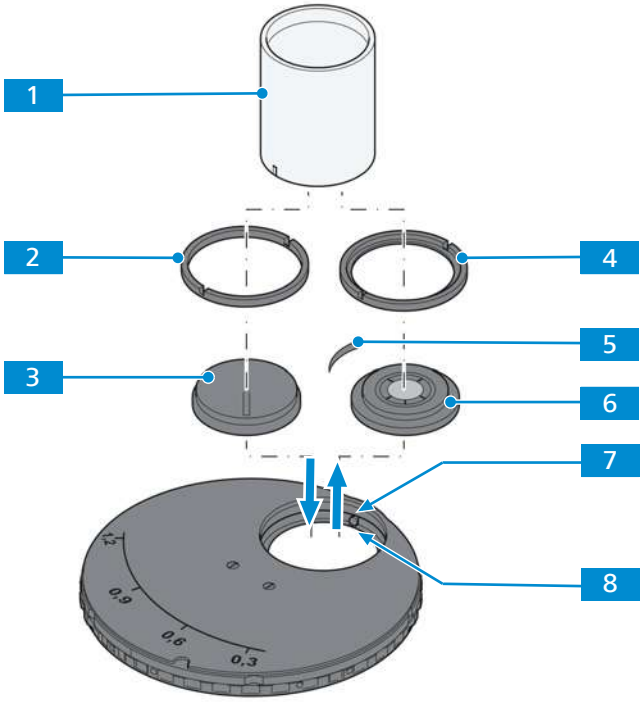
Prerequisite

- ✓ The condenser 3 is *removed from the condenser carrier [▸ 188]*.

Procedure

1. Loosen the clamping screw 2 of the condenser's dial segment 1 and pull out the dial segment.
2. Slide the modulator disk 5 with its two-pronged forked opening pointing forward into the condenser opening 4.
3. Make sure that the disk engages in the guide on both inner sides of the condenser.
   → The guide serves as a stop for the modulator disk. The pin of the disk's clamping screw must slide into the orientation groove of the condenser.
4. Tighten the disk's clamping screw.
5. Replace the condenser in its carrier.

11.9.2 Assembling the Slit-Diaphragm for PlasDIC into the Modulator Disk



Parts and Tools Hex key, 1.5 mm

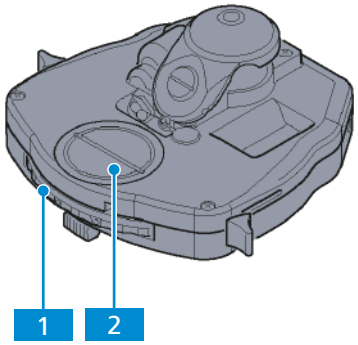
Prerequisite ✓ The modulator disk is *removed [▸ 163]*.

Procedure

1. Turn the PhC diaphragm that needs to be replaced into the free aperture of the modulator disk.
2. Screw the modulator disk's centering screws 7 back until they stop.
3. Unscrew the adapter ring 4 of the PhC diaphragm with the included tool 1.
4. Remove the PhC diaphragm 6 and the spring 5.
5. With the tool, insert the slit-diaphragm for PlasDIC 3 with its cams into the orientation grooves 8.
6. With the tool, screw in the adapter ring 2 included with the slit-diaphragm.

Proceed in the reverse order for removal.

11.9.3 Changing PhC DIC PlasDIC Diaphragms on the 0.9 BF DF PhC DIC Achromatic-Aplanatic Condenser



Parts and Tools

- Hex key, 1.5 mm

Prerequisite

- ✓ The condenser is *removed [▸ 188]*.

Procedure

1. Remove the cover 2.
2. Turn the modulator disk 1 to have access to the corresponding diaphragm position.
3. Change the appropriate diaphragm, see *Assembling the Slit-Diaphragm for PlasDIC into the Modulator Disk [▸ 164]*.
4. If a DIC diaphragm has been inserted instead of a PhC diaphragm, the pre-set mechanism that automatically opens the PhC diaphragm must be deactivated. For this, turn the centering screws of the modulator disk counterclockwise to the stop.
   → Now, the aperture diaphragm can be closed for DIC contrast techniques.

11.10 Assembling the Sample Space Extension, 60 mm

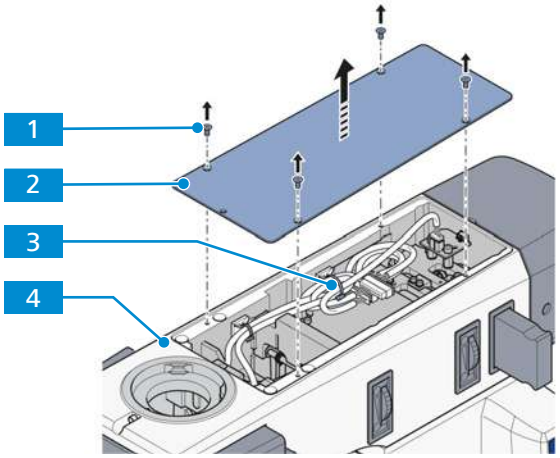
Info

Pure transmitted light stands have no reflector turret sensor / RL LED interface. Accordingly, no connection cables for this purpose are installed.

The following action comprises several action sequences. These sequences are to be carried out in the specified order.

1. *Removing the cover of the upper part of the stand [▸ 166]*
2. *Disconnecting the cable connections [▸ 166]*
3. *Removing the upper part of the stand [▸ 167]*
4. *Assembling the sample space extension [▸ 167]*
5. *Assembling the upper part of the stand on the sample space extension [▸ 168]*
6. *Establishing the cable connections [▸ 168]*
7. *Assembling the cover of the upper part of the stand [▸ 169]*

11.10.1 Removing the Cover of the Upper Part of the Stand

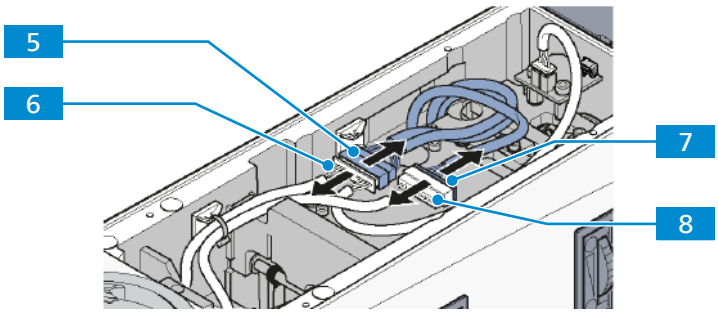


Prerequisite ✓ The binocular tube is *removed [▸ 65]*.

Procedure

1. Unscrew the 4 screws 1.
2. Remove the cover 2 from the upper part of the stand 4.
3. Cut and remove one cable tie 3.

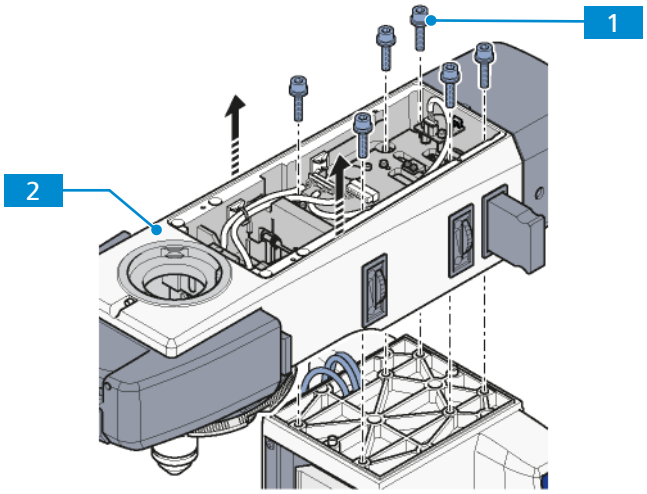
11.10.2 Disconnecting the Cable Connections



Procedure

1. Disconnect the cable connection between the main control board 3 of the lower part of the stand and the nosepiece sensor of the upper part of the stand 4.
2. Disconnect the cable connection between the main control board 1 and the turret sensor / RL LED interface 2.

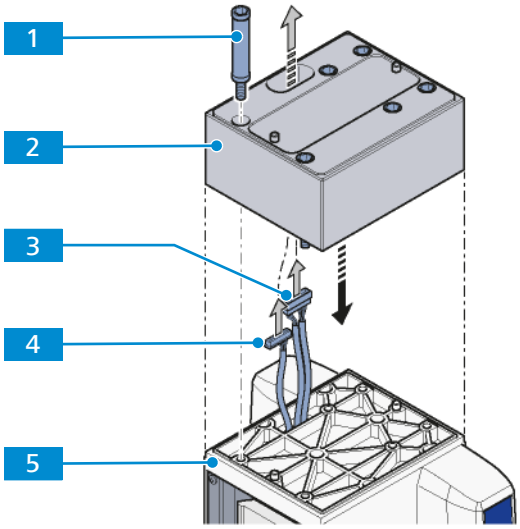
11.10.3 Removing the Upper Part of the Stand



Procedure

1. Unscrew 6 fixing screws 1, holding the upper part of the stand 2.
2. Carefully remove the upper part of the stand while pulling the cables downwards out of the upper part of the stand.

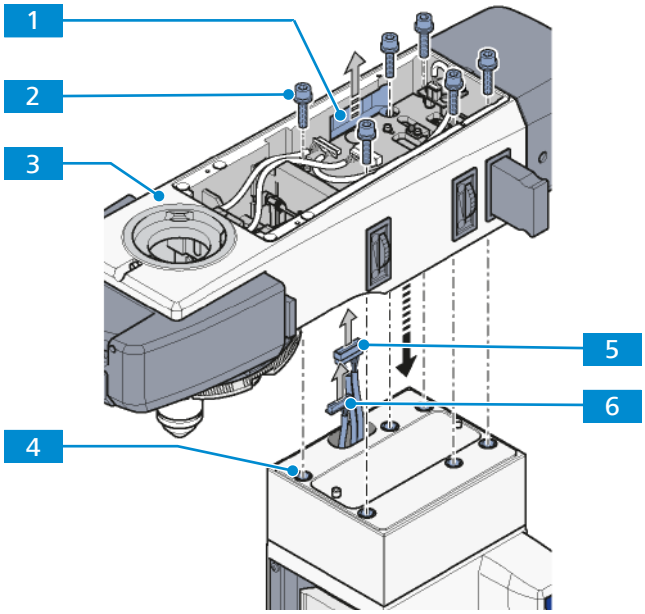
11.10.4 Assembling the Sample Space Extension



Procedure

1. Carefully route the cables 3 and 4 from below through the long hole of the sample space extension 2.
2. Place the sample space extension on the lower part of the stand 5.
3. Tighten the sample space extension with its 6 spacer bolts 1.

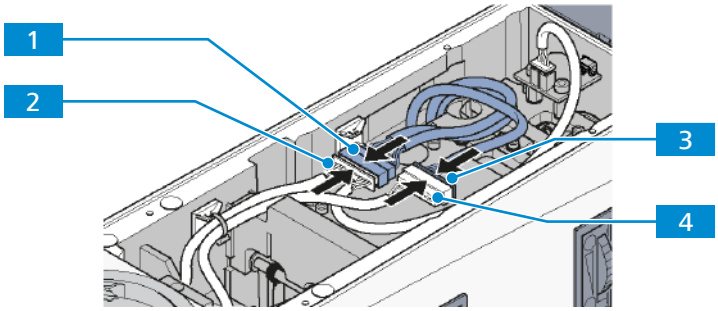
11.10.5 Assembling the Upper Part of the Stand on the Sample Space Extension



Procedure

1. Carefully route the cables 5 and 6 from below through the lateral opening 1 of the upper part of the stand 3.
2. Place the upper part of the stand on the sample space extension 4.
3. Tighten the upper part of the stand with 6 fixing screws 2.

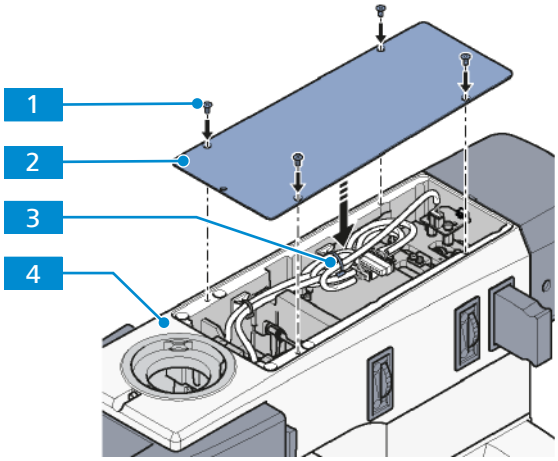
11.10.6 Establishing the Cable Connections



Procedure

1. Establish the cable connection between the main control board 3 of the lower part of the stand and the nosepiece sensor of the upper part of the stand 4.
2. Establish the cable connection between the main control board 1 and the turret sensor / RL LED interface 2.
3. Make sure the plugs are securely connected.

11.10.7 Assembling the Cover of the Upper Part of the Stand



Procedure

1. Secure the cables with a cable tie 3.
2. Place the cover 2 on the upper part of the stand 4.
3. Screw in and tighten the 4 screws 1.
4. *Install the binocular tube [▸ 65]*.

11.11 Polarizers

11.11.1 Polarizer D, Fixed, Removable

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The polarizer can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

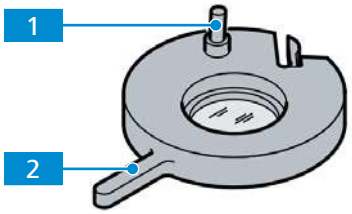


Fig. 65: Polarizer D, fixed, removable

1	Detent bolt	2	Handle of the polarizer for swivelling in/out

11.11.2 Polarizer, Fixed, W-E ±10° adj.

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The direction of linear polarization can be adjusted by ±10°. The polarizer can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

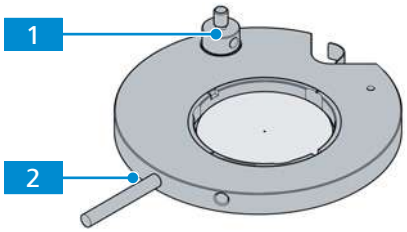


Fig. 66: Polarizer, fixed, W-E ±10° adj.

1	Detent bolt	2	Handle of the polarizer for swivelling in/ out

11.11.3 Polarizer D, 90°, Rotatable, Removable

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The polarizer can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

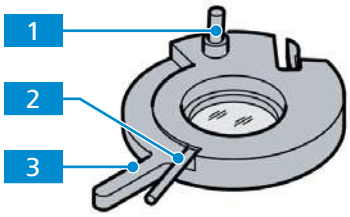


Fig. 67: Polarizer D, 90°, rotatable, removable

1	Detent bolt	2	Lever for rotating the polarizer
3	Handle of the polarizer for swivelling in/ out	4	Adapter plate

11.11.4 Polarizer, 90°, W-E ±10° adj.

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The direction of linear polarization can be adjusted by ±10°. The polarizer can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

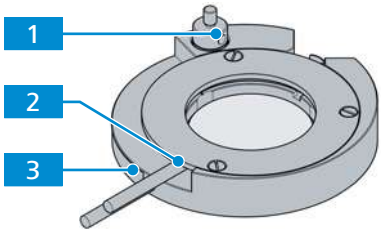


Fig. 68: Polarizer, 90°, W-E ±10° adj.

1	Detent bolt	2	Lever for rotating the polarizer
3	Handle of the polarizer for swivelling in/ out		

11.11.5 Polarizer, Fixed, with Lambda Plate, Rotatable

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The polarizer can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

Polarizer and lambda plate can be swivelled in/out separately.

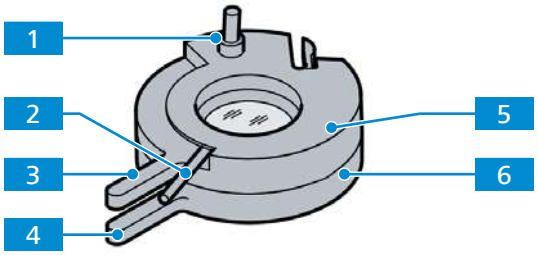


Fig. 69: Polarizer, fixed, with lambda plate, rotatable

1	Detent bolt	2	Lever for rotating the lambda plate
3	Handle of the lambda plate for swivelling in/out	4	Handle of the polarizer for swivelling in/out
5	Adapter plate	6	Lambda plate, rotatable by 90°
7	Polarizer		

11.11.6 Polarizer, Rotatable, with Color Filter Carrier

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. With the help of the color filter carrier optical filter elements can be placed in the beam path. The polarizer and the filter carrier can be swivelled into or out of the beam path using the handle.

Position The polarizer with filter carrier is mounted on the bottom of the *condenser carrier [▸ 174]*.

Polarizer and filter carrier can be swivelled in/out separately.

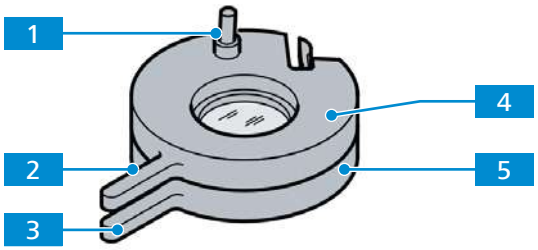


Fig. 70: Polarizer, rotatable, with color filter carrier

1	Detent bolt	2	Handle of the polarizer for swivelling in/out
3	Handle of the color filter carrier	4	Polarizer
5	Color filter carrier		

11.11.7 Polarizer, 90°,W-E ±10° adj.,w. Filter Carrier

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. With the help of the color filter carrier optical filter elements can be placed in the beam path. The direction of linear polarization can be adjusted by ±10°. The polarizer and the filter carrier can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

Polarizer and filter carrier can be swivelled in/out separately.

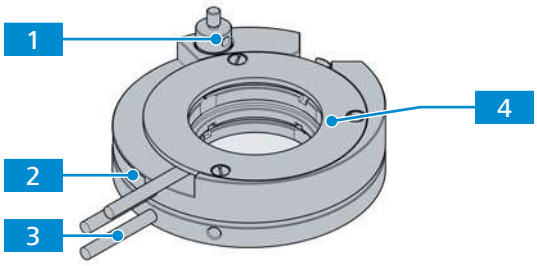


Fig. 71: Polarizer, 90°,W-E ±10° adj.,w. filter carrier

1	Detent bolt	2	Handle of the polarizer for swivelling in/out
3	Handle of the color filter carrier	4	Polarizer

11.11.8 Circular Polarizer D

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The polarizer can be swivelled into or out of the beam path using the handle.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

Upper part and lower part of the polarizer can be swivelled in/out separately.

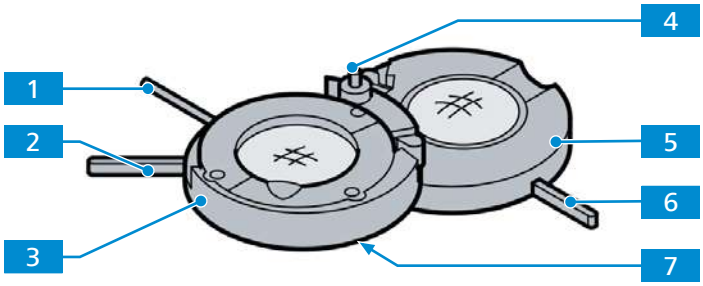


Fig. 72: Circular polarizer D

1	Lever for rotating the lambda 4/plate, 90° possible	2	Handle of the upper part of the polarizer for swivelling in/out
3	Lambda/4 plate in the upper part of the circular polarizer	4	Detent bolt
5	Lower part of the circular polarizer	6	Handle of the lower part of the circular polarizer for swivelling in/out
7	Adjustment slit (2x)		

11.11.9 360-degree Rotatable Polarizer

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The knurled ring allows the user to rotate the polarizer by 360°. The knurled ring is equipped with scale markings at every 15°, and click stops at every 90°. The direction of linear polarization can be adjusted by ±10°. The polarizer can be swivelled into or out of the beam path.

Position The polarizer is mounted on the bottom of the *condenser carrier [▸ 174]*.

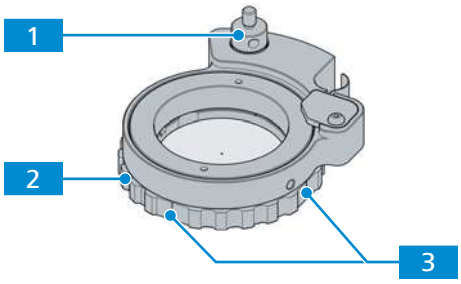


Fig. 73: 360-degree rotatable polarizer

1	Detent bolt	2	Knurled ring with scale markings
3	Click stop position		

11.11.10 Color Filter Carrier 3x for Filter d=32mm

Purpose With the help of the color filter carrier optical filter elements can be placed in the beam path. The filter carriers can be swivelled into or out of the beam path using the handle.

Position The color filter carrier is mounted on the bottom of the *condenser carrier [▸ 174]*.

The three filter carriers can be swivelled in/out separately.

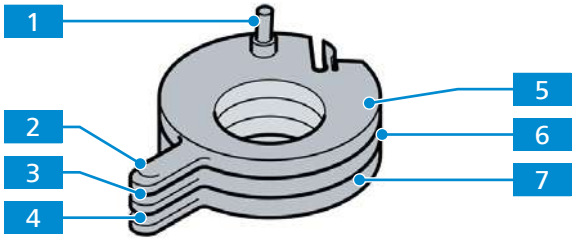


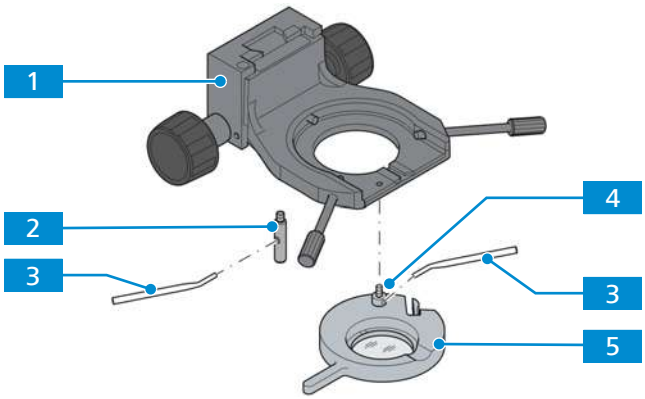
Fig. 74: Color filter carrier 3x for filter d=32mm

1	Detent bolt	2	Handle of the first filter carrier for swivelling in/out
3	Handle of the second filter carrier for swivelling in/out	4	Handle of the third filter carrier for swivelling in/out
5	First filter carrier	6	Second filter carrier
7	Third filter carrier		

11.11.11 Installing Polarizer or Color Filter Carrier on the Condenser Carrier

The following components can be installed on the condenser carrier:

- Polarizer D, fixed, removable
- Polarizer, fixed, W-E ±10° adj.
- Polarizer D, 90° rotatable, removable
- Polarizer, 90°, W-E ±10° adj.
- Polarizer, fixed, with lambda plate, rotatable
- Polarizer, rotatable, with color filter carrier
- Polarizer, 90°, W-E ±10° adj.,w. filter carrier
- Circular polarizer D
- 360-degree Rotatable Polarizer
- Color filter carrier 3x for filter d=32 mm



Prerequisite

✓ The stage carrier with the condenser carrier is *removed [▸ 68]*.

✓ The *low-power system [▸ 177]* is removed.

Procedure

1. Hold the polarizer 5 parallel to the bottom of the condenser carrier 1.
2. Insert the holding pin 4 into the front threaded opening at the left below the condenser carrier.
3. Tighten the holding pin with the adjusting lever 3.
4. Screw the locking pin 2 with the adjusting lever into the rear threaded opening of the condenser carrier.

Proceed in the reverse order for removal.

11.11.12 Polarizer on Field Aperture

Purpose The polarizer for transmitted light is used to polarize the light of the transmitted light source. The direction of linear polarization can be adjusted by ±10° using the handles.

Position The polarizer is mounted on the *field aperture [▸ 175]*.

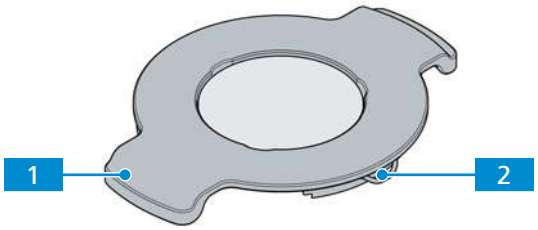


Fig. 75: Polarizer

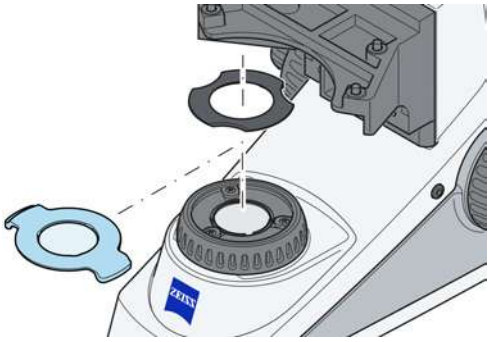
1 Handle **2** Spring

11.11.13 Installing the Polarizer on the Field Aperture

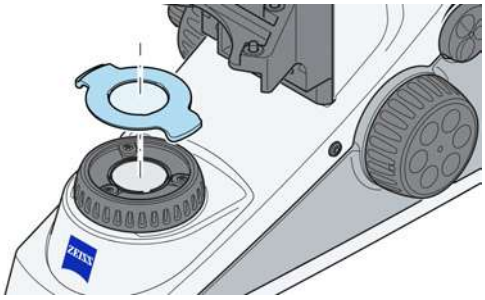
Prerequisite ✓ Enough space is guaranteed between the condenser carrier and the field aperture.

Procedure

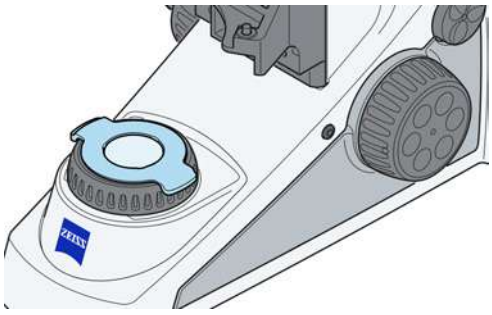
1. Remove the existing black plastic cap on top of the field aperture.



2. Hold the condenser slightly tilted, with the front higher than the back, with the spring facing backward.
3. Press the condenser spring against the rear edge of the field aperture.



4. Lower the front end of the condenser.
5. Using the thumb, press firmly around the perimeter to ensure a tight installation.



11.11.14 Low-power System for Objectives 2.5x/4x

Purpose The low-power system is for full display field illumination when using an objective with a weak magnification factor (2.5x–4x) in combination with the Condenser 0.9/1.25 H.

Position The low-power system is mounted behind the condenser carrier.

Function It can be centered and remains swivelled into the beam path for as long as the respective objective is in use.

The illumination of weak objective magnifications can be centered with the centering screws. For this purpose, the condenser should be centered on the other objectives without the low-power system.

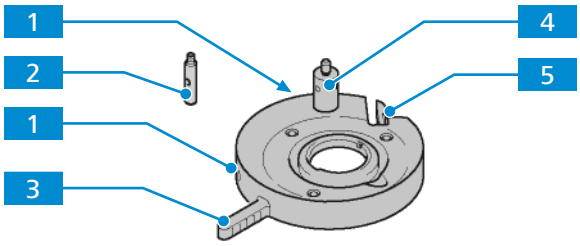


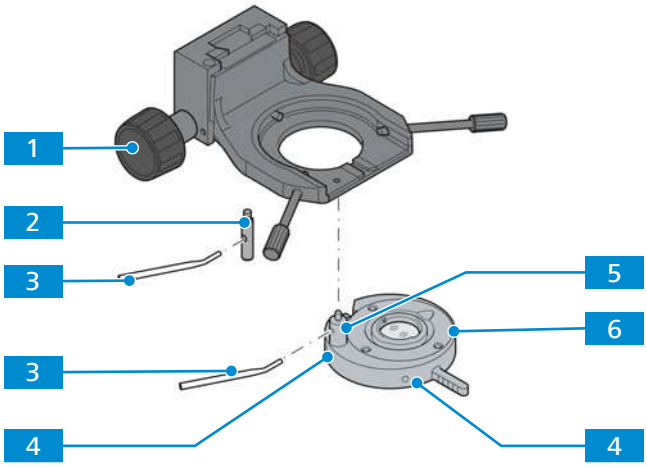
Fig. 76: Low-power system for objectives 2.5x/4x

1	Centering screw (2x)	2	Locking pin
3	Handle of the low-power system for swivelling in/out	4	Holding pin
5	Locking clamp		

11.11.14.1 Assembling and Centering the Low-power System

Info

The low-power system can be used only in combination with the condenser 0.9/1.25.



Parts and Tools

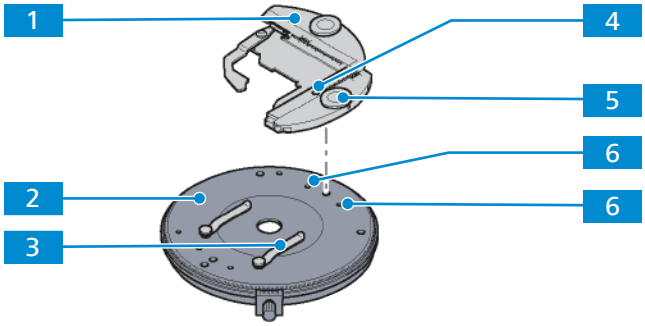
- 2x Hex key, 1.5 mm

Procedure

1. Lift the condenser carrier together with its knurled knob 1 upwards as far as it will go.
2. Hold the low-power system 6 parallel to the underside of the condenser carrier and screw the holding pin 5 of the low-power system with the angled adjusting lever 3 into the front left threaded hole below the condenser carrier as far as it will go.
3. Screw the locking pin 2 with the adjusting lever as far as it will go into the rear threaded hole of the condenser carrier.
4. Swivel the low-power system into the beam path using the handle.
   → Make sure that it is securely engaged.
5. Switch on the microscope.
6. Set transmitted light illumination.
7. Open the aperture diaphragm and luminous-field diaphragm completely.
8. Adjust both adjustment screws 4 until the field of vision is optimally illuminated.

11.12 Assembling the Pol Components

11.12.1 Assembling the Pol Object Guide

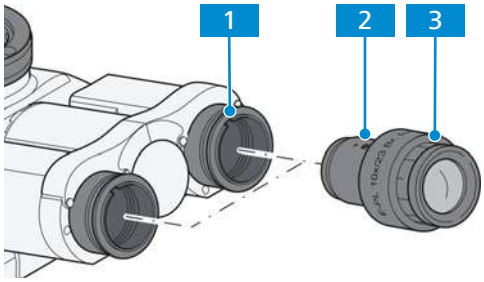


Procedure

1. Remove both stage clips of the clamping device 3 from the rotary stage 2.
2. Insert the Pol object guide 1, introducing the two cylindrical pins on its underside into the respective holes 6.
3. If required, turn the control wheel 5 until the clamping screw becomes visible in the mounting hole.
4. Tighten the clamping screw 4.

Proceed in the reverse order for removal.

11.12.2 Assembling the Focusable Pol Eyepiece

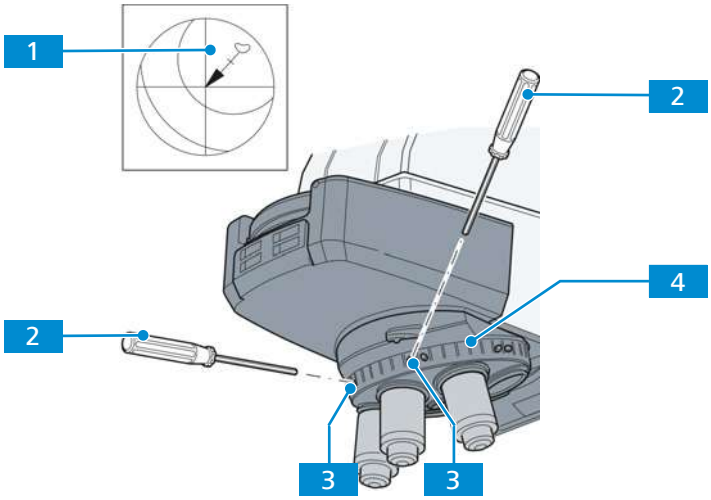


Procedure

1. Insert the eyepiece 3 into the binocular photo tube.
2. Fit the locating screw 2 into the tube's orientation groove 1.

11.12.3 Centering the Objectives of the Polarization Stand

Stage centering is necessary to ensure that a sample feature located in the center of the field of view does not move out while you are rotating the stage. Centering all objectives ensures that the sample feature remains in the center of the field of view even when the objective is changed.



Parts and Tools

- Hex key, 1.5 mm

Prerequisite

- ✓ The *KÖHLER illumination [▸ 78]* is adjusted.
- ✓ The *rotary stage is centered [▸ 156]* using the non-centerable objective mount.
- ✓ A high-contrast sample and an eyepiece with crossline reticle are available.

Procedure

1. Turn the nosepiece with the knurled ring 4 to move a centerable objective mount into the light path.
2. Rotate the stage to determine the position of maximum offset of the sample feature 1 from the center of the eyepiece reticle.
3. Turn the two centering screws 3 on the nosepiece to move the sample feature by half the arrow length towards the reticle center. Use a 1.5 mm hex key 2.
4. Rotate the stage again to check if the sample feature moves off.
5. Repeat the centering procedure, if necessary.
6. Repeat the procedure for the other four objectives.

11.13 Axiocam 203 Mono/212 Color

Purpose The camera is used to snap photos or the microscopic image.

Position The Axiocam 203 mono or Axiocam 212 color is mounted on the camera port of the photo tube.

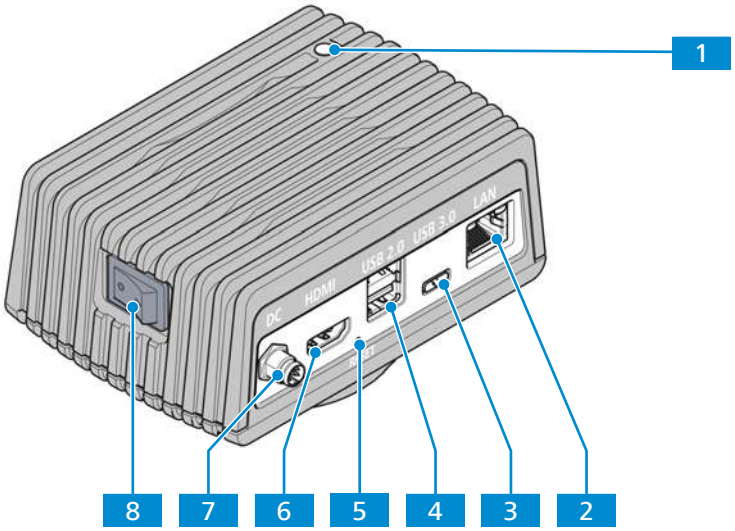


Fig. 77: Axiocam 203 mono/Axiocam 212 color

1 LED function indicator

2 Gigabit Ethernet Port for communication and image data transfer (**LAN**)

3 Port for camera control and image transfer (**USB 3.0**)

4 OSD control mouse and keyboard (2x **USB 2.0** Type-A)

5 Camera factory **RESET** button

6 **HDMI** port for image data transfer to a monitor, TV or projector

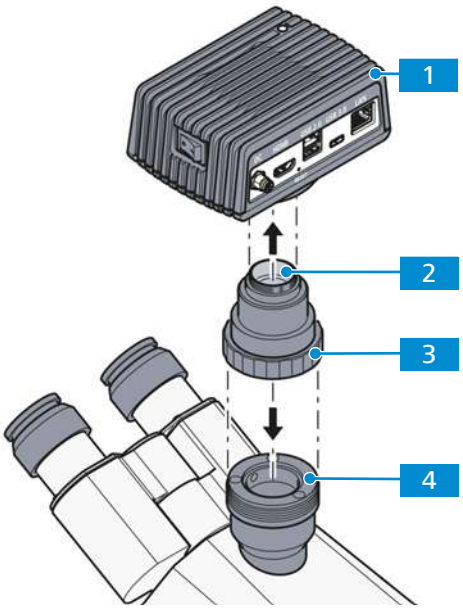
7 **DC** Port for power supply and communication to the microscope stand

8 Power ON / Off switch

11.13.1 Assembling the Axiocam 203 mono or Axiocam 212 color

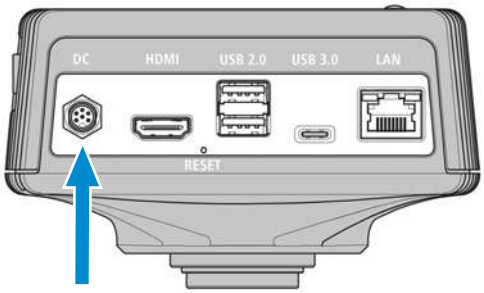
Parts and Tools

- C-mount camera adapter
- HDMI cable

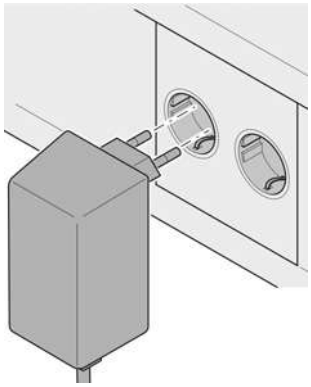


Procedure

1. Mount the C-mount camera adapter 2 on the Axiocam 1.
2. Attach the Axiocam with the adapter to the camera port 4 of the tube.
3. Orient the camera to the stand and fix it in position by tightening the ring nut 3.
4. Insert the M8 plug of the Y-cable into the **DC** port of the camera.



5. Insert the power adapter into a power outlet.



6. Insert the remaining end of the Y-cable into the corresponding socket on the microscope.
7. Connect the camera to an external monitor via an HDMI cable.
8. Alternatively, connect the camera to a WLAN router, USB Type-C drive, or workstation, see also *Operating Modes Using the Axiocam 203 mono/212 color [▸ 182]*.

For additional information, refer to the operating manual of the camera.

11.13.2 Operating Modes Using the Axiocam 203 mono/212 color

11.13.2.1 Axiocam as Standalone System

Purpose The camera is used to capture the microscopic image and store the data on the USB drive connected to the camera.

Function The camera acts as the control interface and is powered by the microscope via the USB (Commercial Micro-D power) cable.

A USB Type-C drive is included in the package and can be connected via the USB slot at the back of the camera for storing data. Then images are recorded and saved to the USB drive.

Functions of the microscope stand such as the Light Manager and encoding are automatically launched. The camera is equipped with image enhancement functions such as true color and noise reduction.

Functionality of the microscope:

- Light Manager
- Coded components
- Image enhancement (true color, noise reduction)
- Record and save images on the USB drive
- Record and save videos on the USB drive

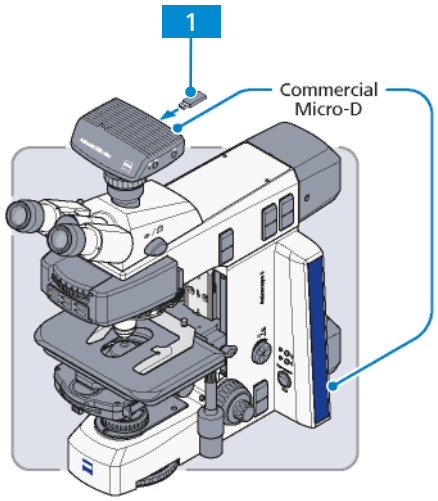


Fig. 78: Axiocam as standalone system

1 USB Type-C drive (included in package)

11.13.2.2 Axiocam Connected to an HD Monitor, TV, or Projector

Purpose The camera is used to capture the microscopic image.

Function A monitor can be connected to the camera via an HDMI cable. The camera is powered by the microscope via the USB (Commercial Micro-D power) cable.

A monitor can be connected to the camera of the microscope via an HDMI cable. The camera is powered by the microscope via a USB (Commercial Micro-D power) cable. A USB hub can be connected via the USB port on the camera.

A wireless or wired mouse and keyboard can be connected to the camera via the USB hub, which together with the monitor, function as the control interface. Functions such as the Light Manager, encoding and image enhancement are automatically launched. Live images can be viewed on the monitor display and advanced features are available in the on-screen display (OSD).

When the microscope is operated together with the Colibri 3 light source, the one-key fluorescence function can be used. Images can be snapped and saved on the USB Type-C drive, which is connected via the USB hub.

Functionality of the microscope:

- Light Manager
- Coded components
- Image enhancement (true color, noise reduction)
- Observe live image on display
- Record and save image on the USB drive
- Record and save video on the USB drive
- One-key fluorescence (works only when the Axioscope is used with Colibri 3)
- Advanced features in OSD

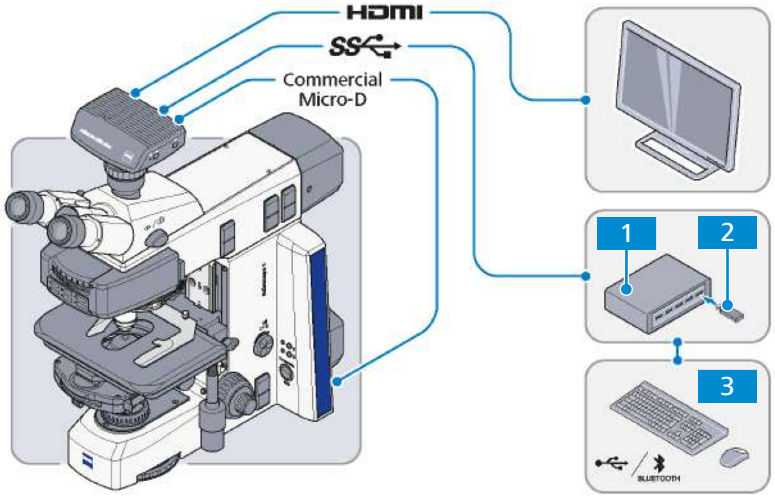


Fig. 79: Axiocam connected to an HD monitor, TV or projector

1 USB hub (input type C to output type A) **2** USB Type-C drive provided in package

3 Mouse, keyboard

11.13.2.3 Axiocam Connected with Labscope/Matscope via a Wi-Fi Dongle

Purpose The camera is used to capture the microscopic image.

Function The camera is powered by the microscope via the USB (Commercial Micro-D power) cable.

An optional monitor can be connected to the camera via an HDMI cable.

The recommended USB Wi-Fi dongle can be connected to the camera via the USB hub.

The control interface can be a workstation or portable electronic device that uses Wi-Fi.

Functions such as the Light Manager, encoding, ECO mode and image enhancement are automatically launched.

When a monitor is connected, live images can be viewed on the monitor display. Live images can also be viewed on workstation or portable devices and advanced features in Labscope/Matscope are available.

Functionality of the microscope:

- Light Manager
- Coded components
- ECO mode
- Image enhancement
- Observe live images
- Record and save images via software
- One-key fluorescence (this works only with Axiolab Bio-TL/FL)
- Advanced features in Labscope/Matscope

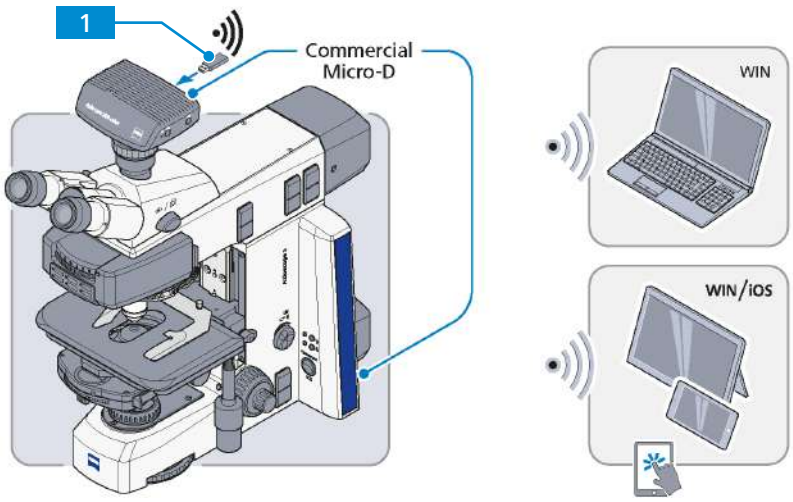


Fig. 80: Axiocam connected with Labscope/Matscope via a Wi-Fi dongle

1	USB Wi-Fi dongle (please contact ZEISS Sales & Service Partner)

11.13.2.4 Axiocam Connected with Labscope/Matscope via a WLAN Router

Purpose The camera is used to capture the microscopic image.

Function The camera is powered by the microscope via the USB (Commercial Micro-D power) cable.

An optional monitor can be connected to the camera via an HDMI cable.

A router is connected to the camera via Ethernet.

The control interface can be a workstation or portable electronic device controlled via Ethernet or Wi-Fi.

Functions such as the Light Manager, encoding, ECO mode and image enhancement are automatically launched.

When a monitor is connected, live images can be viewed on the monitor display. Live images can also be viewed on a workstation or a portable device and advanced features in Labscope/Matscope are available.

Functionality of the microscope:

- Light Manager
- Coded components
- ECO mode
- Image enhancement
- Observe live images
- Record and save images via software
- One-key fluorescence (this works only with Axiolab Bio-TL/FL)
- Advanced features in Labscope/Matscope

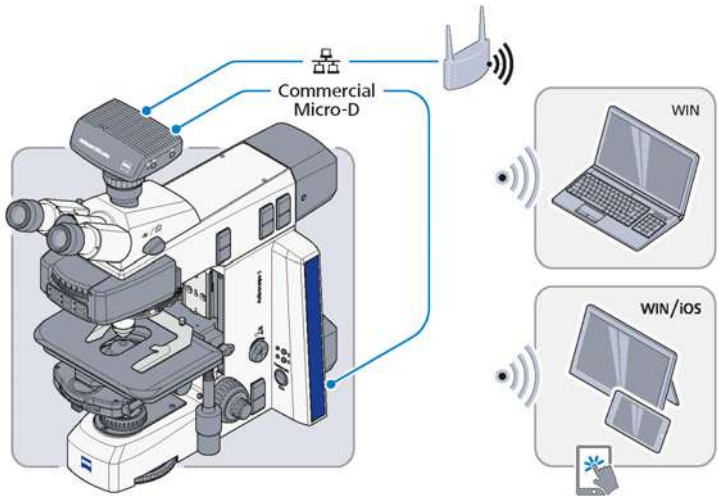


Fig. 81: Axiocam connected with Labscope/Matscope via a WLAN router

11.13.2.5 Axiocam Connected with Labscope/Matscope via a USB

Purpose The camera is used to capture the microscopic image.

Function The camera is powered by the microscope via the USB (Commercial Micro-D power) cable.

An optional monitor can be connected to the camera via an HDMI cable.

A workstation or Windows Surface can be connected to the camera via a USB cable.

Functions such as the Light Manager, encoding, ECO mode and image enhancement are automatically launched.

When a monitor is connected, live images can be viewed on the monitor display. Live images can also be viewed on a workstation or Surface and advanced features in Labscope/Matscope are available.

Functionality of the microscope:

- Light Manager
- Coded components
- ECO mode
- Image enhancement
- Observe live images
- Record and save images via software
- One-key fluorescence (this works only with Axiolab Bio-TL/FL)
- Advanced features in Labscope/Matscope

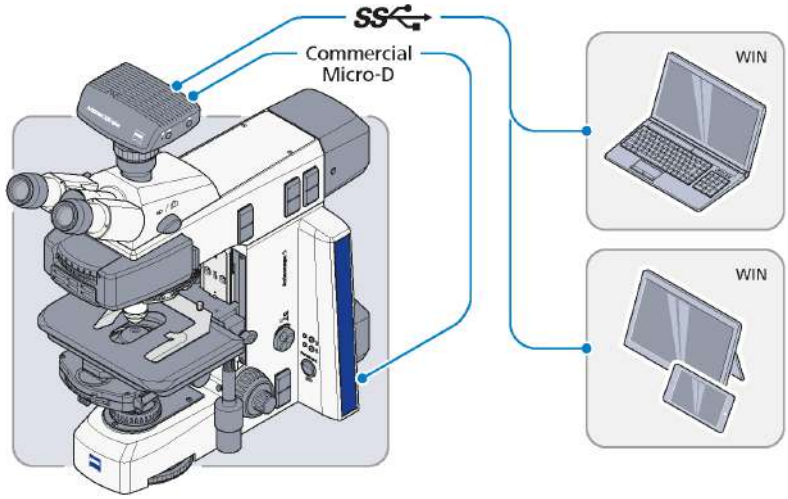


Fig. 82: Axiocam connected with Labscope/Matscope via a USB

11.13.2.6 Axiocam Connected with ZEN Software via a USB

Purpose The camera is used to capture the microscopic image.

Function The camera is powered by the microscope via the USB (Commercial Micro-D power) cable.

A workstation can be connected to the camera and the microscope stand via USB cables at the same time.

Functions such as the Light Manager, encoding and ECO mode are automatically launched.

Live images can also be viewed on the workstation and basic features in ZEN are available.

Functionality of the miscroscope:

- Light Manager
- Coded components
- ECO mode
- Image enhancement
- Observe live images
- Record and save images via software
- Basic features in ZEN

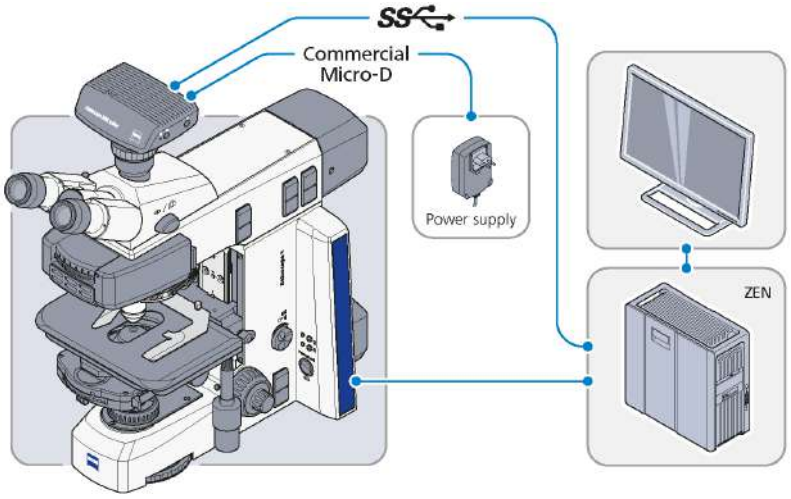


Fig. 83: Axiocam connected with ZEN software via a USB

11.14 Condenser, achromatic-aplanatic 0.9 BF DF PhC DIC

Purpose Condensers are used to optimize the transmitted light illumination. The condenser is usable for brightfield, darkfield, phase contrast and DIC applications.

Position The condenser is mounted on the condenser carrier of the stand.

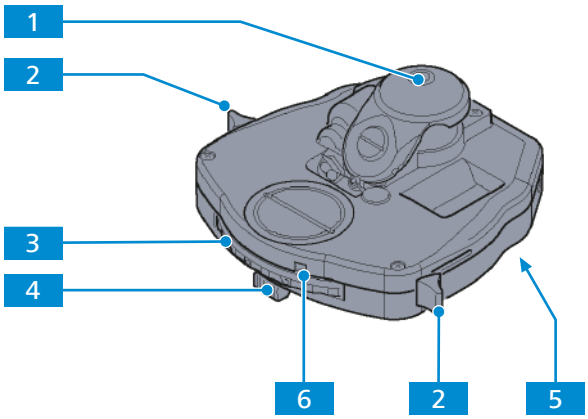


Fig. 84: Condenser, achromatic-aplanatic 0.9 BF DF PhC DIC

1	Front lens	2	Lever for switching the front lens in/out (left/right)
3	Knurled ring for adjusting the position of the 5-positions turret disk	4	Sliding control for setting the aperture diaphragm
5	Dovetail ring mount	6	Display field of the adjusted turret disk position

11.14.1 Assembling the Condenser, Chromatic-aplanatic 0.9 BF DF PhC DIC

Info

If an additional component, e.g. a polarizer, has been mounted beneath the condenser carrier, the stage carrier should be removed before installing the condenser.

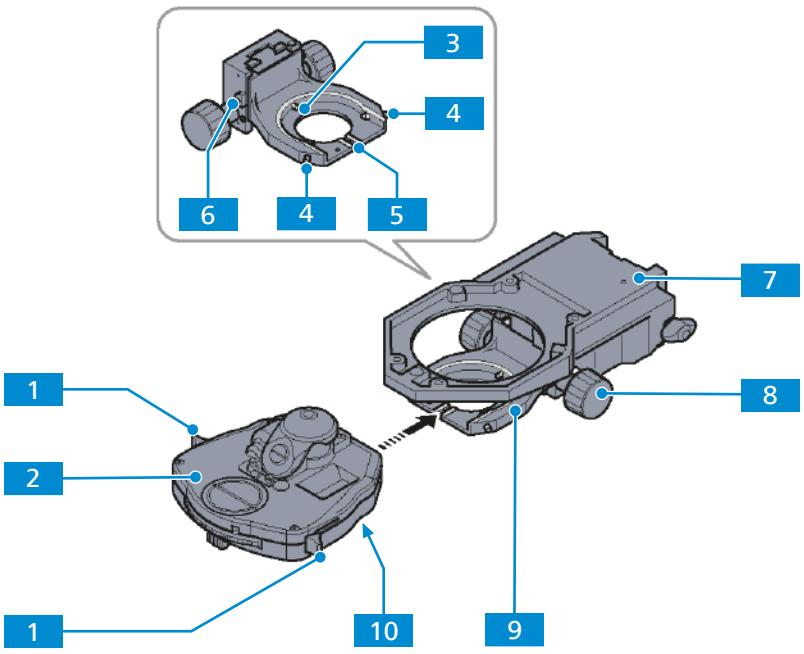
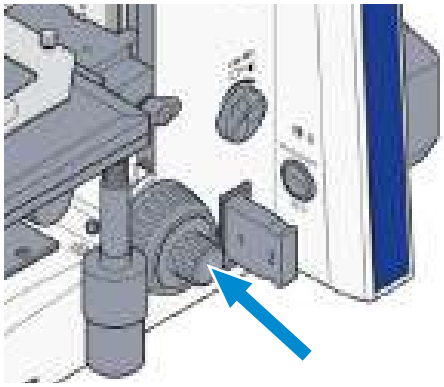


Fig. 85: Installing the condenser, achromatic-aplanatic 0.9 BF DF PhC DIC

Procedure

1. Carefully move the stage carrier 7 to the upper stop position. Use the focusing drive.
   NOTICE Make sure that the stage does not collide with the objective.



2. Swivel out the front lens on the condenser 2 using the lever 1.
3. Unscrew both centering screws 4 on the condenser carrier 9 until their ends are no longer visible.
4. Loosen the clamping screw 6 of the condenser carrier until the maximum vertical adjusting range is usable.
5. Using the knurled knob 8 for vertical adjustment, push the condenser carrier down as far as it will go.
   NOTICE If using a low-power system, make sure that this does not come to rest on the luminous-field diaphragm.
6. Insert the condenser between the condenser carrier and the stage carrier 7. In doing so, align the screwed stud bolt 10 on the underside of the condenser with the groove 5 of the condenser carrier.
7. Press the condenser with the dovetail ring against the mainspring 3 of the condenser carrier until the condenser sits horizontally on the condenser carrier.
8. Screw in the centering screws 4 until they engage with the dovetail ring of the condenser.
9. Screw in the clamping screw 6 without clamping the vertical drive.

Proceed in the reverse order for removal.

11.14.2 Centering the Darkfield Diaphragm of the Condenser

Parts and Tools

- 2x Hex key, 1.5 mm

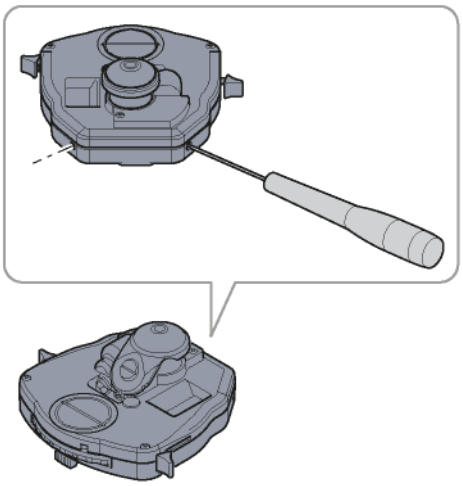
Prerequisite

- ✓ A suitable condenser with modulator disk is installed.
- ✓ The illumination is adjusted for transmitted light brightfield microscopy.

Procedure

1. Set the modulator disks to position D (or DF = darkfield).
2. Remove one eyepiece from the binocular tube or replace it with the auxiliary microscope.
3. Observe the exit pupil of the objective.

4. Turn the two centering screws, until the exit pupil of the objective appears homogeneously dark.



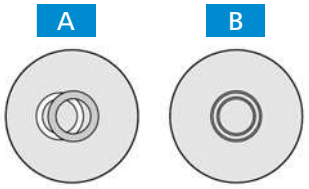
5. Insert the eyepiece.

11.14.3 Centering the Annular Phase Diaphragm of the Condenser

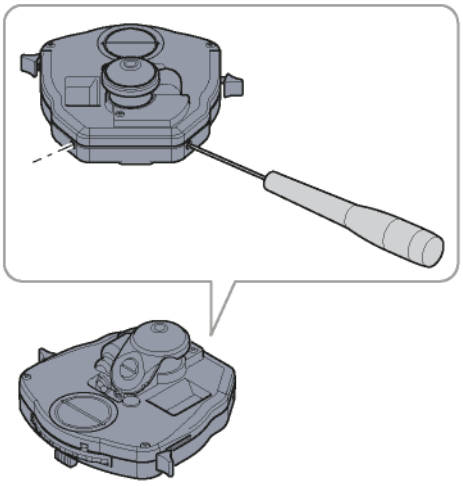
Parts and Tools 2x Hex key, 1.5 mm

Prerequisite
- ✓ A suitable condenser with modulator disk is installed.
- ✓ The illumination is adjusted for transmitted light brightfield microscopy.

Procedure
1. Set the modulator disks to position **Ph** (phase contrast).
2. Remove one eyepiece from the binocular tube or replace it with the auxiliary microscope.
3. Observe the exit pupil of the objective.
4. Check the centering and the overlap of the lighter annular phase diaphragm (in the condenser) with the darker phase ring (in the objective).
   Both rings must be centered and overlapping B.

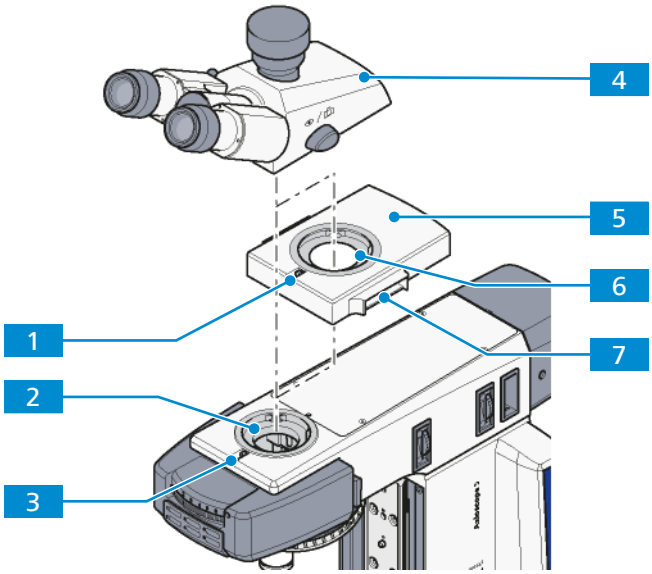


5. If the overlap is not exact A, recenter the lighter annular diaphragm.



6. Remove the auxiliary microscope and replace the eyepiece.

11.15 Assembling the Intermediate Plate for Analyzer Slider



Parts and Tools

- Hex key, 3.0 mm

Procedure

1. Loosen the clamping screw of the stand 3.
2. Replace the binocular tube 4.
3. Unscrew the tube lens of the tube (accessible from the bottom). Use the included ring tool.
4. Screw the tube lens included with the intermediate plate into the binocular tube.
5. Insert the intermediate plate 5 with the dovetail ring into the stand mount 2.
6. Tighten the clamping screw of the stand .
7. Hold the binocular tube at an angle, insert it with the dovetail ring into the mount of the intermediate plate 6 and turn into a horizontal position.
8. Rotate the binocular tube into the desired observation position.
9. Tighten the clamping screw of the intermediate plate 1.
10. Insert the analyzer slider into the slider slot 7, if applicable.

Proceed in the reverse order for removal.

11.16 Assembling the Tube Lens Turret

Prerequisite

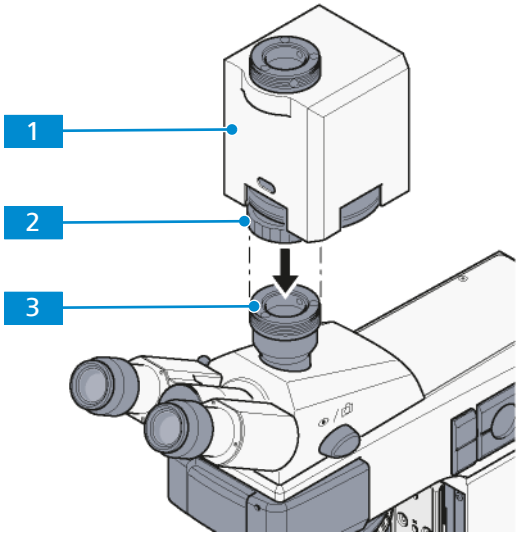
- ✓ The microscope is switched off.
- ✓ The tube is removed (see *Assembling the Intermediate Plate for Analyzer Slider [▸ 191]*).

Procedure

1. Unscrew the tube lens (accessible from the bottom). Use the included ring tool.
2. Insert the tube lens turret's dovetail ring into the tube mount.
3. Tighten the clamping screw.
4. Mount the binocular tube.

Proceed in the reverse order for removal.

11.17 Assembling and Adjusting the Magnification Changer 4x



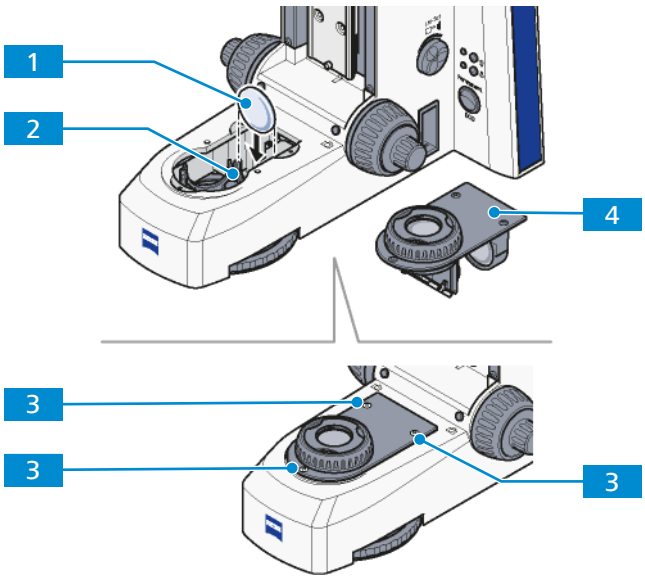
Prerequisite ✓ The microscope is switched off.

Procedure

1. Remove the *camera, camera adapter [▸ 181]* or the dust protection cover from the camera port 3 of the photo tube.
2. Mount the magnification changer 1 on the camera port.
3. Adjust the magnification changer.
4. Tighten the retainer nut 2.
5. If required, adjust the locking power for the magnification modules stop position. Use the screw located on the bottom of the magnification changer housing. The screw is labeled with a white circle.
6. Mount the camera on the camera port of the magnification changer. Use the appropriate adapter.

Proceed in the reverse order for removal.

11.18 Exchanging the Filters in the Filter Wheel for Transmitted Light



Prerequisite ✓ The stage carrier is *removed [▸ 68]*.

Procedure

1. Unscrew three screws 3 of the luminous-field diaphragm socket 4.
2. Remove the socket from the stand base.
3. Remove the filter 1 to be changed from the filter wheel.
4. Put the new filter into the position 2.
5. Repeat the procedure for all filter wheel positions.
6. Re-mount the field diaphragm socket.

11.19 Dual Observation

Purpose The accessory unit allows two people to look at the samples through eyepieces at the same time. Both users will be able to have the simultaneous view of the sample.

Position The dual observation unit is mounted on the top of the stand.

Function The main observer (with the microscope stand) has a black stick to control the position of the arrow in the vision.

The following features and controls are available:

- Four-color LED (blue, green, red and white) arrow in the field of view to point at the region of interests
- Field of view 23 mm

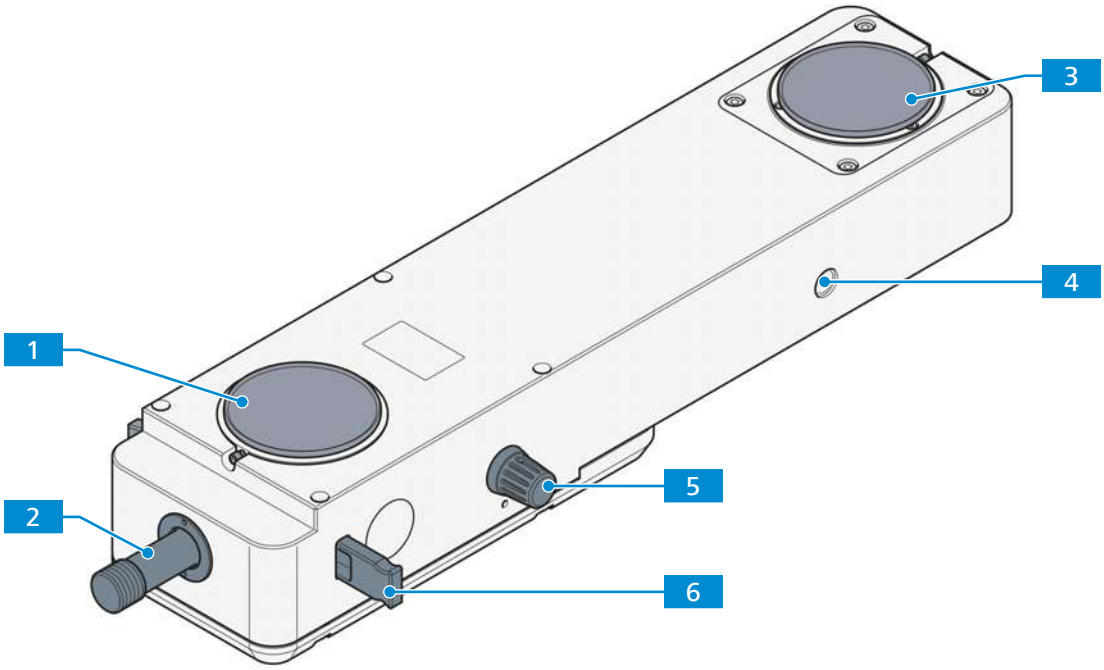


Fig. 86: Dual Observation

1	Observation tube mount for main observer	2	Joystick for LED arrow position control
3	Observation tube mount for co-observer	4	DC input socket (5V)
5	ON/OFF switch	6	Filter plate for LED arrow color changing

11.19.1 Preparing the Binocular Tubes

1. *Remove the tubes lenses from all binocular tubes [▸ 194]*, except for 425520-9080-000.
2. *Install the adaptation set to the binocular tube for the main observer [▸ 195]*.
3. *Install the neutral density filter to the binocular tube for the co-observer [▸ 195]*.

11.19.1.1 Removing the Tube Lens from the Binocular Tubes

NOTICE

Malfunction due to tube lens confusion

Binocular tubes and tube lenses are properly matched to one another.

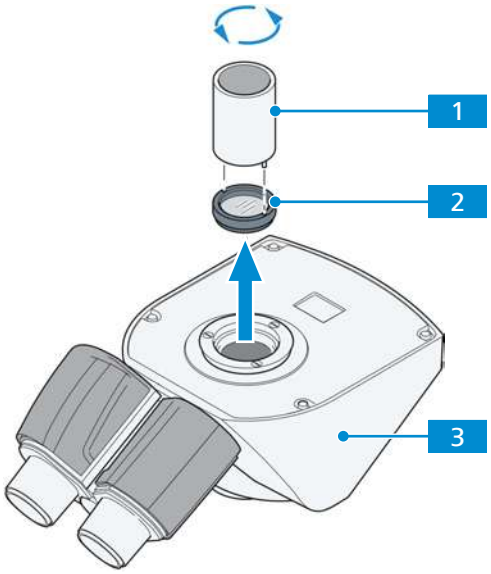
- Mark binocular tubes and tube lenses in such a way that they can be assigned to each other again for later use.

Parts and Tools Ring tool

Prerequisite ✓ The binocular tube is removed from the microscope.

Procedure

1. Put the binocular tube 3 upside down on the table.



2. Remove the tube lens 2 using the ring tool 1.
3. Store the tube lens in dust-free conditions.
4. Turn the binocular tube.

11.19.1.2 Inserting the Adaptation Set into the Binocular Tube for the Main Observer

The neutral glass filter should be used with Axioscope tubes only. The adaptation set is delivered fully assembled with a glass plate. The included neutral density filter is not required for the dual observation component.
The neutral density filter is only required, when super low light intensity is to be achieved.

Parts and Tools

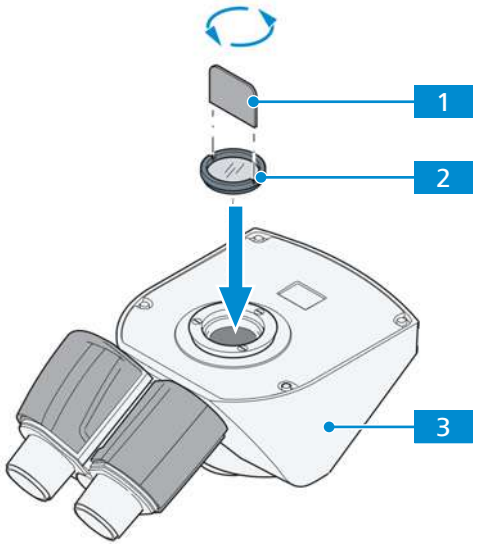
- Mounting tool

Prerequisite

- ✓ The tube lens is *removed [▶ 194]*.
  Exception: When using the ergo-tube 425520-9080-000, the tube lens should not be removed.

Procedure

1. Put the binocular tube 3 upside down on the table.
2. Insert the adaptation set 2 using the mounting tool 1.



3. Turn the binocular tube.

11.19.1.3 Inserting the Neutral Density Filter into the Binocular Tube for the Co-observer

The neutral density filter with 50% transmission is recommended for the co-observer if a photo tube is used on the main observer and a tube without a photo port is used on the co-observer.

Parts and Tools

- neutral density filter with 50% transmission

Prerequisite

- ✓ The tube lens is *removed [▶ 194]*.
  Exception: When using the ergo-tube 425520-9080-000, the tube lens should not be removed.

Procedure

1. Put the binocular tube upside down on the table.
2. Insert the neutral density filter into the dovetail mount of the binocular tube.
3. Install the binocular tube to the dual observation.

11.19.2 Assembling the Dual Observation

Info

All tubes should be equipped with eyepieces of the same field diameter (preferably 23 mm) in order to obtain same-size fields of view for the main observer and the co-observer.

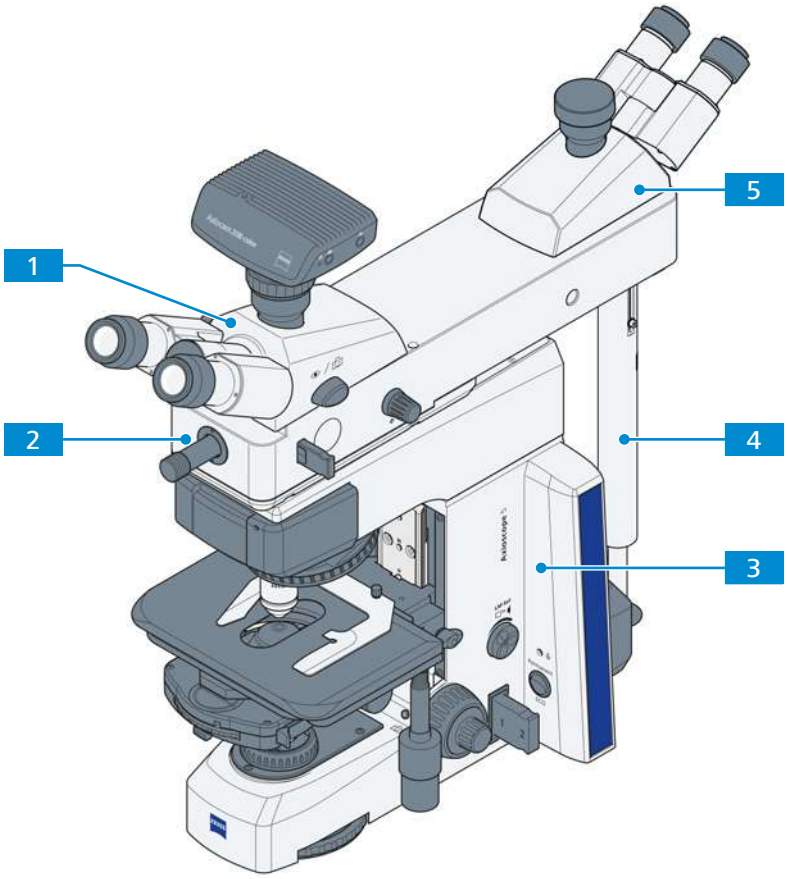


Fig. 87: Axioscope 5 TL with dual observation

1	Binocular tube for the main observer	2	Dual observation
3	Microscope stand	4	Column
5	Binocular tube for the co-observer		

Prerequisite

- ✓ The tube lenses are *removed from both binocular tubes [▸ 194]*.
- ✓ The adaptation set is *installed to the binocular tube for main observer [▸ 195]*.
- ✓ The neutral density filter is *installed to the binocular tube for the co-observer [▸ 195]*.
- ✓ The microscope is placed on a suitable table.

Procedure

1. Install the dual observation 2 on the microscope stand 3 with the joystick facing to the main observer.
2. Install the column 4.
3. Install the *binocular tube [▸ 65]* for the main observer 1.
4. Install the *eyepieces [▸ 66]* for the main observer.
5. Install the binocular tube for the co-observer 5.
6. Install the eyepieces for the co-observer.
7. Connect the plug-in power cord to the microscope stand.

11.19.3 Operating the Dual Observation

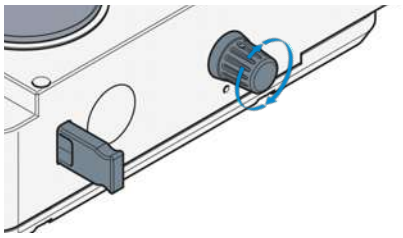
Prerequisite

✓ The dual observation is assembled.

✓ The microscope is switched on.

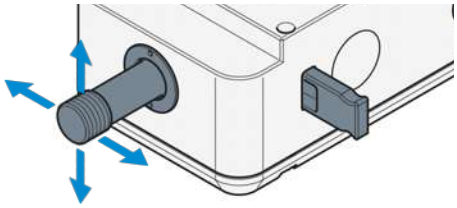
Procedure

1. Switch on the dual observation by turning the rotary button clockwise.

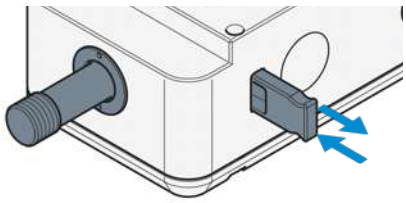


→ The blue LED below the knob lights up.

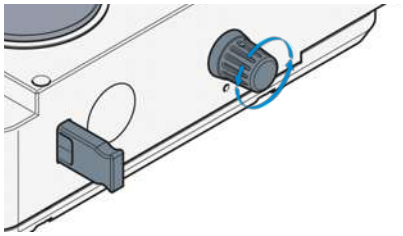
2. Adjust the light intensity by turning the rotary button.
3. Position the LED arrow in the field of view by means of the joystick.



4. Set the color of the LED arrow by pulling or pushing the filter plate.



5. Re-focus the eyepieces of the co-observer by approx. 1/3 diopter to compensate the glass path of the removed tube lens.
6. Switch off the dual observation by turning the rotary button counterclockwise.



→ The blue LED below the knob goes out.

Revision History

Revision	Date of Issue	Introduced Modifications
2	08/2025	▪ Chapter *Contact and Addresses [▸ 8]* added ▪ Corrections ▪ Viluma 5/7 light sources added ▪ Axiocam 202 mono and Axiocam 208 color replaced by Axiocam 203 mono and Axiocam 212 color ▪ Correction of chapter(s): – *Optical Risk Grouping [▸ 15]* – *EMC Information [▸ 16]* – *Product and Functional Description [▸ 22]* – *Functions of Stand Keys and Display Elements [▸ 41]* – *Transport and Storage [▸ 116]* – *Accessories and System Expansions [▸ 123]*
1	09/2024	▪ Change of address of the manufacturer ▪ Correction of chapter(s): – *Dual Observation [▸ 193]* ▪ New material number as successor of 430035-7344-001, revision 18

Tab. 4: Revision History

Glossary

ACR (Automatic component recognition)

A function that recognizes automatically objectives, identifies reflector modules and recognizes the exchange of components.

BF (Brightfield)

Illumination and imaging system where direct light passes through the objective aperture and provides a bright background against which the image is viewed.

C-DIC

Differential Interference Contrast in cirularly polarized light, a contrast method which employs the differential interference contrast technique with circularly polarized light, thus fully imaging sample structures which otherwise are only visible in a certain orientation

DF (Darkfield)

Illumination and imaging system that prevents direct light from entering the objective aperture.

DIC (Differential Interference Contrast)

An imaging light microscopy method that converts differences in the optical path length in the object into differences in the brightness of the image

FL (Fluorescence)

Phenomenon of a selective absorption of radiation with relatively short wavelength (i.e., relatively high energy) by matter with the result of the emission of radiation with longer wavelengths (i.e., lower energy), which persists only very briefly after the excitation has ceased.

P&C (Push and Click)

Functionality of a product that can be mounted without the use of tools by simply inserting it and then audibly snapping into place.

PCBA

Printed Circuit Board Assembly

PE conductor

A protective conductor provided for protective earthing.

PlasDIC

Differential Interference Contrast for Plastic Receptacles

PPE (Personal protective equipment)

Equipment used to protect persons from harm in the working environment.

PSU (Power supply unit)

Chiefly used for combinations of transformers and rectifiers that convert AC mains power to a lower-voltage DC power used in electronic devices. Superordinate concept -- see cross reference for specific types.

RL (Reflected Light)

Designation for microscopy techniques to image light that was reflected by the object

Sample or Specimen

A representative part or a single item from a larger whole or group especially when presented for inspection or shown as evidence of quality.

TIC (Total Interference Contrast)

Total Interference Contrast in circularly polarized light is a technique for imaging and layer thickness measurement in materials microscopy. Contrary to traditional polarization interferometers, work in this technique is carried out in circularly polarized light.

TL (Transmitted Light)

Light used for illuminating a object, where the light is transmitted through the object.

ZEISS service representative

Specially trained service expert, either ZEISS staff or authorized service partner of ZEISS.

ZEN software

Modular software, that is controlling all ZEISS light microscope sytems and has a wide application field: acquiring images, processing images and analyzing images.

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

Instruction Manual ZEISS Axioscope 5, Axioscope 5/7 MAT
en-US | Rev. 2 | 08/2025

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Certificate

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07745 Jena
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with the sites listed in the attachment the introduction and application of a

Quality management system according to EN ISO 13485

in the scope

Design and development, production, distribution, installation and service of microscopic devices as well as software and accessories for in-vitro-diagnostic purposes

An audit by mdc has proven that this quality management system meets the requirements of the following standard:

EN ISO 13485:2016 + AC:2018 + A11:2021 - ISO 13485:2016
Medical devices – Quality management systems – Requirements for regulatory purposes

Valid from	2025-10-27	Registration No.	D1501800002
Valid until	2028-10-26	Report No.	P25-00279-326433

Stuttgart, 2025-07-29

Certification Body

DAkkS Deutsche Akkreditierungsstelle D-ZM-16002-06-00

Sites included in the certification:

Location	Scope
Carl Zeiss Microscopy GmbH Carl-Zeiss-Promenade 10 07745 Jena Germany	Design and development, production, distribution, installation and service of microscopic devices as well as software and accessories for in-vitro-diagnostic purposes
Carl Zeiss Microscopy GmbH Kistlerhofstrasse 75 81379 München Germany	Design and development, production and service of microscopic software for in-vitro-diagnostic purposes

Stuttgart, 2025-07-29

Certification Body

Carl Zeiss Microscopy GmbH 73446 Oberkochen

To whom it may concern

Carl Zeiss Microscopy GmbH

Oberkochen location
Carl-Zeiss-Strasse 22
73447 Oberkochen
Germany

Phone: +49 (0) 73 64
Fax: +49 (0) 73 64
Email: guido.bauhammer@zeiss.com

Division/Dept.: CZ-RMS/GH
Your contact: Guido Bauhammer

Your ref.:
Yours of:
Our ref.:
Date: 14.07.2026

Subject: Confirmation of Spare Parts and Consumables Availability
Tender 21634377 from 16.06.2026, Lot#3, Institute of Oncology

We hereby confirm that for the microscope model AxioScope5 with AxioCam 212, our company guarantees the availability of spare parts and consumables for a minimum period of 10 (ten) years from the date of delivery.

Sincerely

Guido Bauhammer
Director Regional Sales

Carl Zeiss Microscopy GmbH
Location Oberkochen