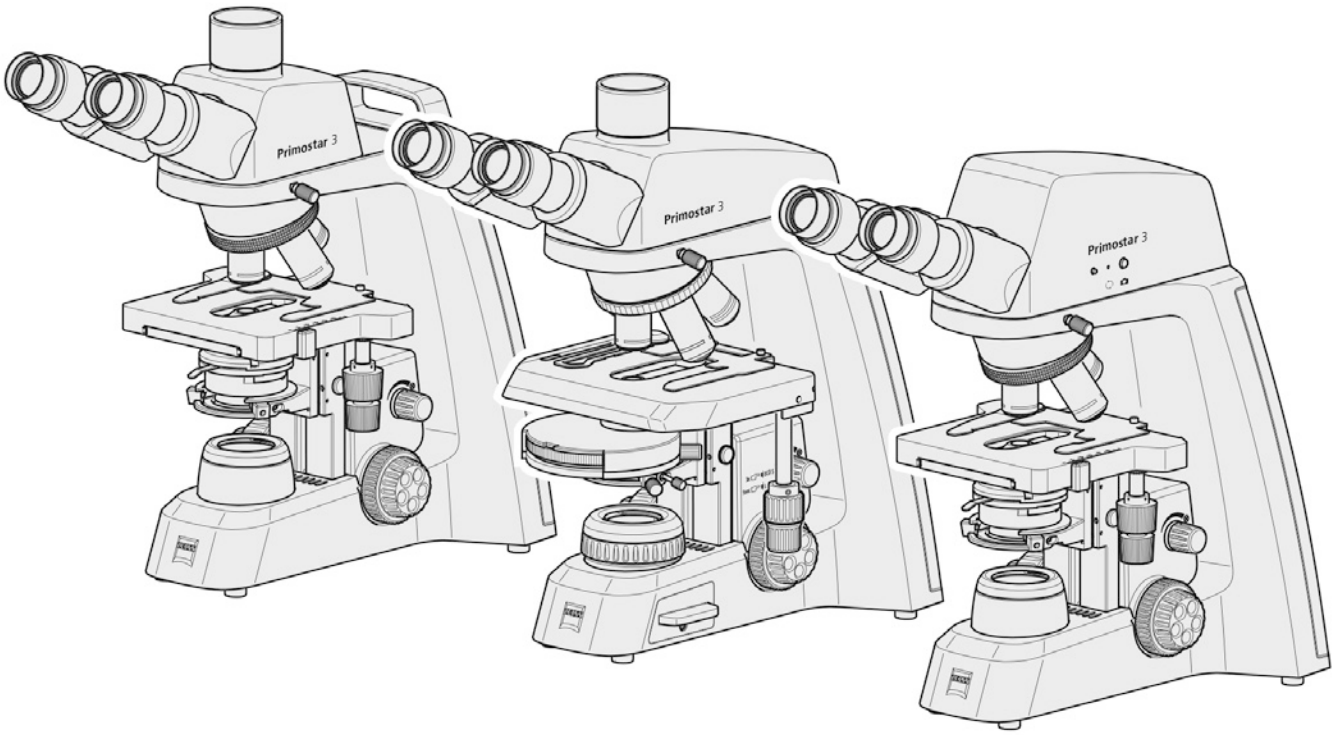

Instruction Manual

ZEISS Primostar 3

Upright Microscope for Education and Routine

ZEISS Primostar 3

Original Manual

EC REP

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UKCA IVD CE

Table of Contents

1 About this Instruction Manual

This Instruction Manual (further called "document") is considered to be part of the Primostar 3, 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.

1.1 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 [▸ 6]*.
Link to a website.	https://www.zeiss.com

1.2 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

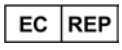
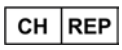
Type and source of danger

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

Info

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

1.3 Explanation of Symbols

	CE marking (Conformité Européene)
	CSA label: product tested by CSA to meet U.S. and Canadian standards. CSA approval master number optionally given adjacent to this symbol
	UKCA marking (UK conformity assessed)
	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
	Authorized representative in the European Community
	Swiss authorized representative

IVD	In vitro diagnostic medical device
#	Model number
SN	Serial number
REF	Catalogue number
	Class II equipment according to IEC 61140
	Intended for use in educational establishments by pupil operators at least 11 years old under supervision of the responsible body. The number 11 is an example age. Other numbers can be marked for other ages.
	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

1.4 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.

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

Also observe the following instruction manuals:

- Labscope software manual

1.5 Contact

If you have any questions or problems, contact your local ZEISS Sales & Service Partner or one of the following addresses:

Headquarters

Phone:	+49 1803 33 63 34
Fax:	+49 3641 64 3439
Email:	info.microscopy.de@zeiss.com

Microscopy Courses, Training, and Education

For information on microscopy courses, training, and education visit the ZEISS Academy Microscopy (https://www.zeiss.com/microscopy/en/service-support/training-education/academy-microscopy.html).

ZEISS Portal

The ZEISS Portal (https://portal.zeiss.com/) offers various services that simplify the daily work with your ZEISS systems (machines and software).

Service Germany

Phone:	+49 7364 20 3800
Fax:	+49 7364 20 3226
Email:	service.microscopy.de@zeiss.com

2 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

2.1 Intended Purpose

2.1.1 Microscopes for In Vitro Diagnostic Applications

The microscopes labeled Primostar 3 on the type label (including Primostar 3 with binocular tube with integrated 8 MPx camera) are instruments for general microscopic imaging for the in vitro examination of various biological samples including samples collected from humans or animals. This imaging provides information to further assess physiological and pathological conditions.

The microscopes are intended to be used by trained professionals only.

2.1.2 Microscopes for Non-Medical Applications

The microscopes labeled Primostar 3 cam on the type label are universally usable microscopes for educational microscopy in digital classroom environments. It is not intended to either directly or indirectly generate medical diagnostic results.

The microscopes are intended to be used by trained professionals only.

The microscopes are also suitable for use in educational establishments by students at least 14 years old when supervised by trained professionals.

2.2 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.

2.2.1 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.

Any operations by students in educational establishments shall be under the supervision of authorized and trained personnel.

2.2.2 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 and its components may only be operated after correct installation by a ZEISS service representative and 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.

2.2.3 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.

2.2.4 EMC Information

2.2.4.1 Tubes with Integrated Camera

Primostar 3 with tube with integrated 8 MPx camera:

The microscope is intended to be used in a basic electromagnetic environment for non-clinical applications or in a professional healthcare facility environment for clinical applications.

It is likely to perform incorrectly if used in a home healthcare environment.

Do not use the microscope in proximity to sources of strong electromagnetic radiation (e.g. unshielded intentional RF sources), 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 is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

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

Primostar 3 cam with tube with integrated 5 MPx camera:

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

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Both 8 MPx and 5 MPx tube

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 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 following EMC user notice is for Korea only:

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

The following EMC user notice is for Canada only:

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

2.2.4.2 Tube without Camera

The following EMC information is valid for the Primostar 3 with tube **without** integrated camera.

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 Korea only:

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

2.2.5 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.

2.3 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.

2.3.1 Mechanical Hazards

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.

2.3.2 Electrical Hazards

Voltage Hazards

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

Always use the power adapter supplied by ZEISS. When an unsuitable power adapter is used, ZEISS can no longer guarantee the electrical safety and functionality of the microscope.

- Shut down the microscope.
- Disconnect the power supply before cleaning.
- Set up and operate the microscope so that the connectors are easily accessible.
- Position the microscope stand in a way so that you can easily unplug the power cable at any time.

Safe disconnection from the mains is ensured exclusively by removing the mains plug. The switch on the rear side of the microscope only switches into standby mode.

2.3.3 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

In a domestic environment 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.

2.3.4 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.

Immersion oil

Immersion oil irritates the skin and the eyes. When using immersion oil, always read the relevant safety data sheet first. Avoid any contact of the oil with skin, eyes, and clothing. After skin contact, wash the oil off with plenty of water and soap. After eye contact, immediately rinse the eye with plenty of water for at least five minutes. If the irritation persists, consult a medical specialist. Ensure that no immersion oil enters the surface water or the sewage system.

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.

Disinfectant Hazards

Ensure adequate ventilation in closed rooms. In case of insufficient ventilation, wear respiratory protective equipment. Remove any harmful residue. Allow the device to dry off after disinfection, particularly after disinfection of eyepieces. Do not inhale vapors. When using disinfectants, do not eat, drink or smoke. Avoid contact with eyes and skin. Remove contaminated clothing and wash before reuse.

Eye, Skin, Respiratory Tract Irritation

Exposure to chemicals and their aerosols can cause eye, skin and respiratory tract irritation. Use appropriate personal protective equipment (PPE).

2.3.5 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.

2.3.6 Hazards Generated with the Operating Environment

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.
- 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).

2.4 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.

2.4.1 Labels on the Primostar 3

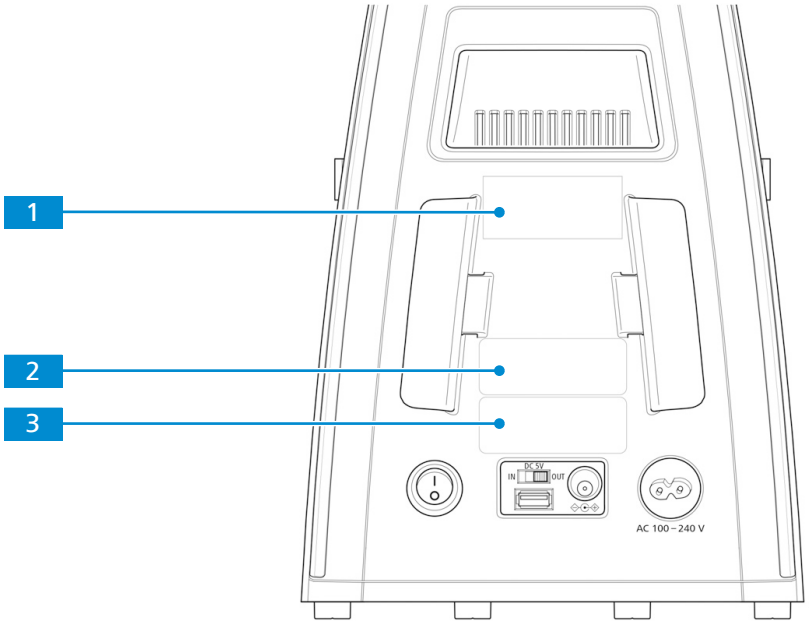


Fig. 1: Labels on the microscope rear side

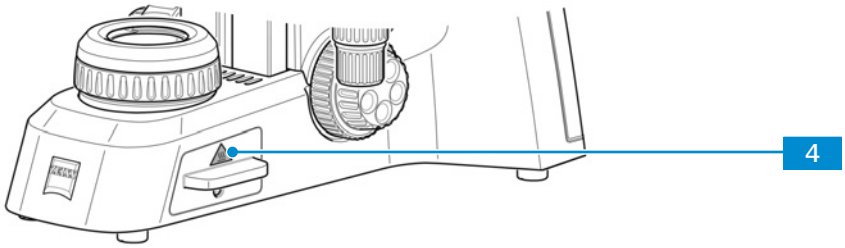


Fig. 2: Label on the halogen module of the Full-Köhler stand

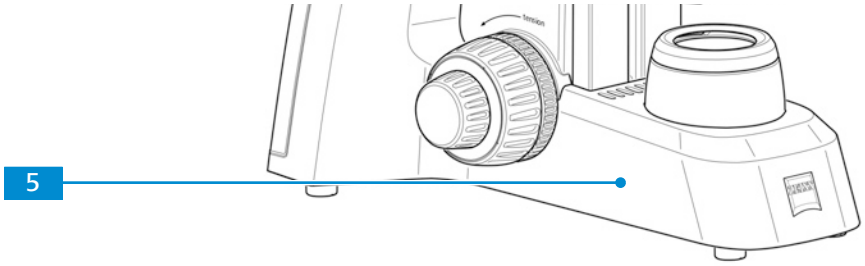
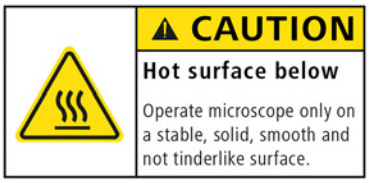
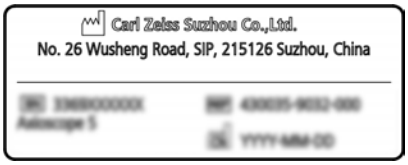
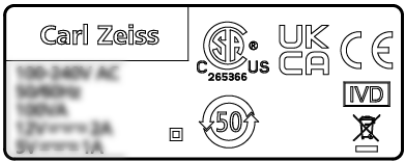
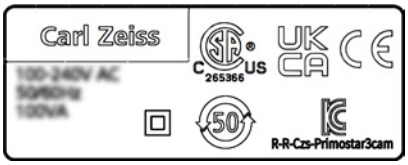
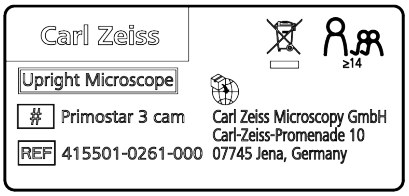


Fig. 3: Labels on the microscope left side

Pos.	Label	Explanation
1		CAUTION Hot surface below Operate microscope only on a stable, solid, smooth and not tinderlike (non-flammable) surface.
2		Microscope type label
3		Microscope type label for Primostar 3
		Microscope type label for Primostar 3 cam
4		Hot surface! Do not touch.

Pos.	Label	Explanation
5		Type label only for Primostar 3 cam

2.4.2 Labels behind the Nosepiece

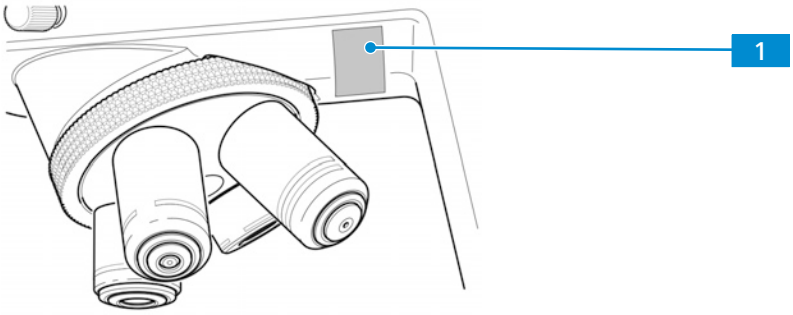
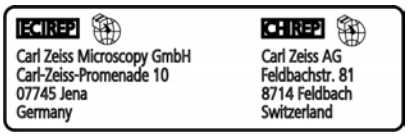


Fig. 4: Label behind the nosepiece

Pos.	Label	Explanation
1		Representatives and importer label not applicable for Primostar 3 cam microscopes
		Importer label only applicable for Primostar 3 cam microscopes

2.4.3 Labels on the Fluorescence Unit

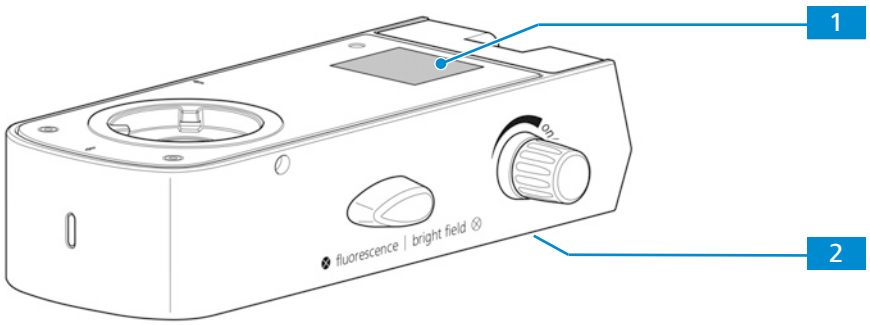
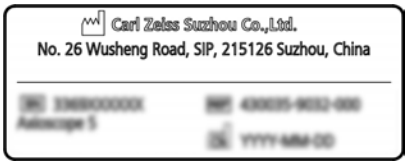


Fig. 5: Labels on the fluorescence unit

Pos.	Label	Explanation
1		CAUTION LED Radiation Do not stare at operating lamp. May be harmful to the eyes.
2		Fluorescence unit type label

2.5 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.

2.5.1 Safety Device of the Reflected-Light FL iLED

To prevent personal injury and/or property damage, the reflected-light FL iLED is equipped with an interlock function, which causes the built-in LED of the reflected-light FL iLED to be switched off as soon as the reflected-light FL iLED is turned with regard to the stand or detached.

Defective and damaged safety devices can lead to injuries and damage. In the event of damage or defect, the affected parts and the entire microscope must be taken out of operation immediately and secured against unintentional use.

To check the microscope safety, contact your ZEISS Sales & Service Partner and keep the service protocols for your microscope.

3 Product and Functional Description

The Primostar 3 is a transmitted-light microscope of compact design with a small footprint. The microscope provides high resolution, infinity-corrected objectives for all important transmitted-light techniques, such as brightfield, darkfield, simple polarization, and phase contrast microscopy.

The microscope is optionally available with a camera port for photo and video documentation.

For special camera applications there are two optional binocular tubes with integrated camera:

- Binocular tube 25°/22 with integrated 8 MPx camera
- Binocular tube 25°/22 with integrated 5 MPx camera
  The microscope with this tube is called Primostar 3 cam.

Typical Applications

- 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

Info

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

3.1 Main Components of the Primostar 3

The Primostar 3 microscopes have the following main components:

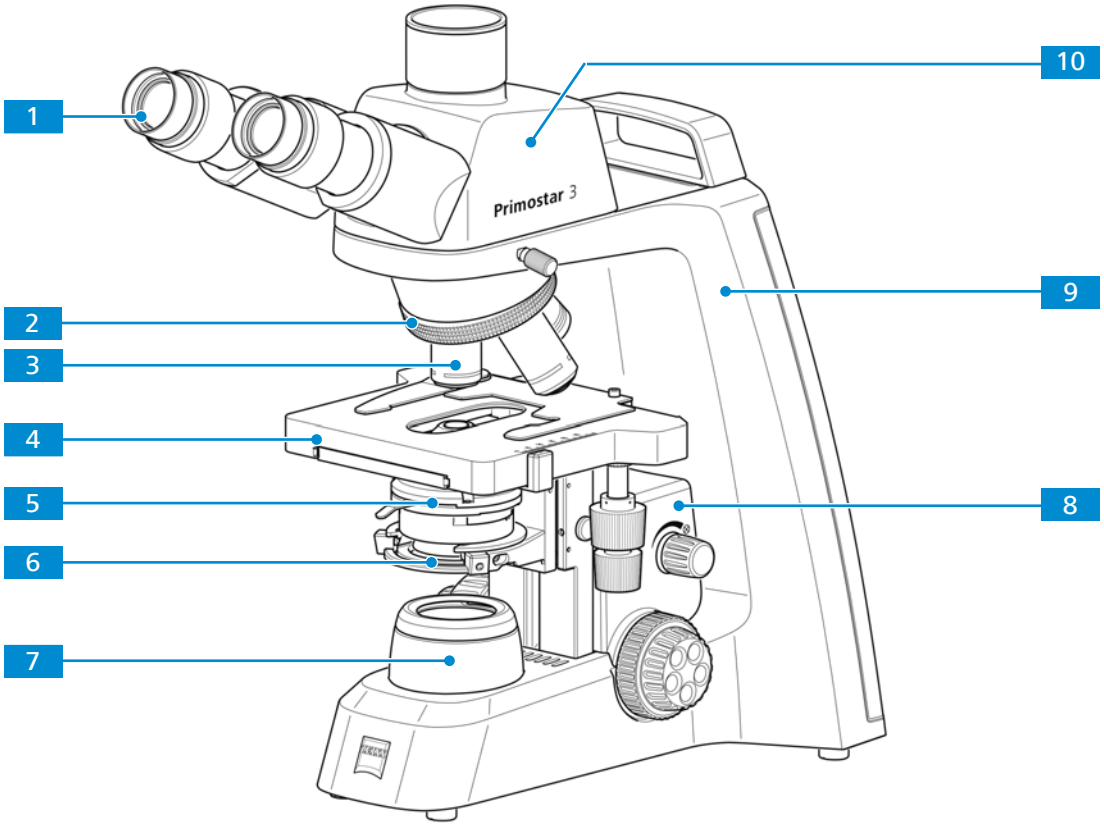


Fig. 6: Main components of the Fixed-Köhler microscope

1	*Eyepiece [▸ 35]*	2	Nosepiece
3	Objective	4	Stage
5	*Condenser [▸ 34]*	6	Condenser carrier
7	Illumination and luminous-field diaphragm	8	Stage carrier
9	Stand	10	Tube

3.1.1 Components of Primostar 3 Fixed-Köhler

The Fixed-Köhler configuration is characterized by the following components:

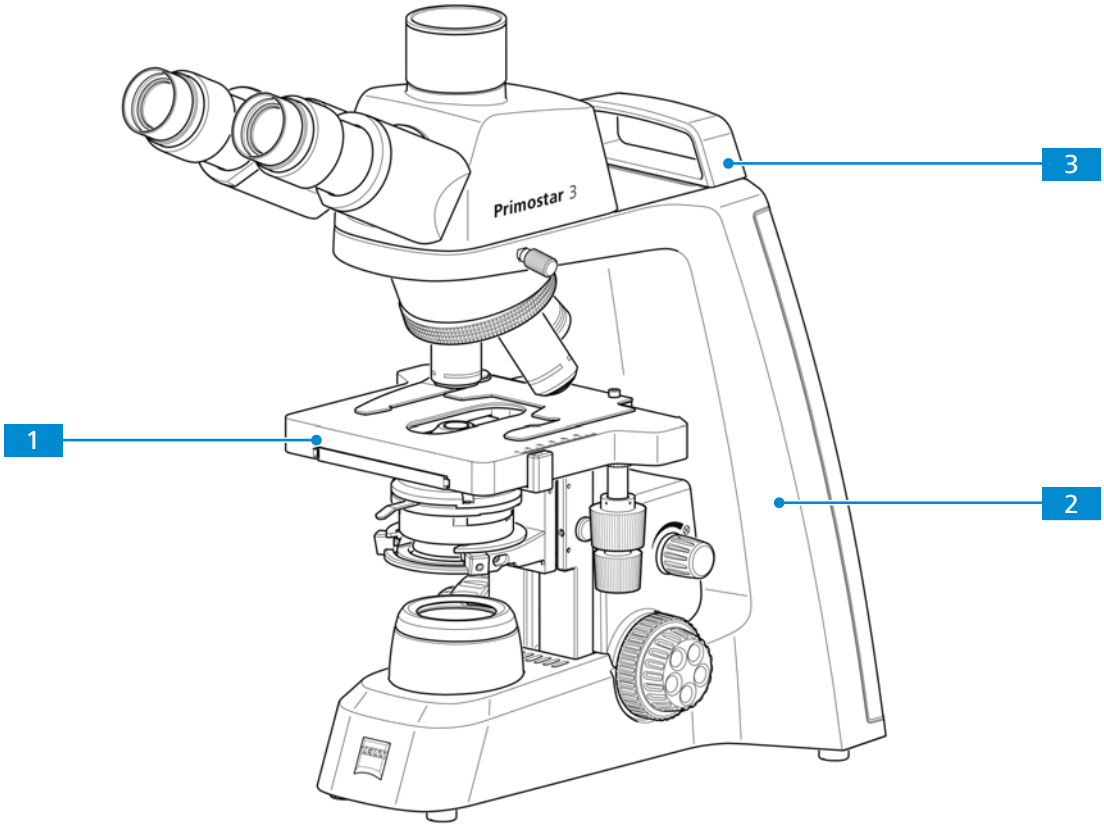


Fig. 7: Components characterizing the Fixed-Köhler microscope

1 Rackless stage 75x40, drive right or drive left

2 Fixed-Köhler stand

3 Small hand lift

3.1.2 Components of Primostar 3 iLED (Fixed-Köhler)

The Fixed-Köhler microscope with reflected light FL iLED is characterized by the following components:

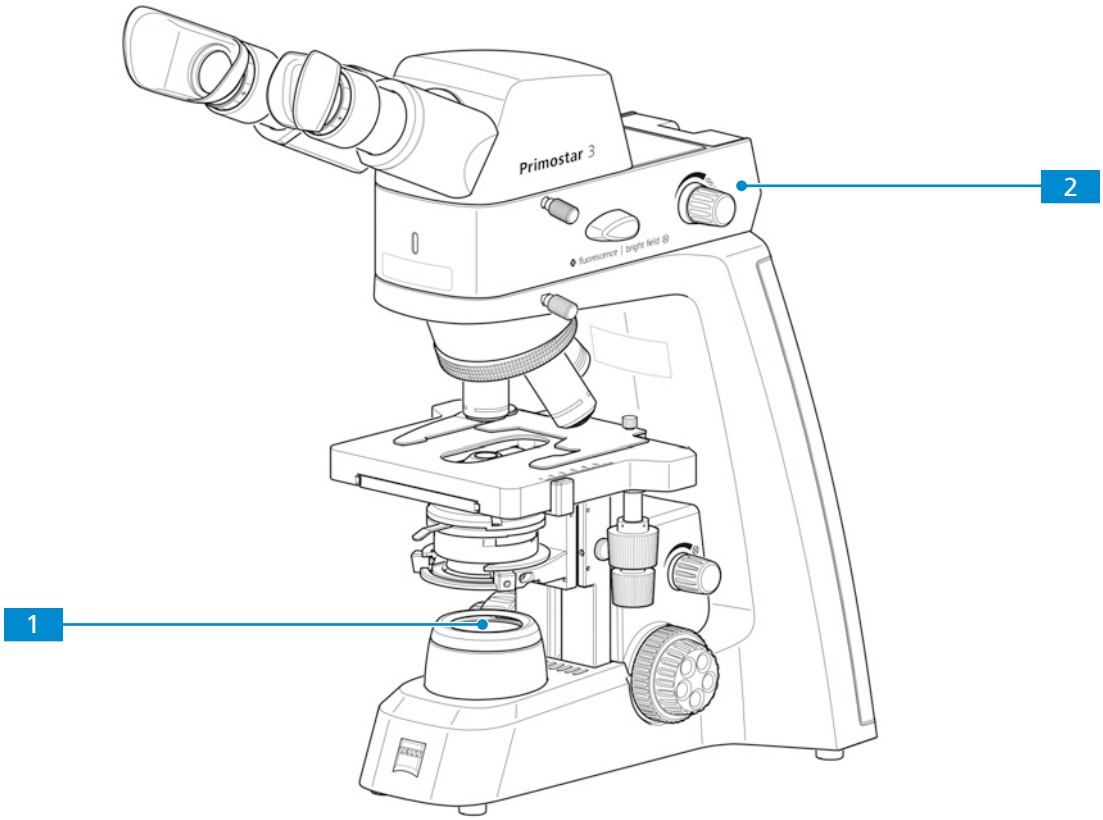


Fig. 8: Components characterizing the Fixed-Köhler microscope with iLED

1 Yellow filter insert with two positions:

- position for adapting the color temperature in transmitted light
- position for blocking the transmitted-light path in reflected-light fluorescence

2 Reflected-light FL iLED

3.1.3 Components of Primostar 3 with Tube with Integrated Camera

The Fixed-Köhler microscope with binocular tube with integrated camera is characterized by the following components:

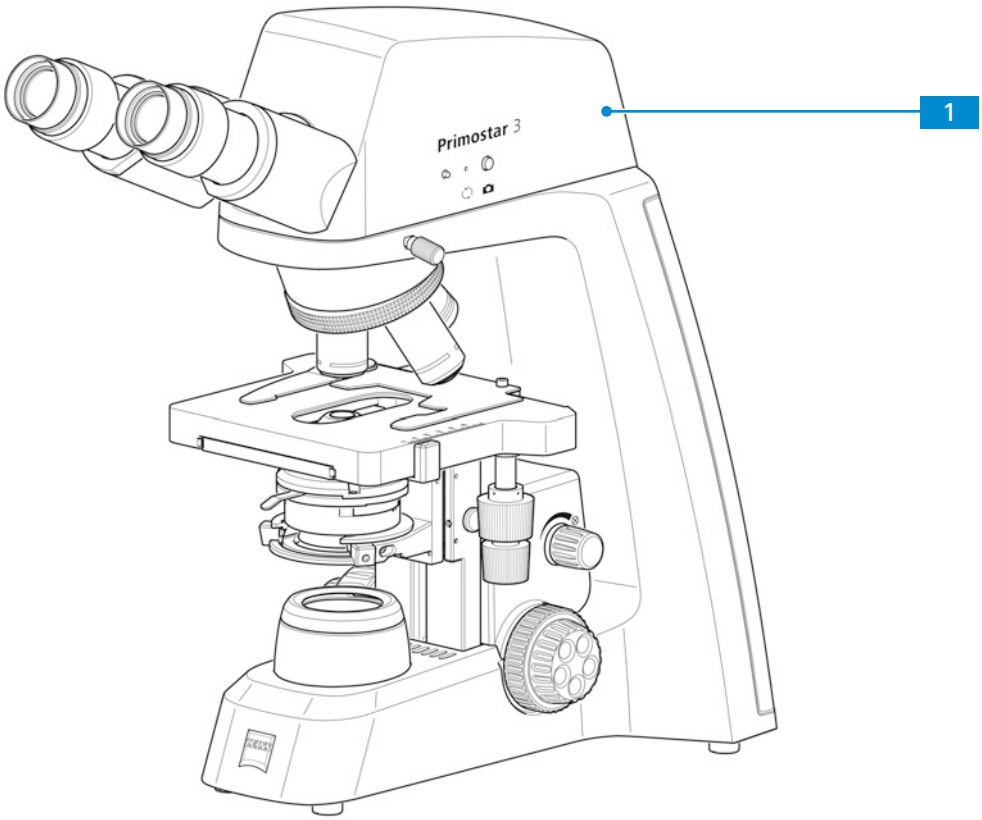


Fig. 9: Components characterizing the microscope with binocular tube 25°/22 with integrated camera

1 *Binocular Tube 25°/22 with Integrated Camera [▸ 32]*

- Binocular tube with 8 MPx camera
- Binocular tube with 5 MPx camera (Primostar 3 cam)

3.1.4 Components of Primostar 3 Full-Köhler

The Full-Köhler configuration is characterized by the following components:

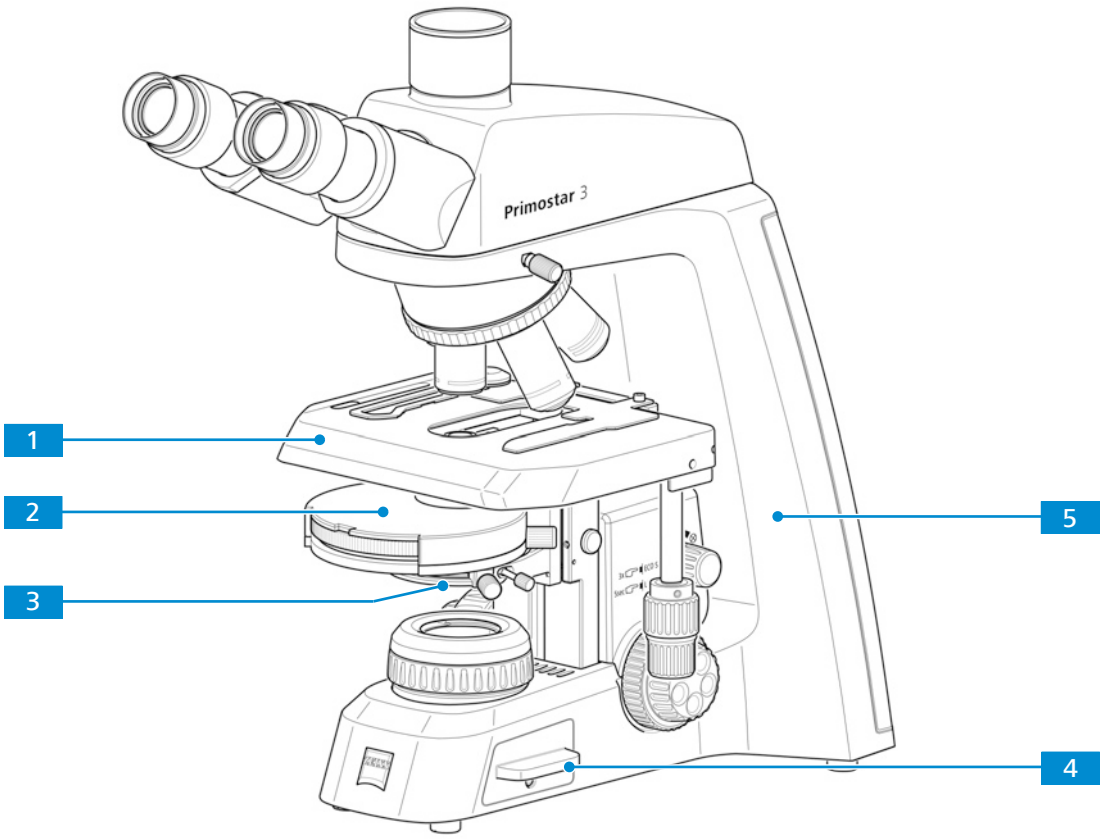


Fig. 10: Components characterizing the Full-Köhler microscope

1	Rackless stage 75x50, drive right or drive left	2	Turret condenser 0.9/1.25 field 22 or *Abbe Condenser 0.9/1.25 Field 20* *[▸ 34]*
3	Condenser carrier with centering screws for condenser adjustment	4	Transmitted-light illuminator, LED or HAL
5	Full-Köhler stand		

3.2 Controls and Connections

3.2.1 Fixed-Köhler Stand

Purpose The controls on the stand control the main functions of the microscope.

Position The following controls are located on the right side of the stand.

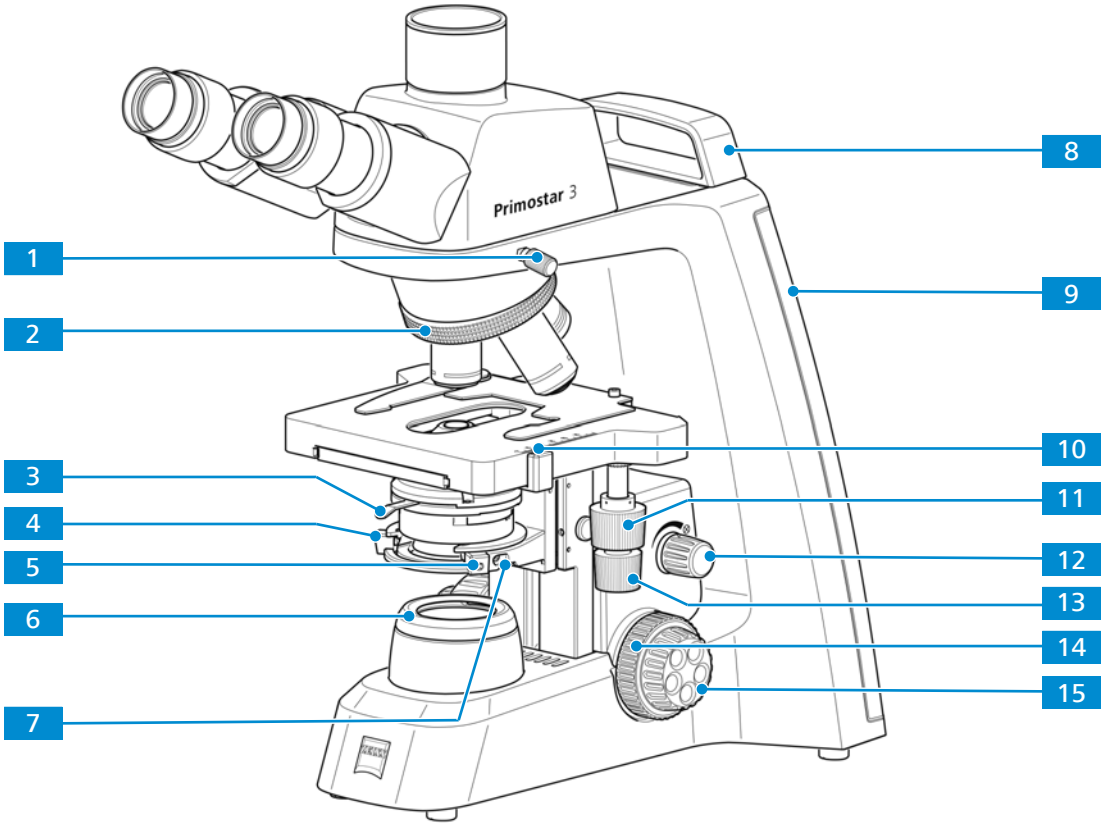


Fig. 11: Stand controls on the right side (Fixed-Köhler)

1 Clamping screw for tube

2 Knurled ring for turning the nosepiece

3 Lever for adjusting the aperture diaphragm of the condenser, see also *Abbe Condenser 0.9/1.25 Field 20* *[▸ 34]*

4 Centering screw (Allen screw) for condenser on condenser carrier (left side)

5 Centering screw (Allen screw) for condenser on condenser carrier (right side)

6 Cover cap of the luminous-field diaphragm

7 Clamping screw for condenser

8 Small hand lift (only Fixed-Köhler stand)

9 Illumination-intensity indicators for transmitted light (right side)
The selected intensity is indicated in five layers by the Cyan light-emitting diodes belt.

10 Vernier and scale, displaying the Y position of the stage

11 Control knob for Y travel of rackless stage

12 Rotary knob to adjust the illumination intensity for transmitted light

13 Control knob for X travel of rackless stage

14 Coarse focusing drive (right side)

15 Fine focusing drive (right side)

Position The following controls are located on the left side of the stand.

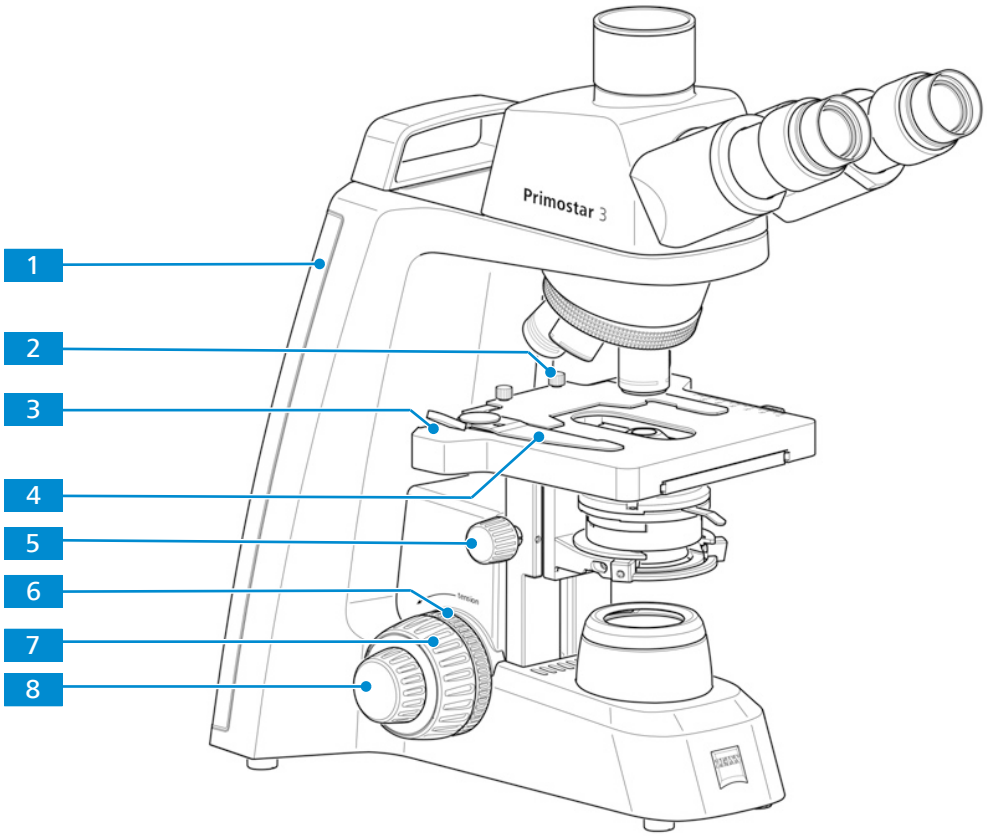


Fig. 12: Stand controls on the left side (Fixed-Köhler)

1	Illumination-intensity indicators for transmitted light (left side) The selected intensity is indicated in five layers by the Cyan light-emitting diodes belt.	**2**	Clamping screw for the specimen holder
3	Vernier and scale, displaying the X position of the stage	**4**	Lever of the specimen holder for fixing the specimen
5	Knurled ring for condenser height adjustment	**6**	Knurled ring for adjusting the smoothness of the coarse focusing drive
7	Coarse focusing drive (left side)	**8**	Fine focusing drive (left side)

Position The following controls and connections are located on the rear side of the stand.

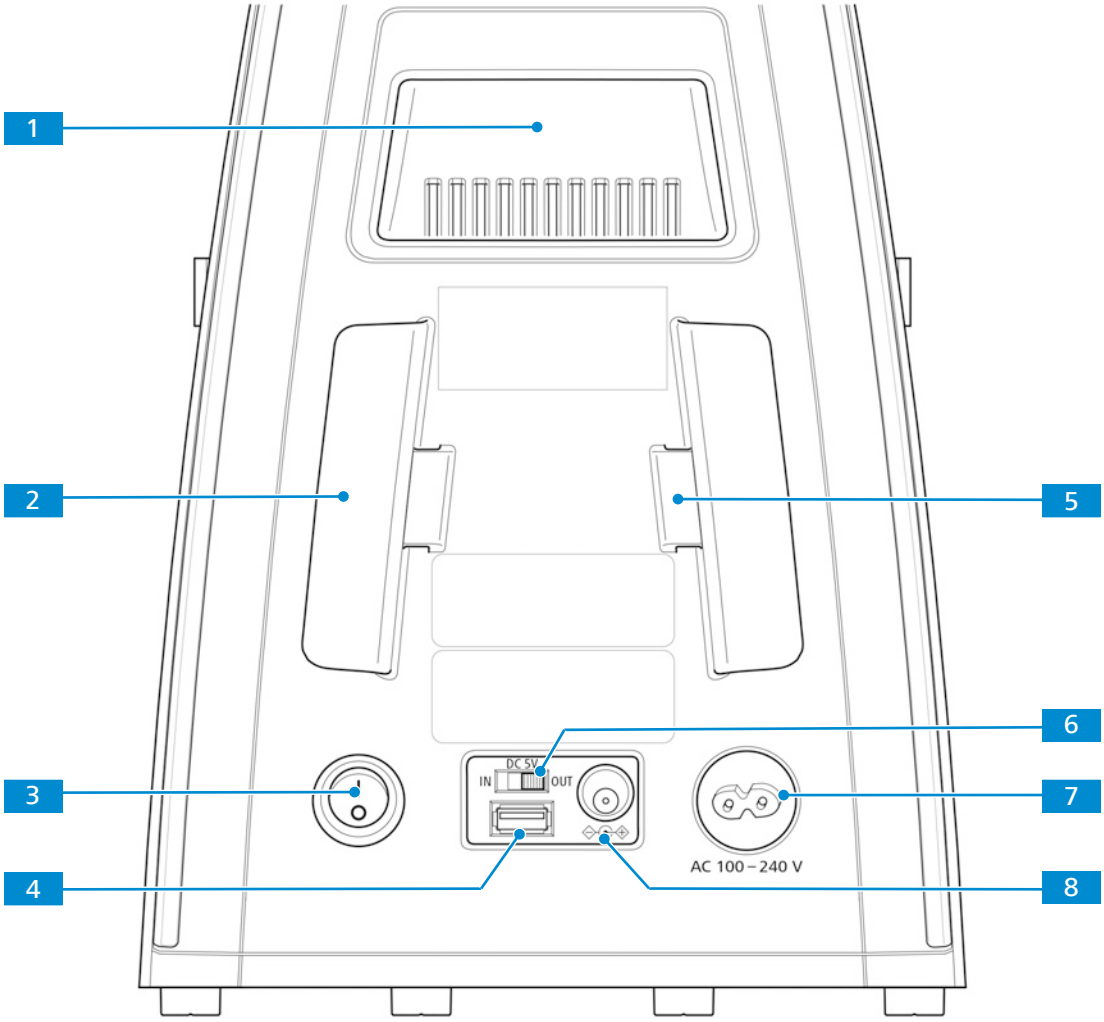


Fig. 13: Stand controls and connections on the rear side (Fixed-Köhler)

1	Carrying handle	2	Holder for power cable
3	**Main power ON/OFF** button	4	5V USB port for mobile power bank
5	Storage place for phase plate adjustment tool	6	**DC 5V** switch
7	Mains socket	8	Connection port for external DC power supply (12 V)

Info

When the **DC 5V** switch 6 is set to the **OUT** position, the maximum output of the USB port 4 is 1 A.

3.2.2 Full-Köhler Stand

Purpose The controls on the stand control the main functions of the microscope.

Position The following controls are located on the right side of the stand.

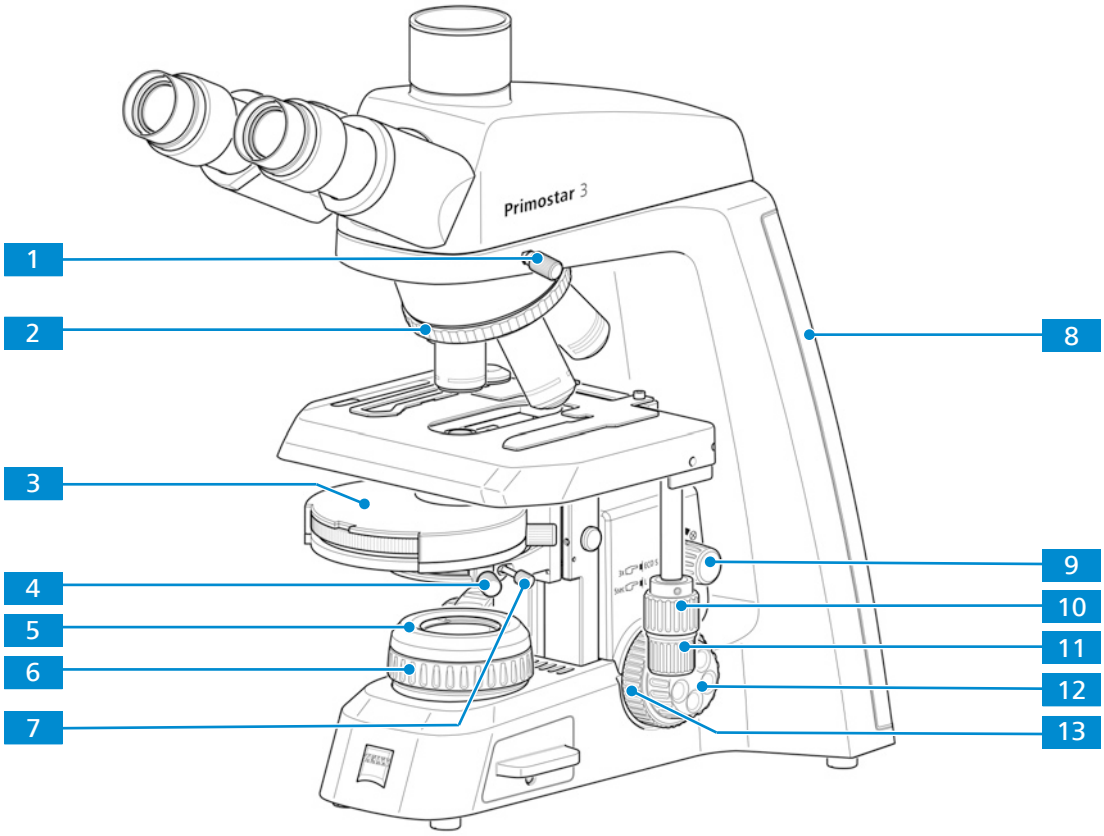


Fig. 14: Stand controls on the right side (Full-Köhler)

1 Clamping screw for tube

2 Knurled ring for turning the nosepiece

3 Turret condenser, controls see *Abbe Condenser 0.9/1.25 Field 20 [▸ 34]*

4 Centering screw (knurled screw) for condenser on condenser carrier (right side)

5 Cover cap of the luminous-field diaphragm

6 Knurled ring for adjusting the luminous-field diaphragm

7 Clamping screw for condenser

8 Illumination-intensity indicators for transmitted light (right side)
The selected intensity is indicated in five layers by the Cyan light-emitting diodes belt.

9 Rotary knob for varying the brightness of the microscopic image, for switching on / off the Light manager and the ECO mode

10 Control knob for Y travel of rackless stage

11 Control knob for X travel of rackless stage

12 Fine focusing drive (right side)

13 Coarse focusing drive (right side)

Position The following controls are located on the left side of the stand.

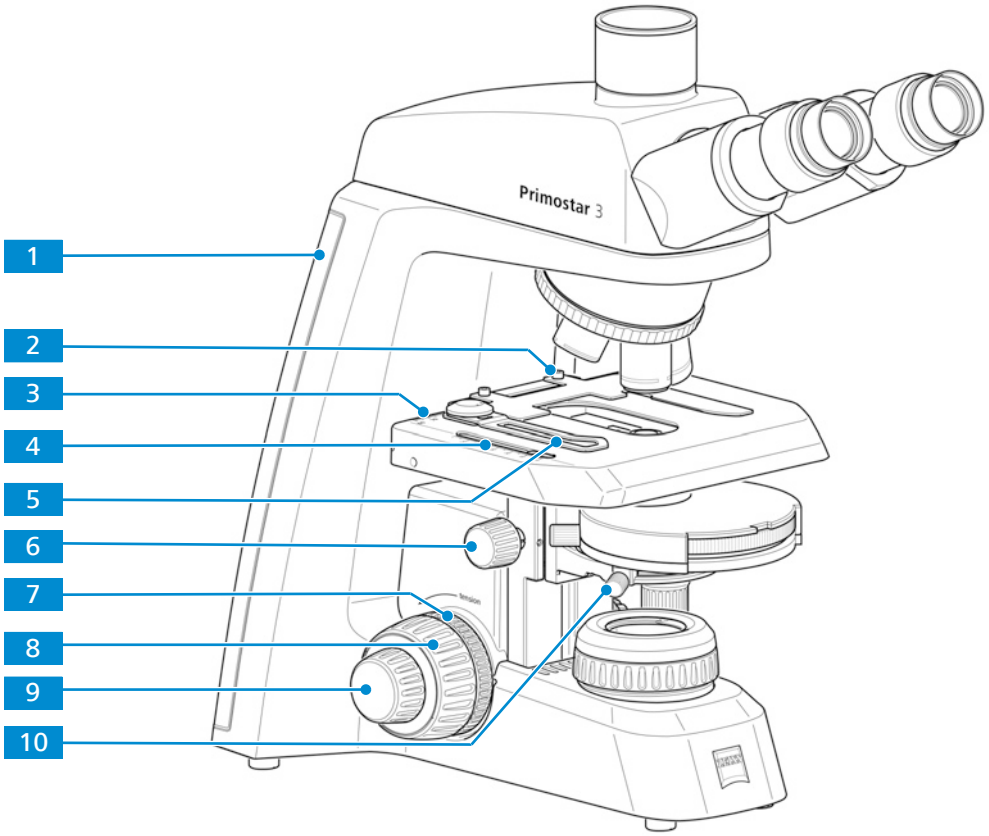


Fig. 15: Stand controls on the left side (Full-Köhler)

1 Illumination-intensity indicators for transmitted light (left side)
The selected intensity is indicated in five layers by the Cyan light-emitting diodes belt.

2 Clamping screw for the specimen holder

3 Vernier and scale, displaying the X position of the stage

Knurled ring for condenser height adjustment

4 Vernier and scale, displaying the Y position of the stage

5 Lever of the specimen holder for fixing the specimen

6 Knurled ring for condenser height adjustment

7 Knurled ring for adjusting the smoothness of the coarse focusing drive

8 Coarse focusing drive (left side)

9 Fine focusing drive (left side)

10 Centering screw (knurled screw) for condenser on condenser carrier (left side)

Position The following controls and connectors are located on the rear side of the stand.

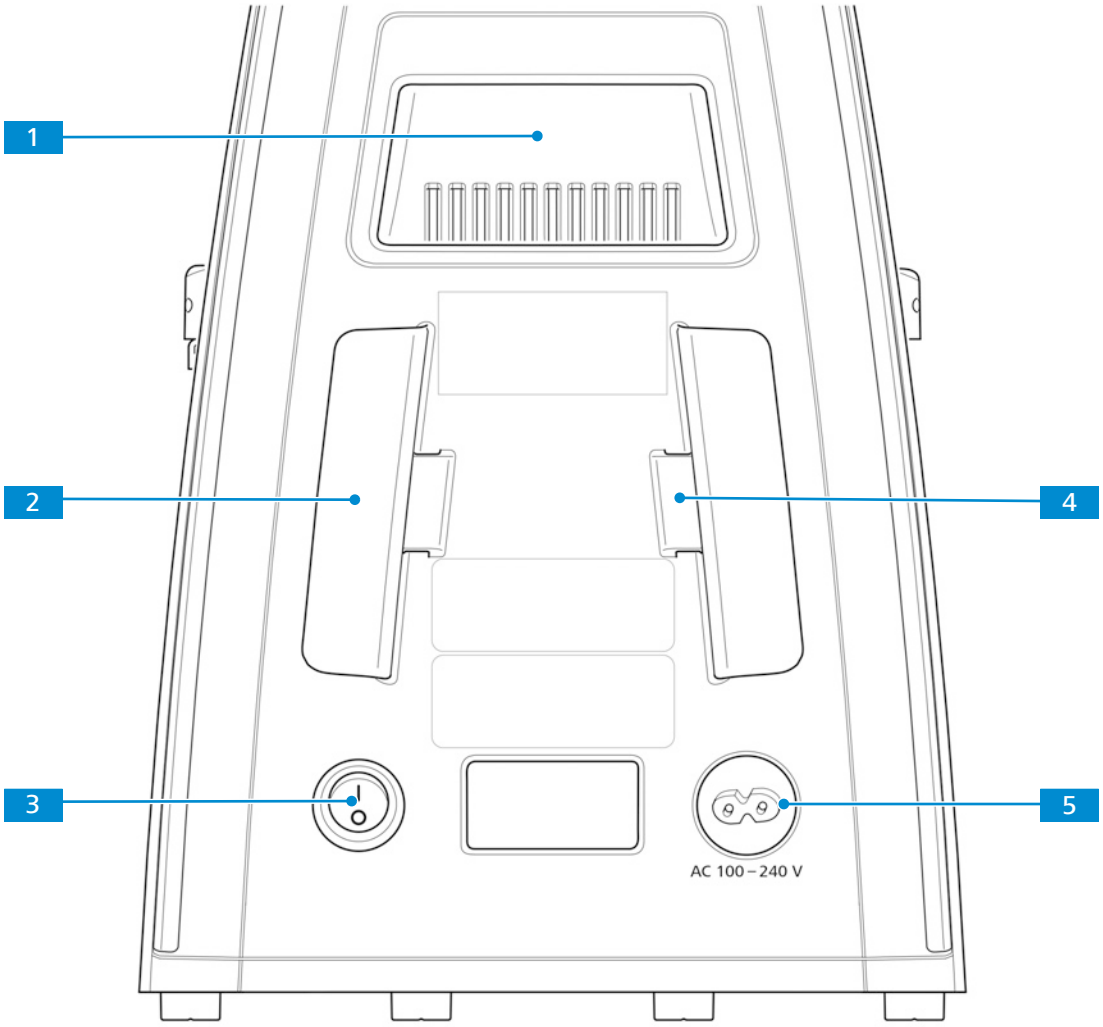


Fig. 16: Stand controls and connections on the rear side (Full-Köhler)

1	Carrying handle	2	Holder for power cable
3	**Main power ON/OFF** button	4	Storage place for phase plate adjustment tool
5	Mains socket		

Function For Full-Köhler stands, Light Manager, encoding function and sleeping mode are factory set up:

- The Light Manager enables the microscope to remember the best illumination setting from the previous use. When the microscope is set at the best illumination with objective A, light intensity will be remembered. You can switch to objective B and adjust the illumination. When you change back to objective A, light intensity will return to the last setting. The light intensity of all five objectives can be remembered.
- The Light Manager feature can be disabled by pushing the intensity knob for five seconds. You will see that the Cyan LED Belt reduces its intensity from Max to Min, indicating that the Light Manager is disabled. You can re-activate the Light Manager by the same process.
- If you do not touch the microscope for 30 minutes it will go into ECO mode. The lowest layer of the Cyan LED belt will "breathe" (blink slowly). Any movement of the nosepiece or the intensity knob will re-activate the microscope.
- The ECO mode can be disabled by triple clicking the intensity knob (for example in case of long time video shooting). You will see the Cyan LED belt illuminating once as a sign. Triple clicking the intensity knob again will reactivate ECO mode.

3.2.3 Reflected-Light FL iLED

Purpose To carry out examinations according to the reflected-light fluorescence method, the reflected-light FL iLED is required.

Position The reflected-light FL iLED is mounted on the Fixed-Köhler stand (without small handle lift).

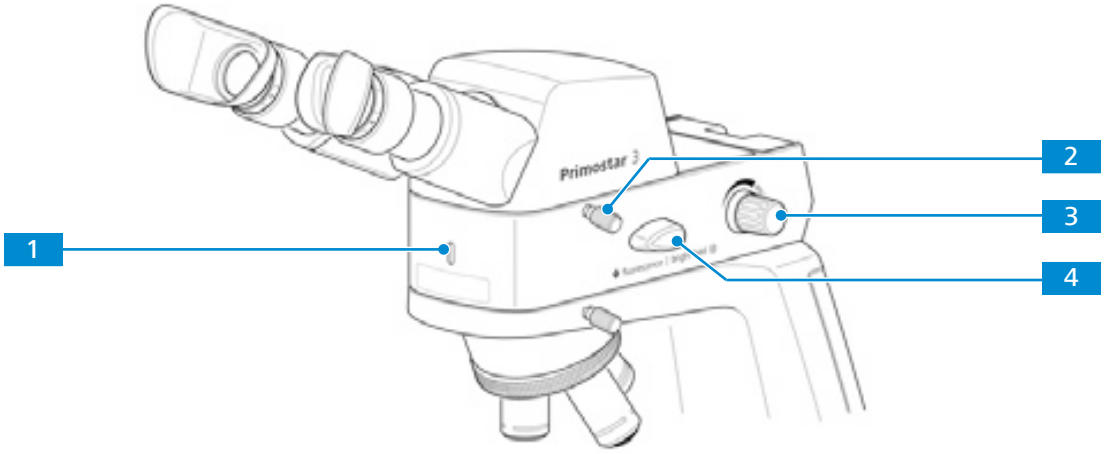


Fig. 17: Controls of the reflected-light FL iLED

1 Pilot lamp for reflected-light FL iLED: lights up blue when switched on; brightness corresponds to intensity

2 Clamping screw for tube

3 Rotary knob for switching ON/OFF and adjusting the intensity for reflected light

4 **fluorescence/brightfield** changeover switch
Always turn the **fluorescence/bright-field** changeover switch first upward and then to the desired position. Using force to turn it downward will damage the reflected-light FL iLED.

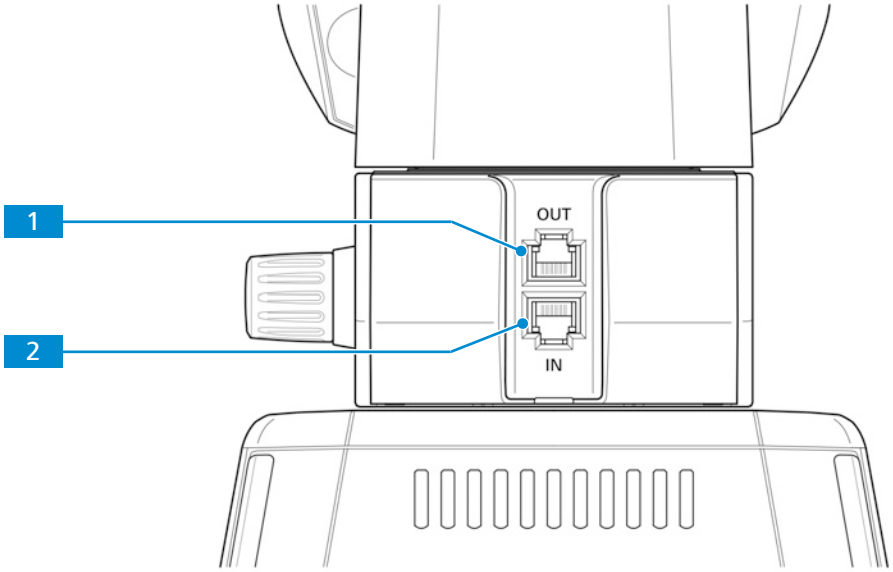


Fig. 18: Connections and special components on the rear side of the reflected-light FL iLED

1 RJ12 port
For power supply of the binocular tube with integrated camera, if mounted additionally

2 RJ12 port
For power supply of the reflected-light FL iLED

3.2.4 Binocular Tube 25°/22 with Integrated Camera

Purpose The binocular tube 25°/22 with integrated camera is used to visualize and transfer the microscopic image to an external medium, such as a separate monitor, PC, or mobile device via data line or Wi-Fi connection.

Position The binocular tube 25°/22 with integrated camera is mounted on the Full- or Fixed-Köhler stand (without small handle lift).

There are two types of binocular tube with integrated camera for Primostar 3:

- Binocular tube with 8 MPx camera (labeled Primostar 3 on the type label)
- Binocular tube with 5 MPx camera (labeled Primostar 3 cam on the type label)

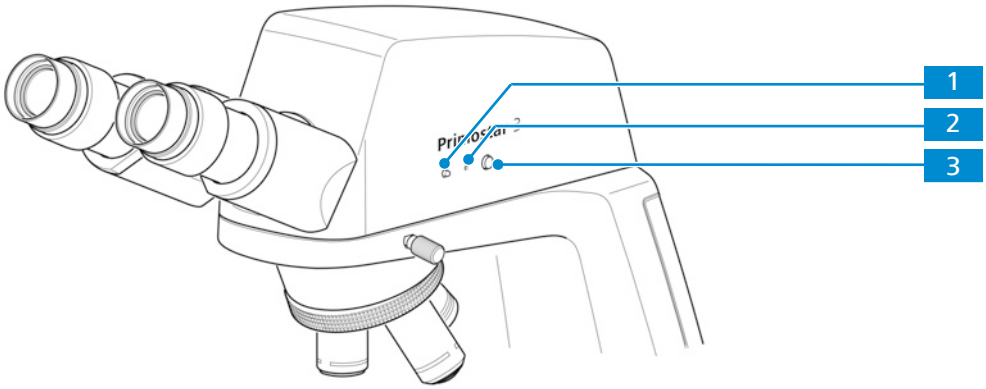


Fig. 19: Controls of the binocular tube 25°/22 with integrated camera

1 LED indicator:
Shows the current camera working status.

2 **Reset** button:
Restarts the camera by continuously pressing the button for 5 seconds using a clip.

3 **Snap** button:
Press briefly to trigger an exposure, press and hold to start a video recording, press briefly to stop a video recording

The states of the tube with HD camera are displayed by LED indicator.

Color	State	Status
pink	continuously	Start sequence
blue	flashing	Snapping/recording in process, and saving data to USB flash drive
blue	continuously	Power supplied and camera ready
red	flashing	Firmware updating/factory resetting
pink	flashing	No USB flash drive or the drive is full

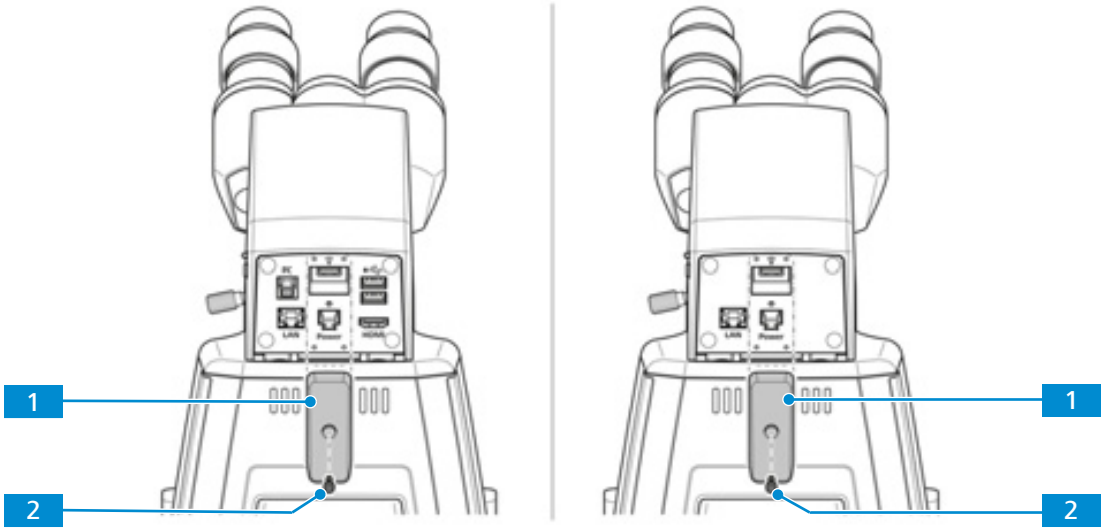


Fig. 20: Cover plate on the rear side of the binocular tube 25°/22 with integrated 8 MPx camera (left) and 5 MPx camera (right)

1 Cover plate
For covering the USB TYPE A port and the RJ12 port

2 Cover plate lock screw
For locking the cover plate

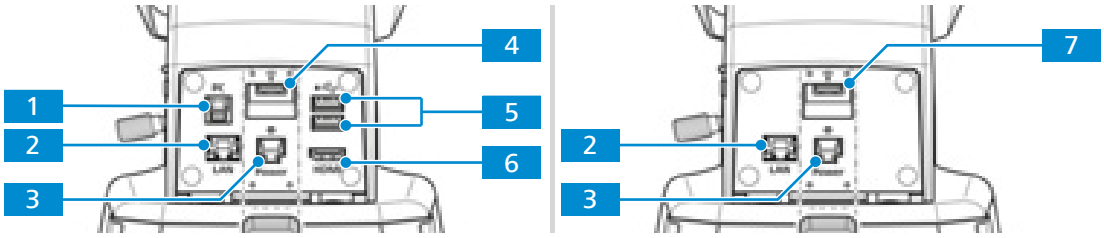


Fig. 21: Connections of the binocular tube 25°/22 with integrated camera on the rear side

1 USB TYPE B
For image data transfer to a PC

2 Fast Ethernet port (RJ45)
For communication and image data transfer

3 RJ12 port
For power supply from stand

4 USB TYPE A
Especially for Wi-Fi adapter

5 2x USB TYPE A
For storing image data to USB flash drive

6 HDMI port
For image data transfer to a display (monitor/projector)

7 USB TYPE A
Especially for Wi-Fi adapter and optionally for storing image data to USB flash drive

3.2.5 Abbe Condenser 0.9/1.25 Field 20

Purpose The condenser focuses the light from the light source to illuminate the object as evenly as possible, and to guide it as accurately as possible into the imaging beam path.

Position The condenser is mounted on the condenser carrier behind the specimen stage.

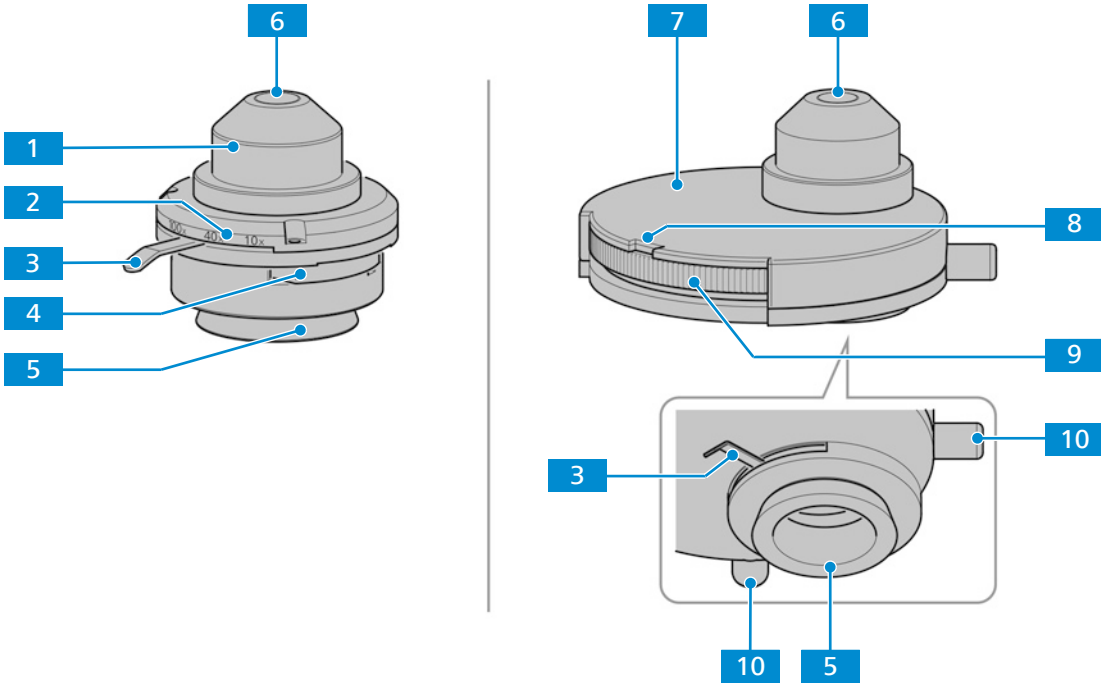


Fig. 22: Abbe condenser and turret condenser

1	Abbe condenser	**2**	Magnification marker for aperture setting
3	Lever for adjusting the aperture diaphragm	**4**	Slot for phase contrast or darkfield slider
5	Dovetail ring mount	**6**	Front lens
7	Turret condenser	**8**	Display field for selected contrast stop
9	Turret disk with five positions for: Brightfield **H** Phase contrast **Ph1**, **Ph2**, **Ph3** Darkfield **D**	**10**	Phase ring adjustment holes

3.2.6 Eyepiece

Purpose The eyepieces (10x/20 Br. Foc. and 10x/22 Br. Foc.) serve to observe the microscopic image.

Position The eyepieces are inserted into the tube.

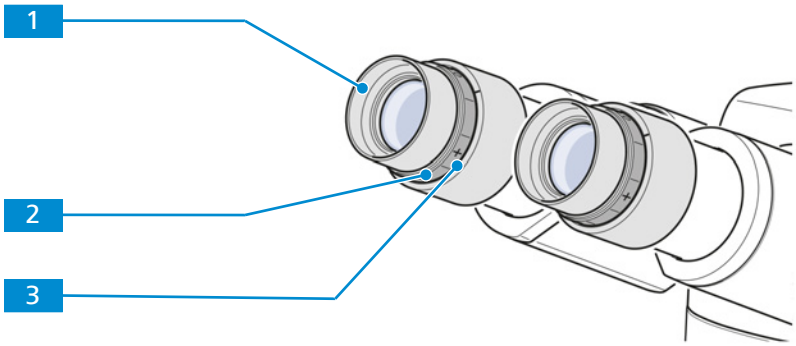


Fig. 23: Eyepiece

1 Foldover rubber eyecup

2 Focusing ring
for compensation of defective vision

3 Diopter scale
to facilitate finding the correct setting

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 with the Reflected-Light FL iLED 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.

3.2.7 Cable and Screw Tool Storage

The main power cable and phase plate adjustment tools can be stored on the rear side of the microscope.
If reflected light FL iLED is used, the hex key 3 mm can be stored on its rear side.

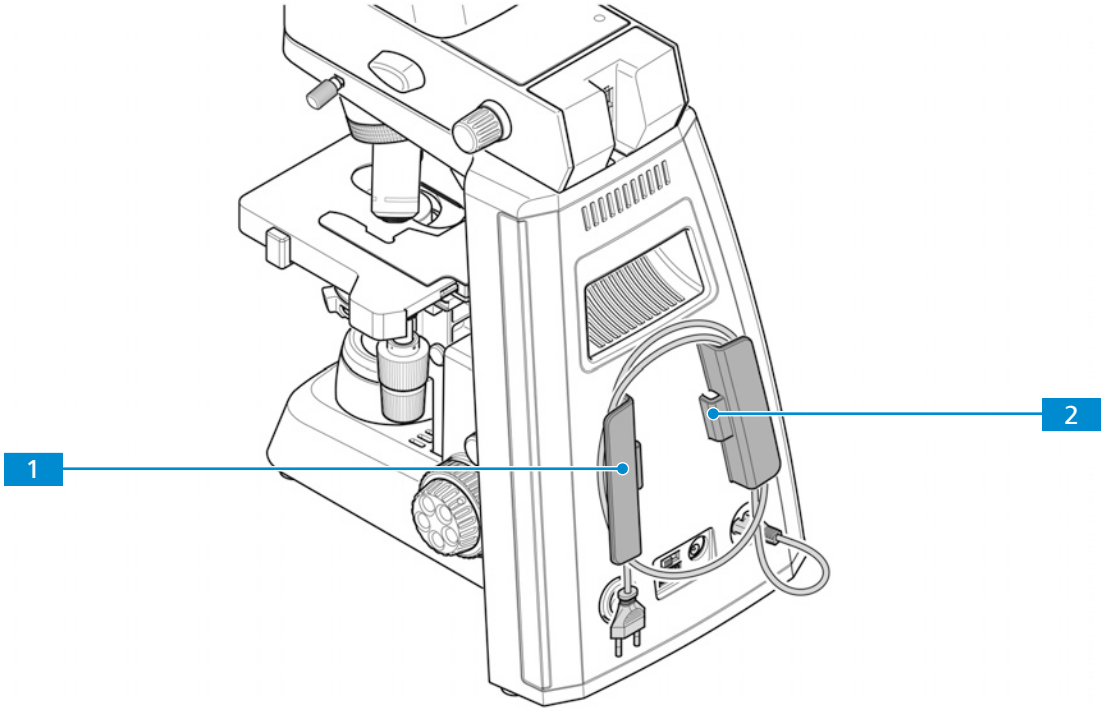
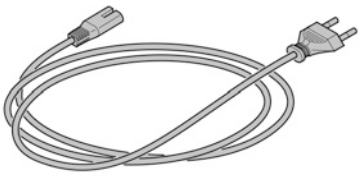
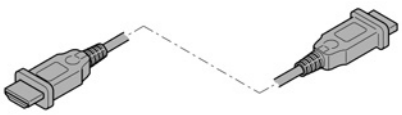


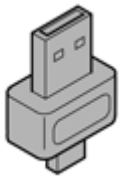
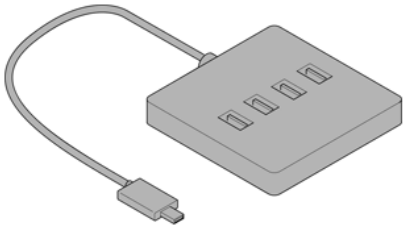
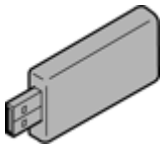
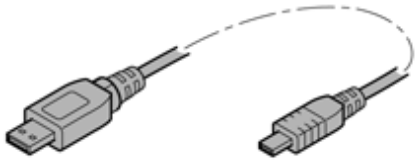
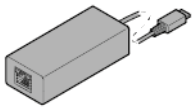
Fig. 24: Storage places

1	Holder for power cable	2	Storage place for phase plate adjustment tool

3.2.8 Accessories for Connecting the Microscope

The following connecting cables and accessories are required for voltage supply and use of the ports:

Name	Figure	Remarks
Power cord		Connection between microscope and power outlet
RJ12 cable		Connection between binocular tube with integrated camera and stand for power supply
HDMI cable (can be ordered in demo kit)		Connection between camera and monitor, TV, or projector

Name	Figure	Remarks
USB flash drive, Type A (not supplied)		Connection to camera for immediate image and video storage
USB hub, Type A (not supplied)		Connection between camera and multiple USB Type A devices, such as keyboard, mouse, and flash drive
USB Wi-Fi adapter (2 types, has to be ordered separately)		Connection between camera and a network, PC, or mobile device tube with integrated 8 MPx camera: only compatible with 2.4 GHz USB Wi-Fi adapter tube with integrated 5 MPx camera: compatible with Dual-Band USB Wi-Fi adapter (2.4 GHz and 5.0 GHz)
USB 3.0 cable, Type B to Type A (not supplied)		Connection between camera and PC
Ethernet cable (can be ordered in demo kit)		Connection between camera and network or WLAN router
Ethernet/USB adapter (not supplied)		Connection between camera and PC or mobile device

3.3 Objective Labeling

Purpose The objective is a light collecting optical system.

Position The objective is screwed into the nosepiece.

The selection of objectives co-determines the fields of use that the microscope can reasonably cover.

Fig. 25: Objective labeling

Pos.	Designation	Value (example)
1	Objective class	e.g. LD A-Plan, Plan-Apochromat, Fluar
2	Magnification	
3	Optical System	ICS- Optic ∞
4	Color coding of magnification	See 2.
5	Contrast method	Text color: ▪ Black = Standard ▪ Red = Pol/DIC ▪ Green = Ph 0, Ph 1, Ph 2, Ph 3
6	Numerical Aperture	e.g. 0.25
7	Application	▪ Immersion Medium (Oil / W/ Glyc) ▪ Adjustable cover glass correction (Corr.) ▪ Contrast method. See 5.
8	Designed for polystyrene	(PS)
9	Cover glass thickness (mm)	e.g. 1.0

4 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.

4.1 Safety During Installation

Before installing and starting up the microscope, be sure to carefully read and observe the notes on instrument safety, see chapter Safety.

NOTICE

Pollution of the optics

Dirty optics impair the function of the microscope.

- Do not touch optical surfaces when unpacking the microscope to avoid fingerprints!

4.2 Unpacking and Setting up the Microscope

The microscope is supplied completely assembled and including accessories that are packed to commercial standards.

Additionally ordered components, such as sliders and the transmitted-light module with illuminating mirror or Reflected-light FL iLED, are delivered in separate packages and must be mounted to 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.
   The distance of the microscope to the wall should be at least 9 cm, in order to ensure sufficient air circulation and accessibility of the cabling.

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.

4.3 Assembling Additional Components

4.3.1 Assembling or Changing the Tube

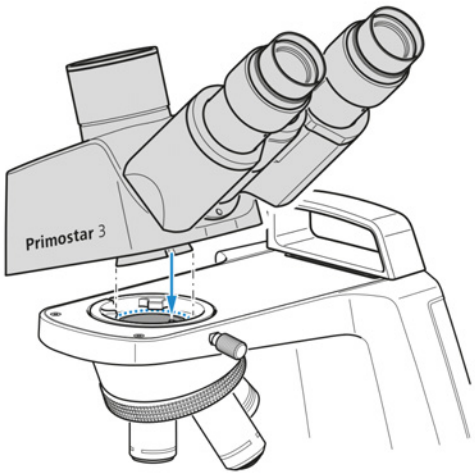
Prerequisite

✓ The microscope is unplugged from the mains power.

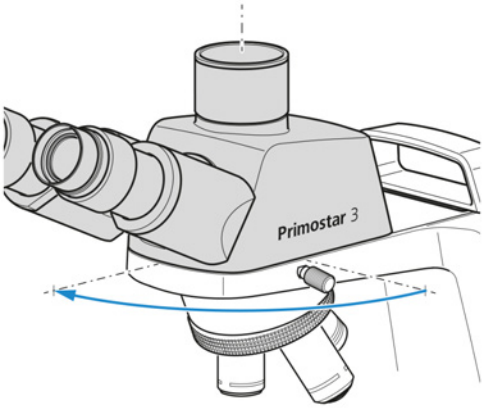
Procedure

1. Insert the tube to be installed into the stand.

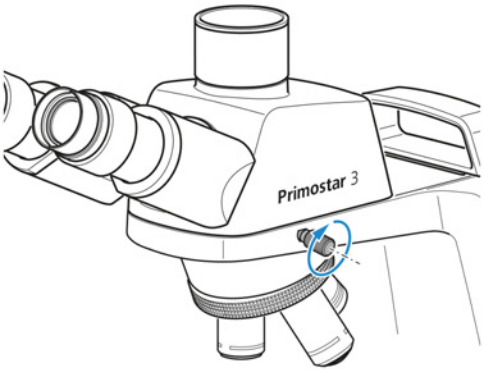
→ The eyepieces must point to the right and its dovetail mount must be slightly inclined, under the two holding elements.



2. Place the tube horizontally onto the stand.
   → The groove on the underside of the tube must be located above the third holding element of the stand.
3. Turn the tube counterclockwise by 90°, align it to the stand.
   → The eyepieces are pointing frontward.



4. Tighten the knurled clamping screw.



5. To detach the tube, loosen the knurled clamping screw.
6. Turn the installed tube clockwise by approximately 90° and detach it on the right side upward.

Info

For space-saving storage of the microscope (e.g. in a cabinet) the tube may also be rotated by 180° to the back.

Info

For reasons of space, the tube may also be clamped by the Allen set screw supplied with the tube.

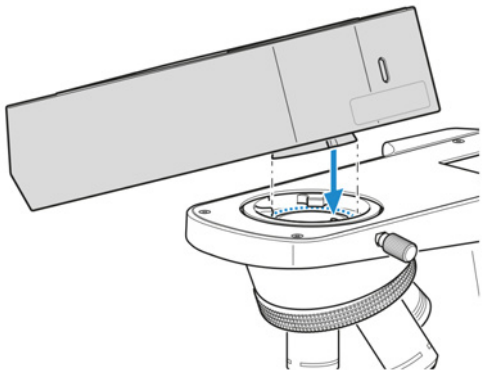
4.3.2 Assembling the Reflected-Light FL iLED onto the Stand

Prerequisite

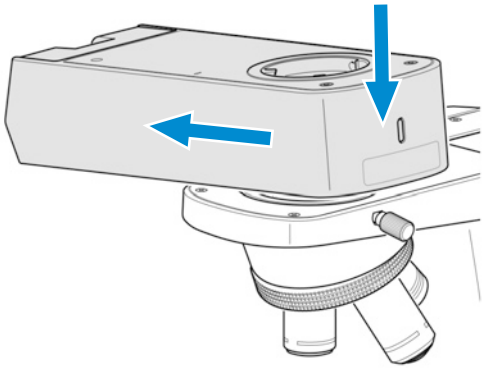
- ✓ The microscope is unplugged from mains power.
- ✓ Stand without small hand lift.
- ✓ RJ12 cable is available.

Procedure

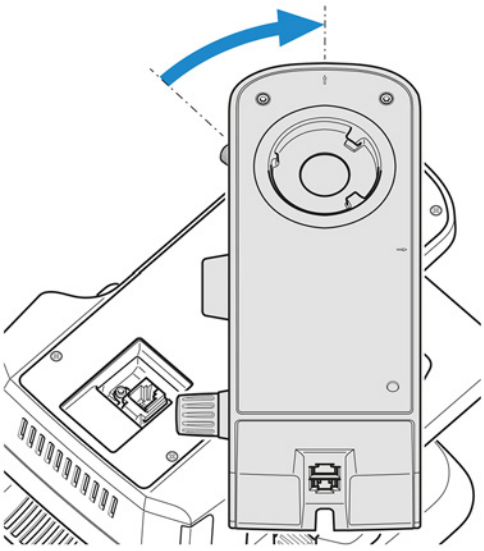
1. Insert the Reflected-light FL iLED at correct angle and slightly inclined with its dovetail mount into the stand.



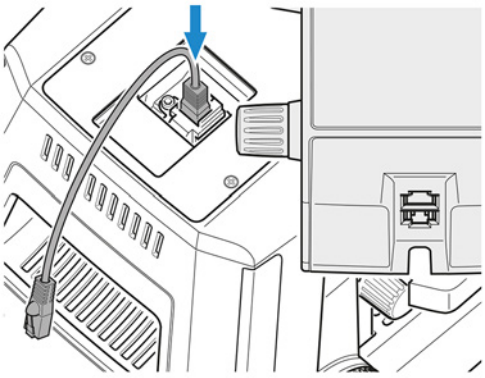
2. Position the Reflected-light FL iLED horizontally.



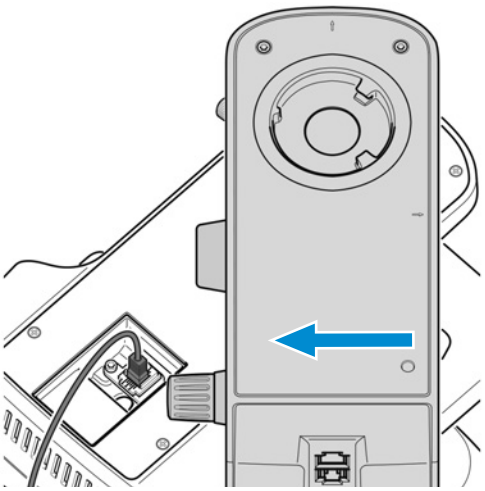
3. Turn the Reflected-light FL iLED clockwise to face backwards with the dovetail mount in the stand.



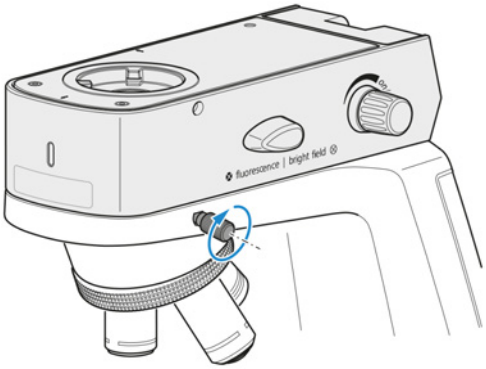
4. Plug the RJ12 cable into the RJ12 female connector port of the stand.



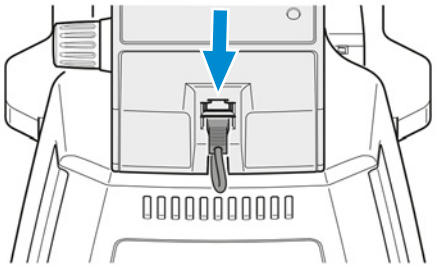
5. Align the Reflected-light FL iLED to the outer edges of the stand.



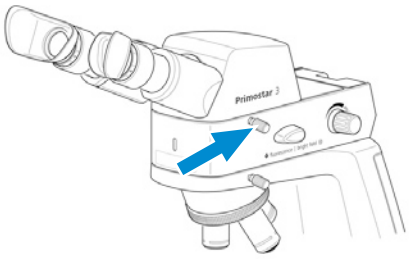
6. Tighten the set screw of the stand.



7. Plug the other side of the RJ12 cable into the RJ12 female connector port of the Reflected-light FL iLED.



8. Hide the RJ12 cable at the rear side groove of the Reflected-light FL iLED.
9. Place the tube onto the Reflected-light FL iLED (see *Assembling or Changing the Tube [▸ 39]*) and tighten the clamping screw of the Reflected-light FL iLED.



10. If required, place the yellow filter onto the luminous-field diaphragm, see *Assembling the Yellow Filter or the TL Cover Plate (Fixed-Köhler Stand) [▸ 43]*.

Info

Special eyecups with light protection (see *Changing the Eyecups [▸ 53]*) are used for fluorescence applications if no darkroom is available. However, they cannot be folded over and are, therefore, not suitable for spectacle wearers. For this reason, spectacle wearers should use the standard eyecups.

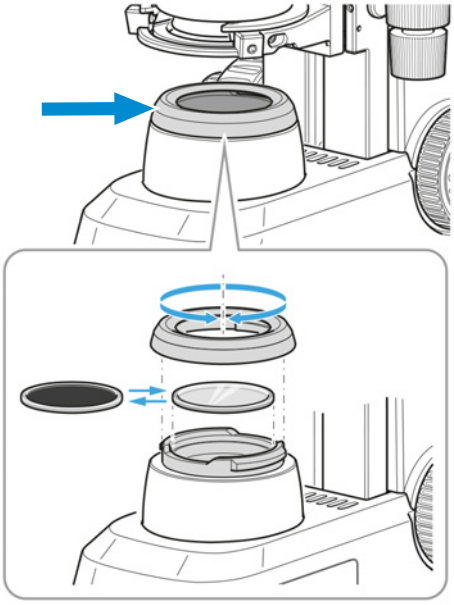
Info

For mounting the Reflected-light FL iLED on stands with small hand lift, please contact an authorized ZEISS service representative.

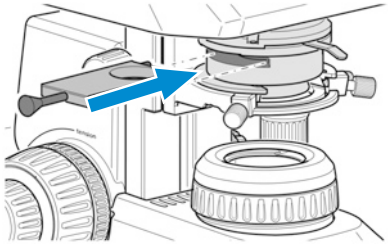
4.3.3 Assembling the Yellow Filter or the TL Cover Plate (Fixed-Köhler Stand)

Procedure

1. Unscrew the cover cap from the luminous-field diaphragm and remove it.



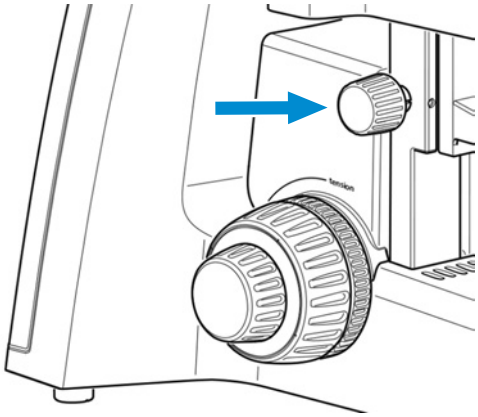
2. Place the yellow filter onto the mounting surface of the luminous-field diaphragm or remove it if necessary.
3. Re-attach the cover cap to the luminous-field diaphragm and lock it.
4. If required, place the TL cover plate into the Abbe condenser phase plate slot.



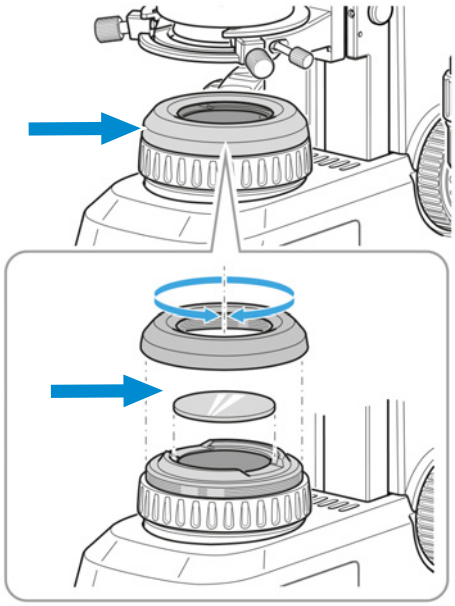
4.3.4 Inserting a Color Filter (Full-Köhler Stand)

Procedure

1. Move the condenser carrier up as far as it will go by turning the knurled ring for condenser height adjustment.



2. Unscrew the cover cap from the luminous-field diaphragm.

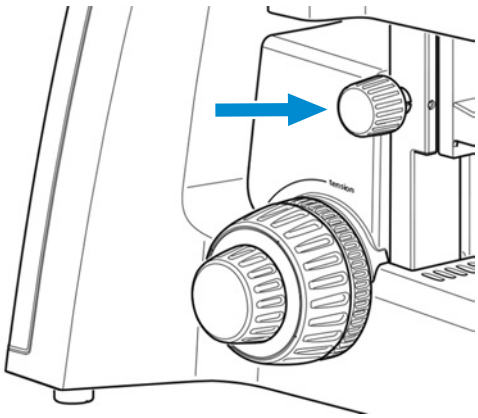


3. Put the desired filter – yellow, green or blue – onto the mounting surface of the luminous-field diaphragm.
4. Screw the cover cap back into place.

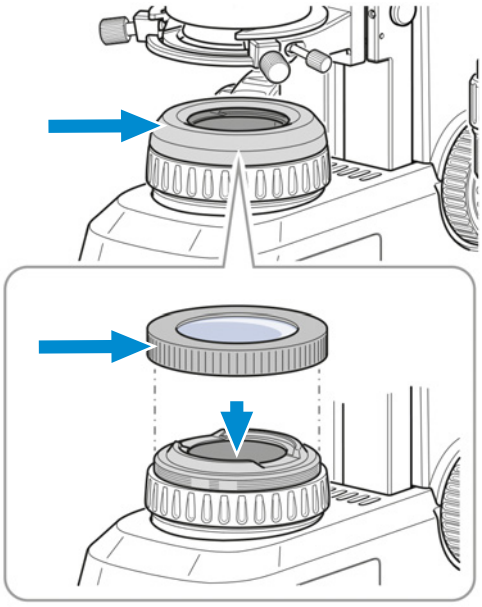
4.3.5 Assembling the Polarizer (Full Köhler Stand)

Procedure

1. Move the condenser carrier up as far as it will go by turning the knurled ring for condenser height adjustment.



2. Unscrew the cover cap from the luminous-field diaphragm and store it for later use.



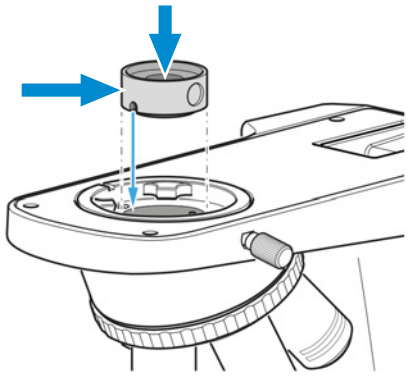
3. Put the polarizer onto the luminous-field diaphragm.
   → The position stop on the polarizer has to match with the position stop on the luminous-field diaphragm.

4.3.6 Assembling the Analyzer

Prerequisite ✓ The microscope is unplugged from the mains power.

Procedure

1. *Remove the tube [▸ 39]*.
2. Place the analyzer into the beam path on the top on stand.
   → The position stop on the analyzer has to match with the position stop on the stand.



3. Re-attach the tube on the stand.

4.3.7 Assembling the Tube with Integrated Camera (5 MPx and 8 MPx)

Info

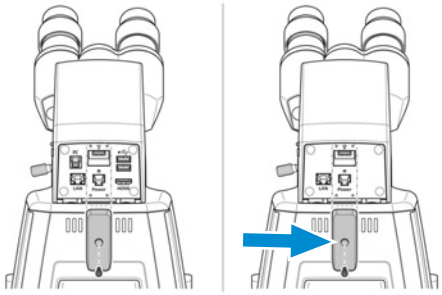
This procedure is valid both for binocular tubes with 8 MPx as well as 5 MPx camera. The images show the 8 MPx camera tube as an example.

Prerequisite
- ✓ The microscope is disconnected from the mains.
- ✓ Stand without small handle
- ✓ RJ12 cable

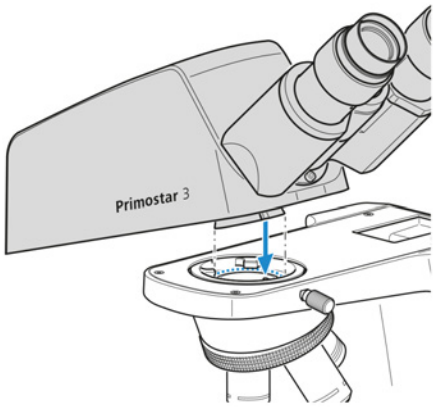
✓ If needed, mount the Reflected-light FL iLED onto the stand first, see *Assembling the Reflected-Light FL iLED onto the Stand [▸ 41]*. Then, mount the binocular tube 25°/22 with integrated camera onto the Reflected-light FL iLED as described below.

Procedure

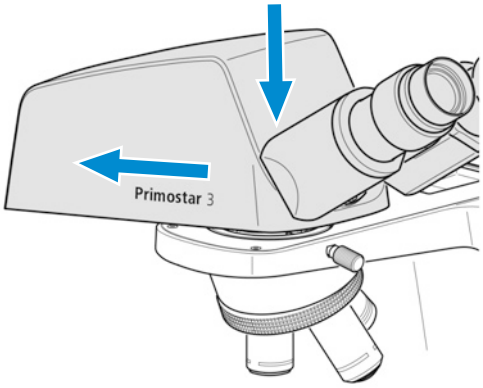
1. Remove the tube, see *Assembling or Changing the Tube [▸ 39]*.
2. Unscrew the cover plate.



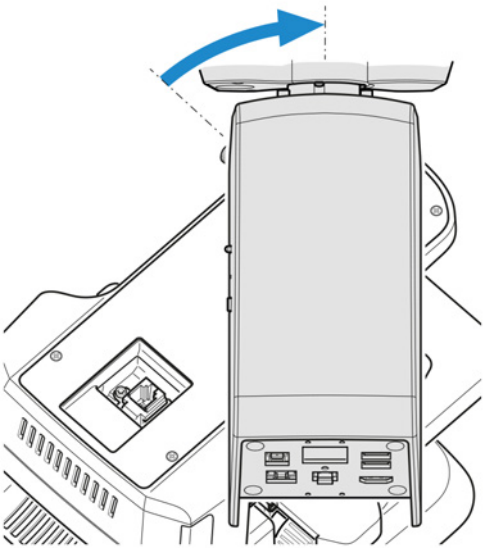
3. Insert the binocular tube 25°/22 with integrated camera at the correct angle and slightly inclined with its dovetail mount into the stand.



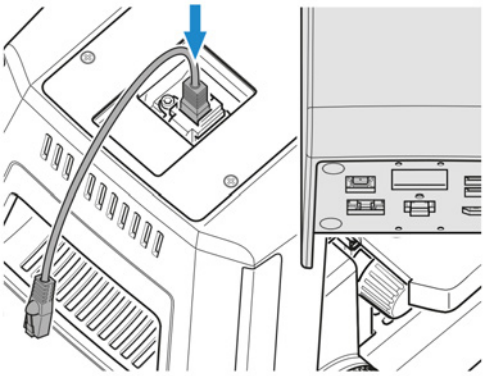
4. Position the binocular tube 25°/22 with integrated camera horizontally.



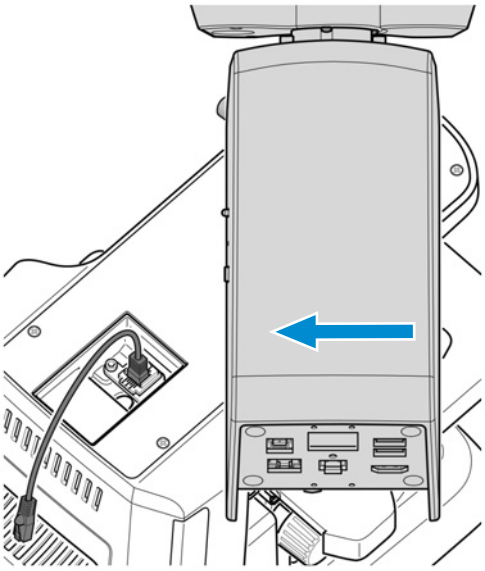
5. Turn the binocular tube 25°/22 with integrated camera clockwise to face backwards with the dovetail mount in the stand.



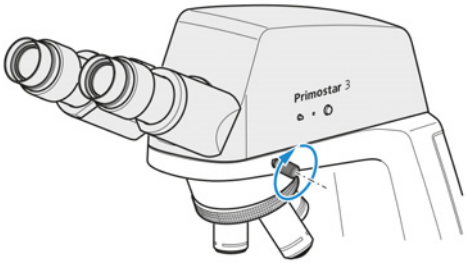
6. Plug the RJ12 cable into the RJ12 port (**Power**) at the stand.
   If the Reflected-light FL iLED is used, plug the RJ12 cable into the upper RJ12 port (**OUT**) of the Reflected-light FL iLED.



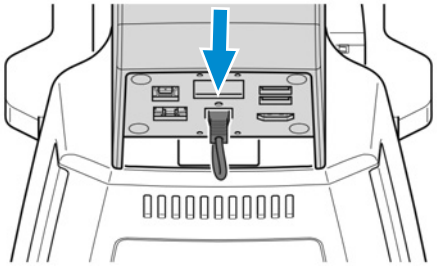
7. Align the binocular tube 25°/22 with integrated camera to the outer edges of the stand.



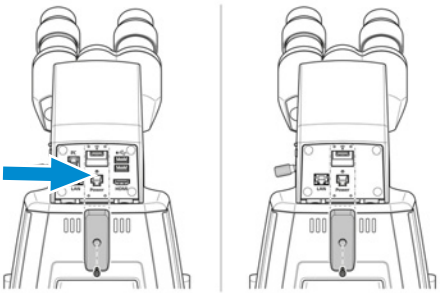
8. Tighten the set screw of the stand.



9. Plug the other side of the RJ12 cable into the RJ12 female connector port of the binocular tube 25°/22 with integrated HD camera.



10. Screw on the cover plate. Make sure the RJ12 cable is invisible.



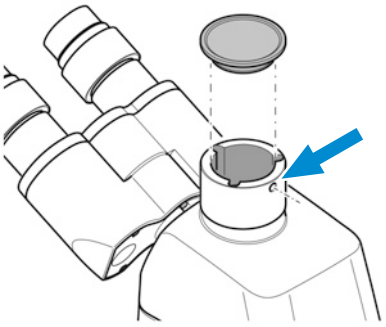
4.3.8 Installing the Camera at the Trinocular Tube

Prerequisite

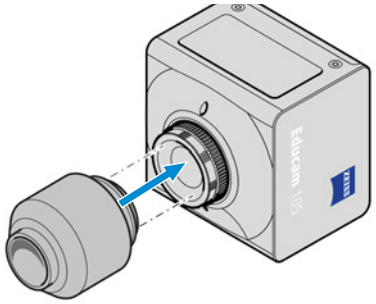
- ✓ A trinocular tube (photo tube) is mounted on the microscope.
- ✓ A camera adapter P90-C 2/3" 0.65x or P90-C 1/2" 0.5x

Procedure

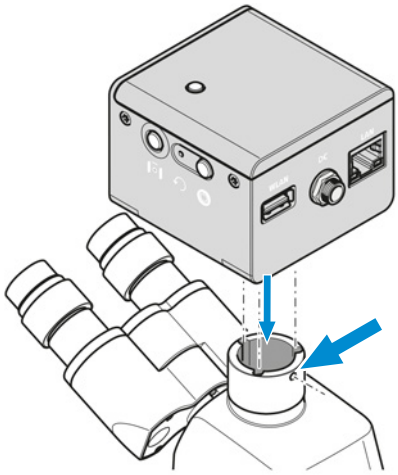
1. Loosen the clamping screw and remove the dust cap from the tube.



2. Mount the C-mount camera adapter on the camera.



3. Attach the camera with the adapter to the C-mount port of the microscope.



4. Orient the camera to the stand and fix its position by tightening the clamping screw.

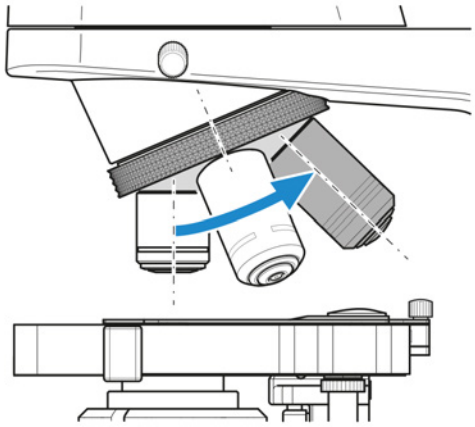
Info

With camera/adapter combinations that have not been recommended expressly by ZEISS, it may be quite impossible to obtain an unvignetted image.

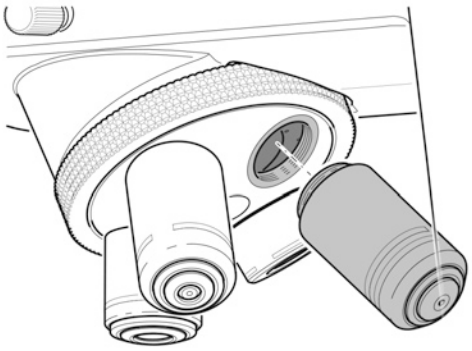
4.3.9 Exchanging the Objectives

Procedure

1. Turn the focusing drive to move the mechanical stage down as far as it will go.
2. Turn the nosepiece to move the objective to be changed into a lateral position.
3. Unscrew the objective using the rubber strip included in the delivery and remove it downward.



4. Screw the desired objective handtight into the nosepiece as far as it will go.



5. If you intend to insert the objective in a previously unused lens mount, remove the dust cover from the corresponding mount of the nosepiece.

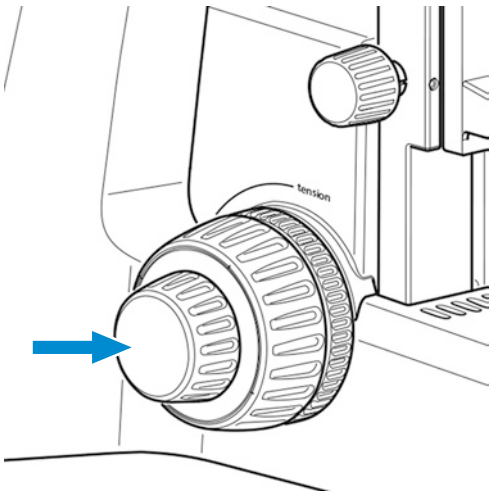
4.3.10 Assembling/Removing the Condenser

The mirror serves to illuminate the specimen if no power outlet is available.

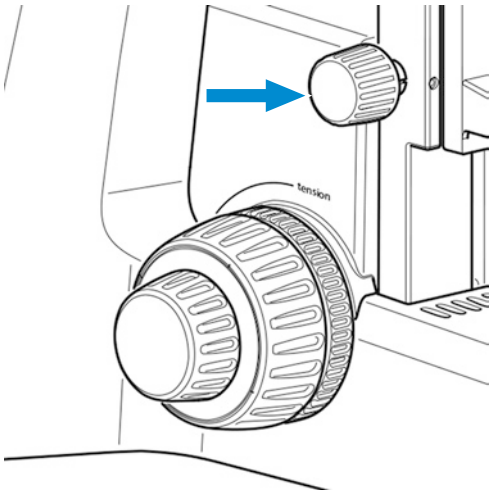
Prerequisite ✓ Full-Köhler stand

Procedure

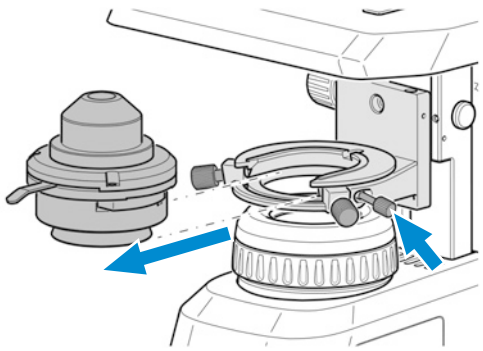
1. Turn coarse focusing drive to move the stage carrier to the upper stop position.



2. Lower the condenser carrier as far as it will go, using the knurled screw for vertical adjustment.



3. Loosen the clamping screw of the condenser, so that the condenser can be removed frontward.



4. Remove the installed condenser, e.g. Abbe condenser.
5. Insert the condenser to be installed, e.g. turret condenser, with its dovetail ring mount into the condenser carrier.
6. Fix it by tightening the clamping screw.

4.3.11 Assembling/Removing the Mirror

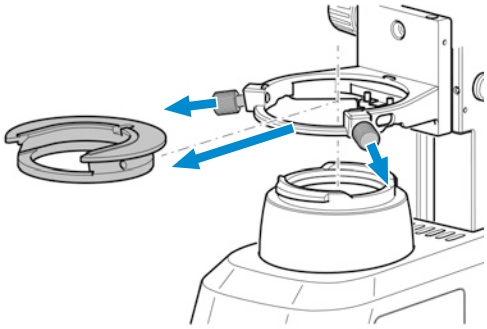
The mirror serves to illuminate the specimen if no power outlet is available.

Parts and Tools Hex key, 2.5 mm (only for Fixed-Köhler microscopes)

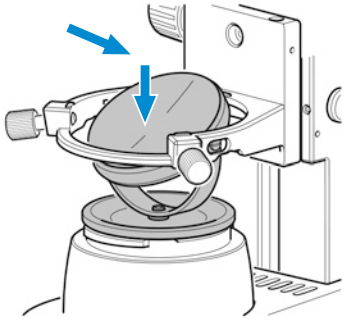
Prerequisite ✓ Fixed-Köhler stand or Full-Köhler stand

Procedure

1. Remove the cover cap from the luminous-field diaphragm, see *Assembling the Yellow Filter or the TL Cover Plate (Fixed-Köhler Stand) [▸ 43]*.
2. Remove the condenser, see *Assembling/Removing the Condenser [▸ 51]*.
   For Fixed-Köhler microscopes, a 2.5 mm hex key is necessary to lose the clamping screw.
3. Only for Full-Köhler stands: Unscrew the 2 clamping screws from the condenser carrier insert.



4. Only for Full-Köhler stands: Push the condenser carrier insert backward against the spring, incline it, and remove it upward from the condenser carrier.
5. Insert the mirror from the top through the opening of the condenser carrier and place it onto the mount of the luminous-field diaphragm. Take care that the mirror rests horizontally on the mount.



6. Rotate and incline the mirror until the room lighting or daylight is reflected homogeneously into the light path.

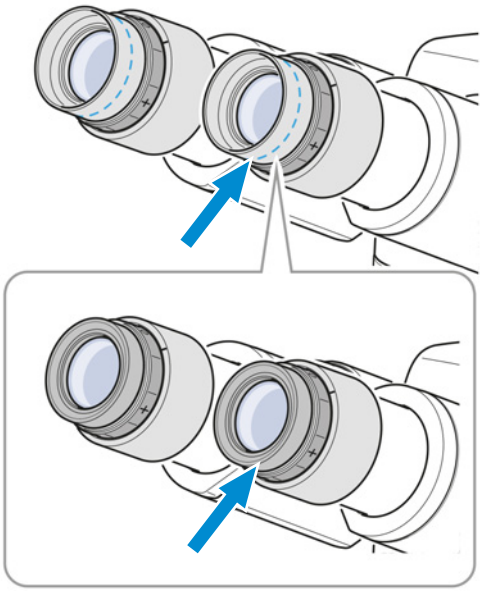
Info

Follow these instructions in reverse order to remove the mirror.

4.3.12 Folding Over the Eyecups

Procedure

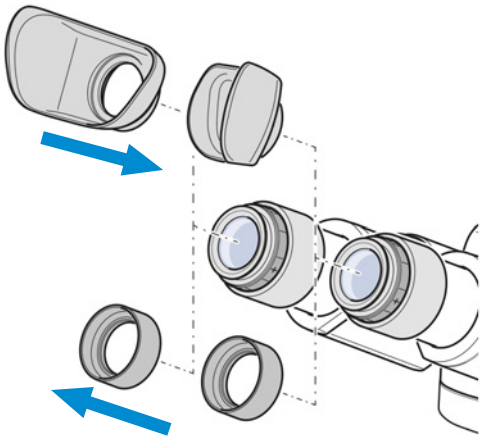
1. If required, fold over the rubber eyecups.



4.3.13 Changing the Eyecups

Procedure

1. Remove the existing eyecup from the eyepiece, e.g. the foldover rubber eyecups.



2. Attach the desired eyecups, e.g. the special eyecups with light protection.

4.4 Connecting the Microscope to the Power Supply

4.4.1 Connecting the Microscope to the Mains Power Supply

All microscopes equipped with Fixed-Köhler stands or Full-Köhler stands can be connected directly to the mains power supply.

Prerequisite

✓ The microscope is installed completely with all components to be used.

Procedure

1. Plug the power cable 3 into the mains socket 2 of the microscope.

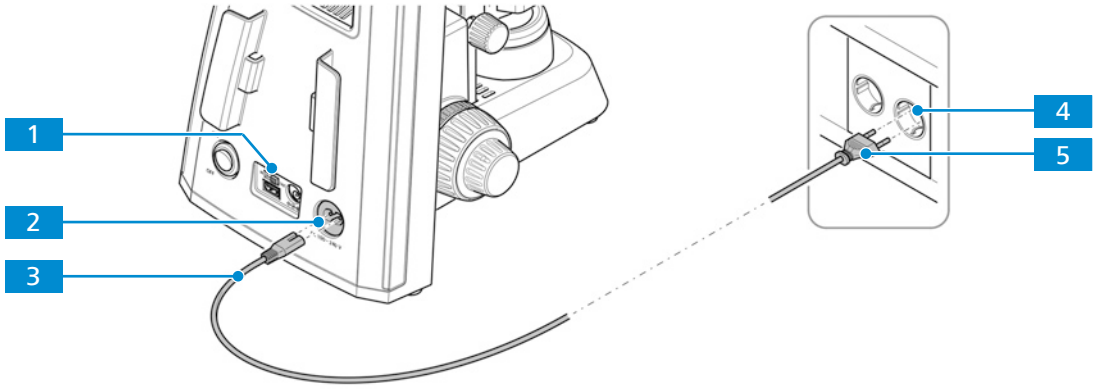


Fig. 26: Connecting the microscope to the mains power supply

2. Make sure the **DC 5V** switch 1 is in the **OUT** position.
   → The **DC 5V** switch is only available on Fixed-Köhler stands.
3. Plug the other end 5 of the power cable into the mains power supply 4.

4.4.2 Connecting the Microscope to a Power Bank

All microscopes equipped with Fixed-Köhler stands can be connected to a power bank for power supply.

Prerequisite

✓ The microscope is installed completely with all components to be used.

✓ The mobile power bank is charged.

Procedure

1. Plug the USB Type A to A cable 3 into the 5V USB port 2 of the microscope.

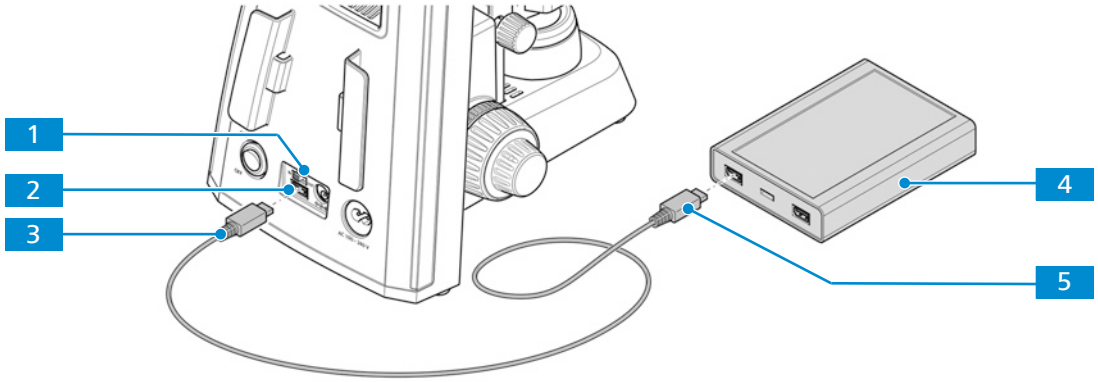


Fig. 27: Connecting the microscope to a power bank

2. Switch the **DC 5V** switch 1 to the **IN** position.
3. Plug the other side of the USB Type A to A cable 5 into the appropriate port of the power bank 4.

4.5 Connecting the Binocular Tube with Integrated Camera to External Devices

The binocular tube 25°/22 with integrated 8 MPx camera and the binocular tube 25°/22 with integrated 5 MPx camera can be connected to various external devices.

The following options are available:

	tube with 8 MPx camera (Primostar 3)	tube with 5 MPx camera (Primostar 3 cam)
Connecting a USB Flash Drive (5 MPx and 8 MPx Camera) [▸ 55]	x	x
Connecting to the PC via USB 3.0 Port (8 MPx Camera) [▸ 56]	x	-
Connecting to an HDMI Display (8 MPx Camera) [▸ 56]	x	-
Integrating into a Network (5 MPx and 8 MPx Camera) [▸ 57]	x	x
Connecting to the PC or to a USB Flash Drive via Ethernet/ USB Adapter [▸ 59]	-	x

4.5.1 Connecting a USB Flash Drive (5 MPx and 8 MPx Camera)

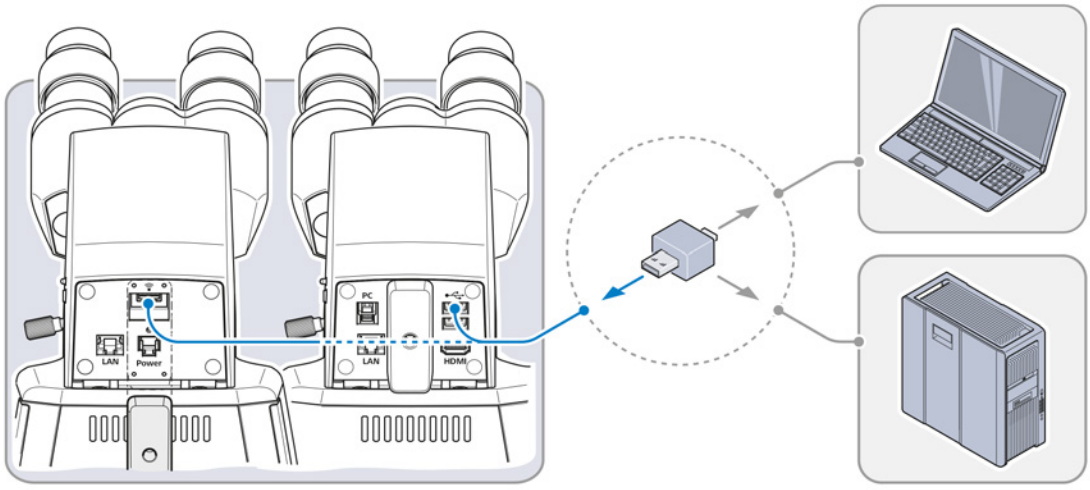


Fig. 28: Connecting a USB flash drive to the binocular tube with integrated camera. Works for the 5 MPx camera tube (left) and the 8 MPx camera tube (right).

Prerequisite

✓ Binocular tube 25°/22 with integrated camera

✓ USB flash drive of FAT32 format with sufficient free space for storing the data

Procedure

1. Only for the 5 MPx camera tube: Unscrew and remove the cover plate.
2. Insert the flash drive into one of the dedicated USB Type A ports of the binocular tube 25°/22 with integrated camera. Note that these are different ports for the 5 MPx and the 8 MPx camera tube.
3. Only for the 5 MPx camera tube: Replace the cover plate and lock it with the lock screw.

Info

To view the captured images or videos connect the USB flash drive to a PC or laptop.

4.5.2 Connecting to the PC via USB 3.0 Port (8 MPx Camera)

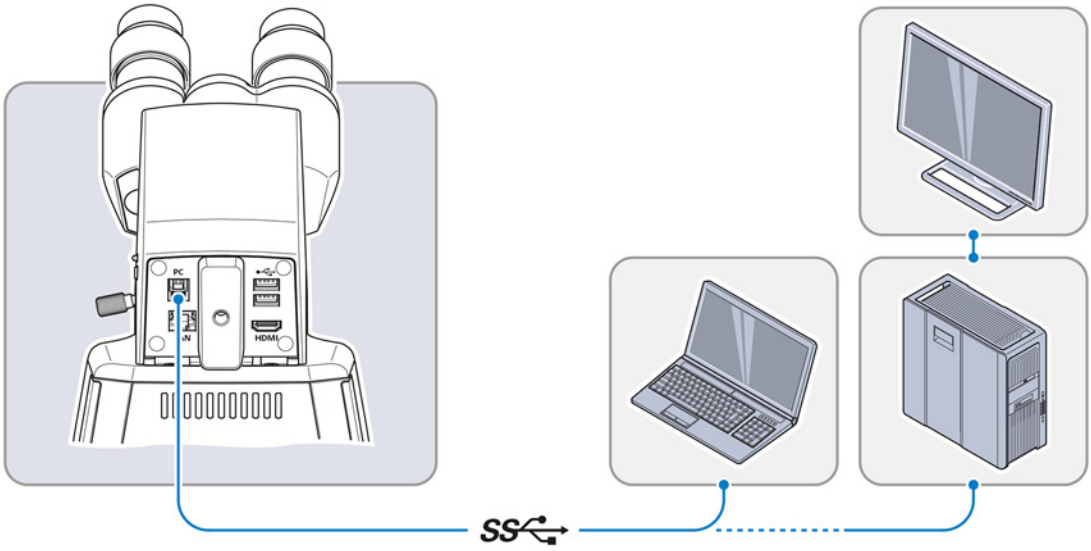


Fig. 29: Connecting the binocular tube with integrated 8 MPx camera to a PC or laptop via USB 3.0 connection

Prerequisite

- ✓ USB 3.0 specification defined as maximum: 500 mA / USB port
- ✓ USB 3.0 (Type B and Type A) cable is required

Procedure

1. Insert the USB-B 3.0 cable connector into the fast Ethernet port (RJ45).
2. Insert the USB-A 3.0 cable connector into the corresponding socket of the PC or laptop.

4.5.3 Connecting to an HDMI Display (8 MPx Camera)

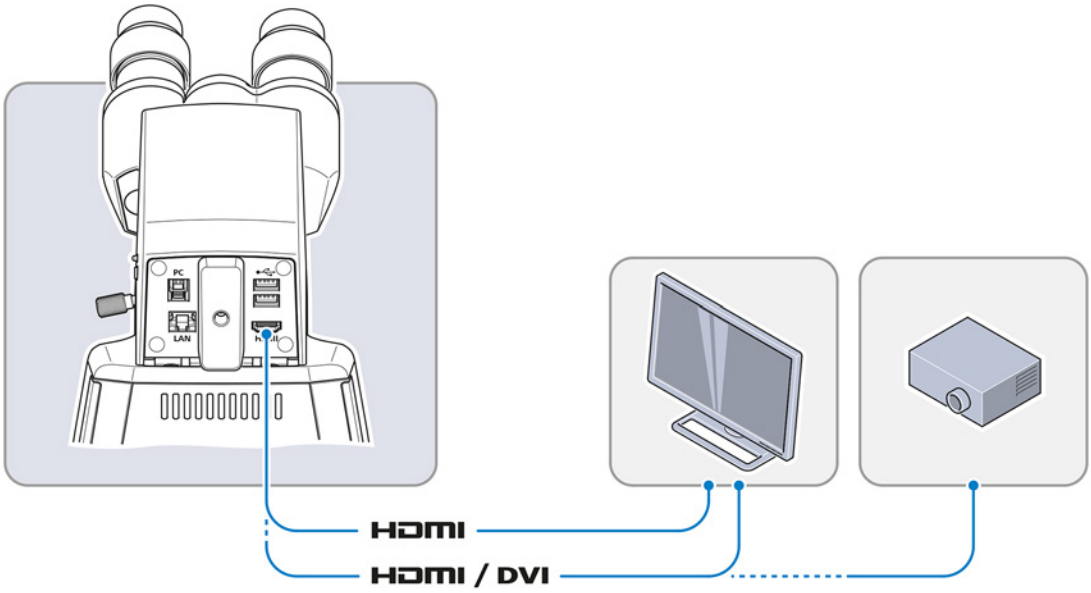


Fig. 30: Connecting the binocular tube with integrated 8 MPx camera to a display (monitor or projector)

The binocular tube 25°/22 with integrated 8 MPx camera can be connected to an HDMI display (monitor or projector) for visualization of the live image data.

Prerequisite

- ✓ The display (monitor/projector) supports 1080p and 4K HD formats.
- ✓ To enable the display in HD quality, it is recommended that only HD-capable devices are connected.

- ✓ If connecting to a monitor, use a monitor that supports 4K for live imaging at 4K resolution (e.g. Monitor TFT 32" HP Z32)
- ✓ If a monitor/projector is used, an HDMI/DVI adapter cable or HDMI/DVI adapter is required for the reproduction of image data.

Procedure

1. Connect the monitor/projector to the tube using the HDMI cable.
2. Secure the HDMI plug on the jack of the monitor/projector.
3. Set the aspect ratio of the display device to 16:9 or Aspect.

4.5.4 Integrating into a Network (5 MPx and 8 MPx Camera)

The binocular tube 25°/22 with integrated camera (5 MPx and 8 MPx) is able to communicate and transfer data to network via Ethernet port or Wi-Fi adapter and work with the **ZEISS Labscope** app.

A WLAN router is required to use the built-in camera together with the **ZEISS Labscope** app.

An existing WLAN infrastructure or a separate microscope WLAN setup may be used.

To use an existing WLAN infrastructure, a High-performance 802.11n WLAN with sufficient free bandwidth is required. In the event of an overloaded or slow WLAN the live image of the built-in camera may be delayed or incorrectly displayed on the Wi-Fi device.

To create a separate microscope WLAN set up, visit **www.zeiss.com/micro-apps** for further information.

The integrated camera will identify itself automatically to the network on DHCP and will be automatically recognized by **Labscope**, provided the Wi-Fi device is in the same network.

4.5.4.1 Connecting via Ethernet

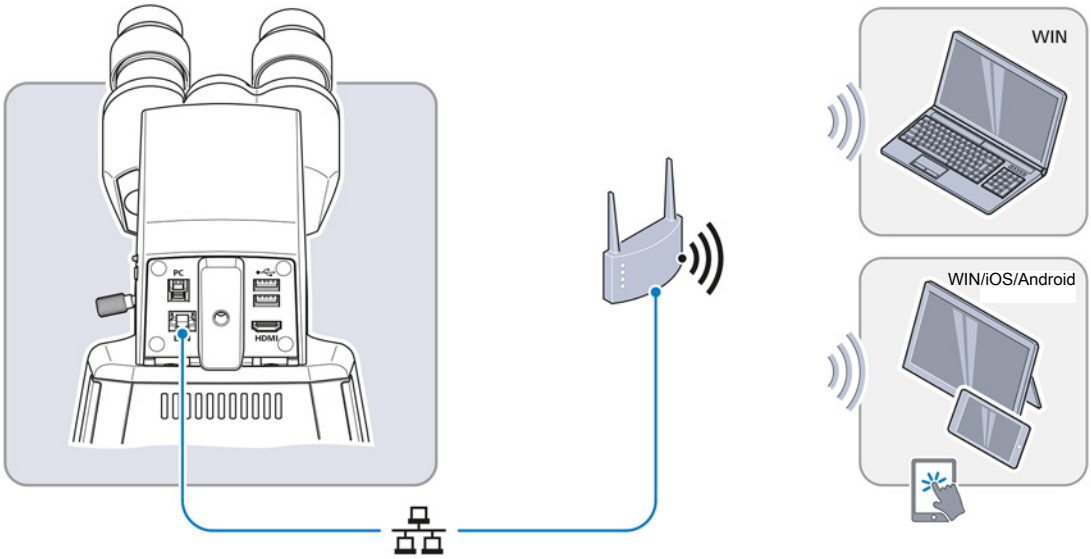


Fig. 31: Integrating the binocular tube with integrated camera into a network via Ethernet. Works both for the tube with 5 MPx and with 8 MPx camera

Procedure

1. Insert the Ethernet cable into the fast Ethernet port (RJ45) of the tube.
2. Insert the opposite connector of the Ethernet cable into the corresponding socket on the WLAN router.
3. Switch on the router.
   → **Labscope** can recognize the network (network name and password are the same as in the WLAN router setting).

4.5.4.2 Connecting via Wi-Fi Adapter

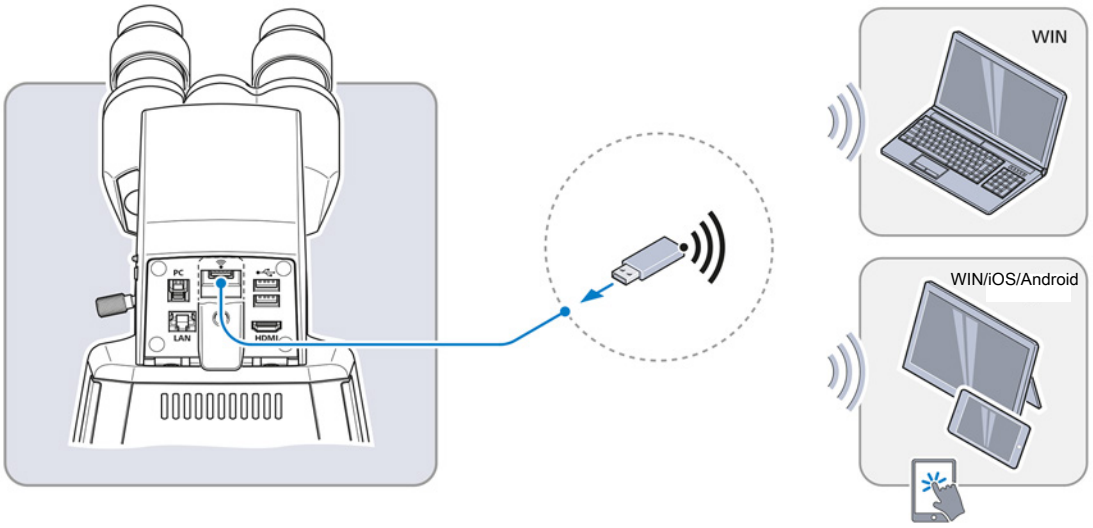


Fig. 32: Integrating the binocular tube with integrated camera into a network via Wi-Fi adapter. Works both for the tube with 5 MPx and with 8 MPx camera

Prerequisite

- ✓ USB WiFi adapter 2.4 GHz if working with the tube with 8 MPx camera
- ✓ Dual-band USB WiFi adapter 2.4 GHz and 5.0GHz if working with the tube with 5 MPx camera

Procedure

1. Unscrew and remove the cover plate.
2. Insert the Wi-Fi adapter into the dedicated USB type A port.
3. Replace the cover plate and lock it with the lock screw.
   → **Labscope** can recognize the network (Network name: Primostar 3_last six numbers from MAC address (MAC address label is on top of the binocular tube with integrated camera, for example **Primostar3_F9A919**)
   Password: ZEISS1846

Info

When a compatible USB Wi-Fi adapter is inserted into the binocular tube 25°/22 with integrated 5 MPx camera, the **Wi-Fi Settings** menu will be displayed. It offers advice for connecting the camera to a Wi-Fi device (e.g. PC or mobile device).

Info

Consult your network administrator for further guidance.

Further information of all ZEISS Microscopy apps can be found at https://www.zeiss.com/microscopy/int/products/microscope-software/microscopy-apps.html.

4.5.5 Connecting to the PC via Ethernet/USB Adapter (5 MPx Camera)

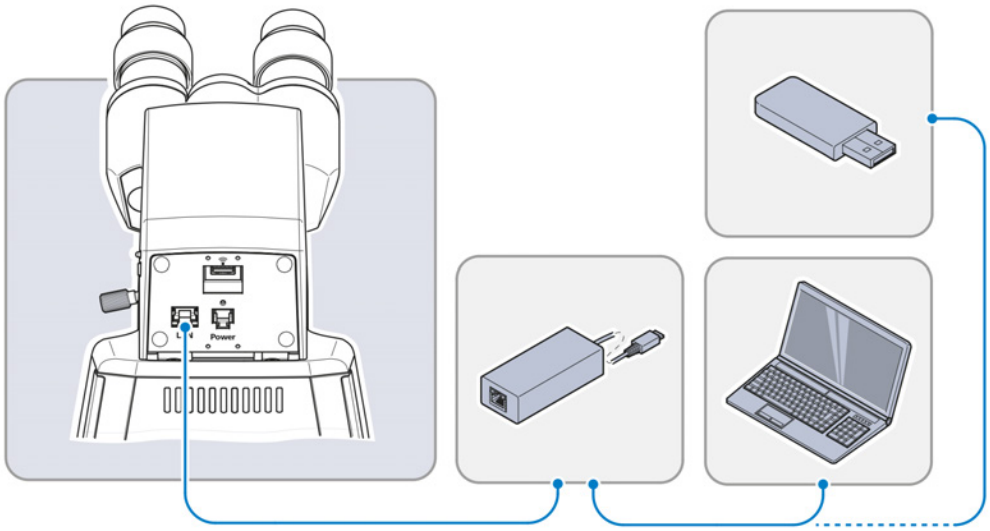


Fig. 33: Connection of tube with integrated camera to PC or laptop

Prerequisite
- ✓ Binocular tube with integrated 5 MPx camera
- ✓ Ethernet cable
- ✓ if applicable: USB cable complying with USB 3.0 standard

Procedure
1. Connect the Ethernet/USB adapter to the fast Ethernet port (RJ45) of the tube via Ethernet cable.
2. Connect the Ethernet/USB adapter to the USB port of a PC or laptop. If the adapter is not connected directly to the end device, use a USB 3.0 cable

4.6 Installing the Labscope Software for Using the Binocular Tube with Integrated Camera

The Labscope software can be used with Windows PCs and mobiles devices for image capturing.

4.6.1 Installing the Labscope Software on PC

Prerequisite
- ✓ Windows PC is required.

Procedure
1. Download Labscope for Windows from the ZEISS Portal.
2. Install the app as described.

4.6.2 Installing the Labscope App on Android

Prerequisite
- ✓ Android device is required.

Procedure
1. Download Labscope for Android from the ZEISS Portal.
2. Install the app as described.

4.6.3 Installing the Labscope App on iPad

Prerequisite
- ✓ iPad is required.

Procedure
1. Go to the App Store.
2. Search for **Labscope** by ZEISS.
3. Install the app as described.

5 Operation

This chapter describes switching on/off the microscope as well as the 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.

5.1 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.

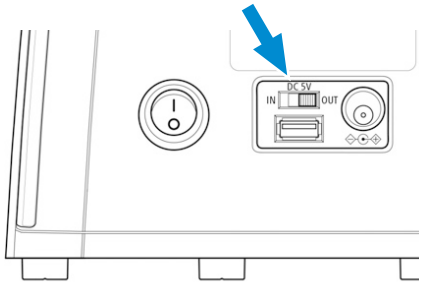
5.2 Switching On the Microscope

5.2.1 Switching On the Microscope with Mains Power Connection

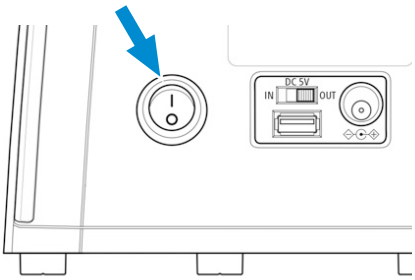
Prerequisite ✓ *The microscope is connected to the mains power supply [▸ 54].*

Procedure

1. At the Fixed-Köhler stand, set the **DC 5V** switch to the **OUT** position.



2. Switch on the **main power ON/OFF** button.

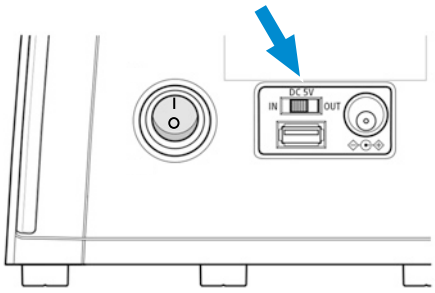


5.2.2 Switching On the Microscope with Power Bank Connection

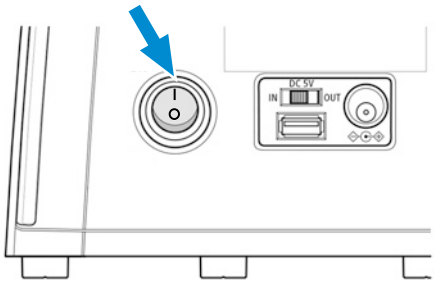
Prerequisite
- ✓ *The microscope is connected to the power bank [▸ 54].*
- ✓ The power bank is charged.

Procedure

1. Set the **DC 5V** to the **IN** position.



2. Switch on the power bank.
3. Switch on the **main power ON/OFF** button.



5.3 Adjusting the Tube

This procedure consists of the following steps:

Prerequisite
- ✓ The microscope is connected to the mains and is switched on.

Procedure

1. *Adjusting the Position of the Eyepieces [▸ 61]*
2. *Adjusting the Eyepiece with Eyepiece Pointer or Eyepiece Micrometer [▸ 62]*

5.3.1 Adjusting the Position of the Eyepieces

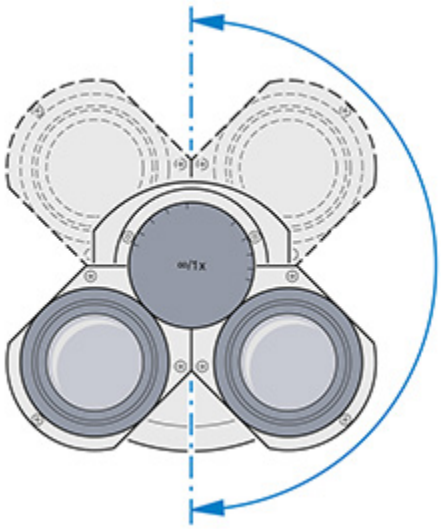
Info

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.

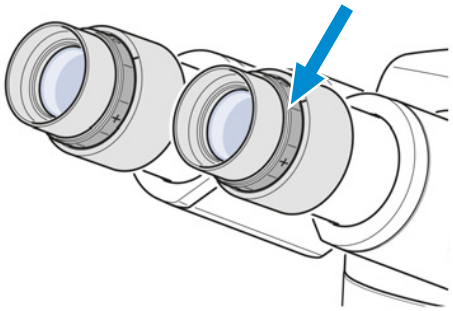
2. Set the viewing height by swivelling the whole eyepiece unit a full 180 ° upwards or downwards.



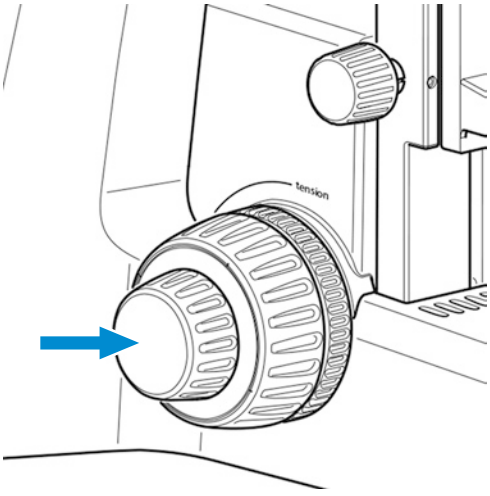
5.3.2 Adjusting the Eyepiece with Eyepiece Pointer or Eyepiece Micrometer

Procedure

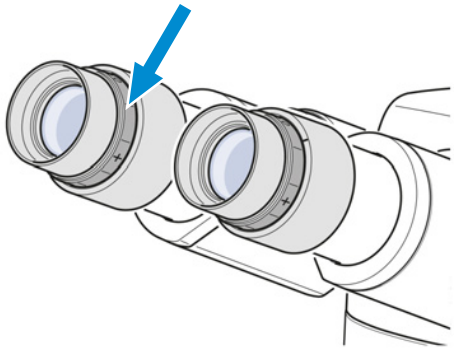
1. Put the eyepiece with pointer or micrometer into the tube and fix it with the set screw.
2. Turn the focusing ring of the eyepiece to focus on the wedge-shaped figure of the eyepiece pointer.



3. Put the specimen onto the mechanical stage.
4. Look at the specimen through the eyepiece with the eyepiece pointer or micrometer.
5. Use the focus drive to bring the microscopic image into focus until both the microscopic image and the eyepiece pointer are sharply defined.



6. Focus the image for the second eye by turning the focusing ring of the second eyepiece.



↳ Having done so, both microscopic images inclusive of the eyepiece pointer or micrometer are focused.

Info

Afterwards, you should focus on the specimen using the focusing drive only.

5.4 Adjusting the Transmitted-Light Brightfield on the Full-Köhler Microscope

Parts and Tools

- High contrast specimen slide with cover glass of 0.17 mm thickness

Info

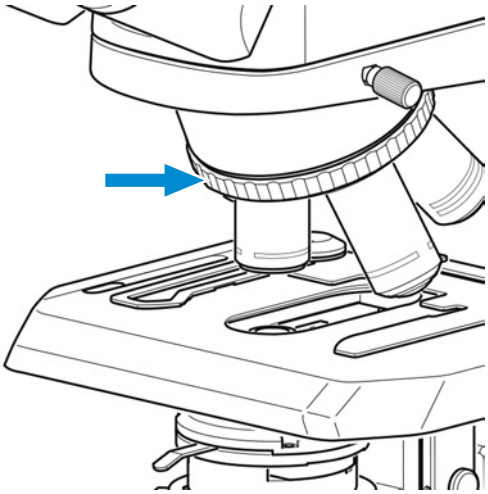
The knurled knob for the vertical condenser adjustment is always on the side opposite to the stage controls.

Prerequisite

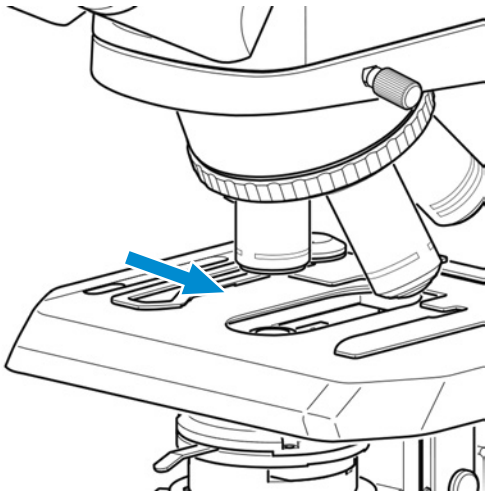
- ✓ The microscope is adapted to the user, see *Adjusting the Tube [▸ 61]*.
- ✓ A 10x objective for use with cover glass of 0.17 mm thickness is mounted.

Procedure

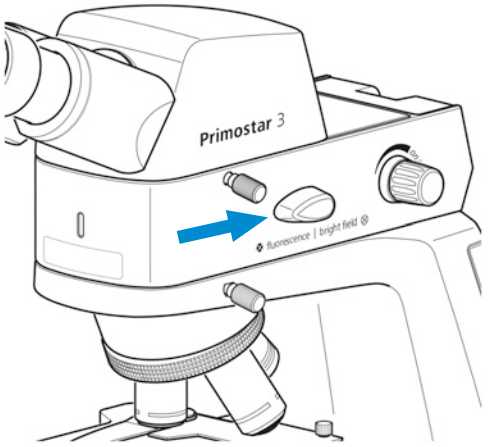
1. Rotate the 10x objective into the light path using the knurled ring of the nosepiece.



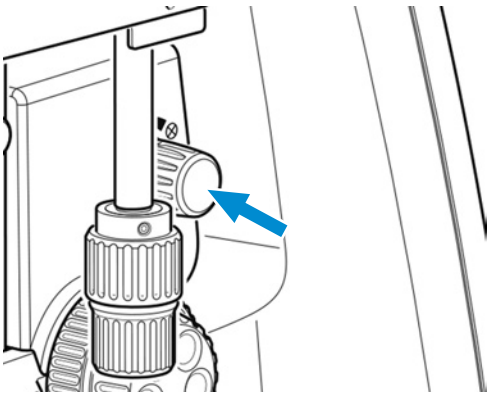
2. Place the high-contrast specimen slide on the stage and fix it using the spring lever of the specimen holder.



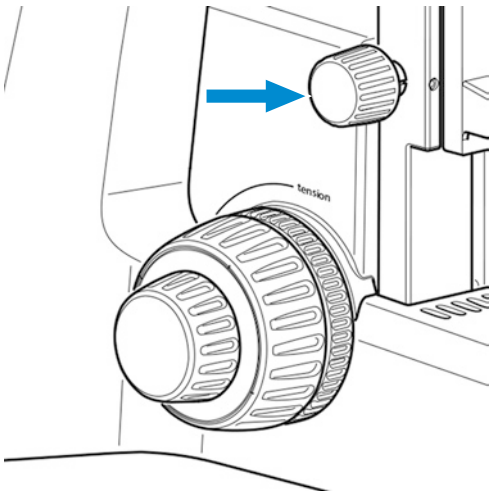
3. If applicable, move all phase contrast or darkfield elements out of the light path.
4. If the microscope stand is equipped with the turret condenser, move turret to **BF** position.
5. When using the Reflected-light FL iLED, turn the **fluorescence/brightfield** changeover switch to the **brightfield** position (turn the switch fully upward first).



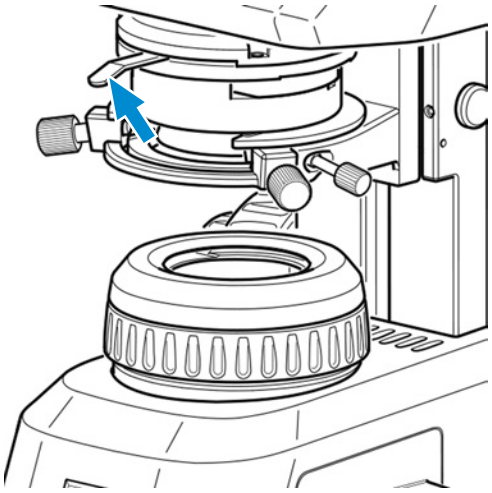
6. Use the rotary knob for illumination intensity to adjust the illumination to a comfortable setting.



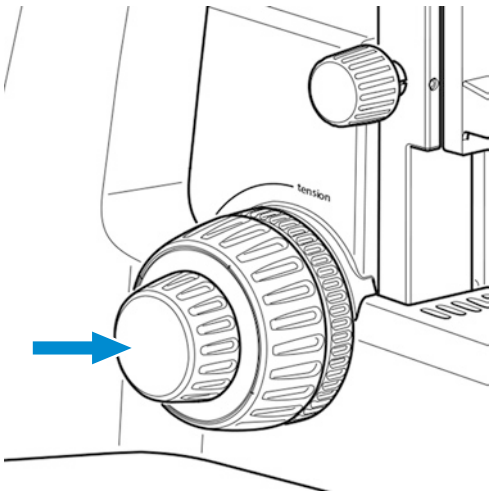
7. Use the knurled knob for vertical condenser adjustment to move the condenser to the upper limit stop.



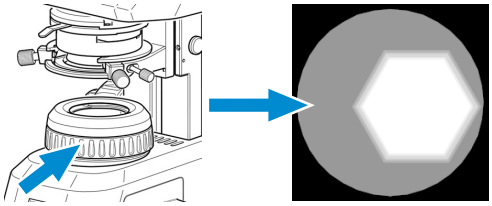
8. Use the control lever of the aperture diaphragm to set the aperture diaphragm to the middle position.



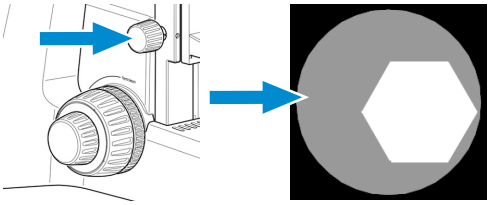
9. Look through one eyepiece and use the focusing drive to bring the specimen into focus.



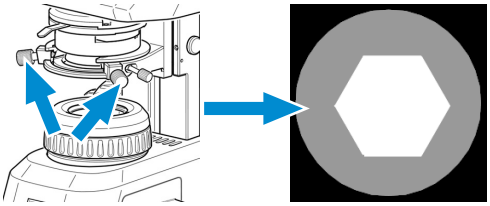
10. If necessary, readjust the image sharpness for the other eye by turning the adjustable eyepiece.
    → The image of the high-contrast specimen is sharp for both eyes.
11. Close the luminous-field diaphragm until its edges become visible in the field of view.



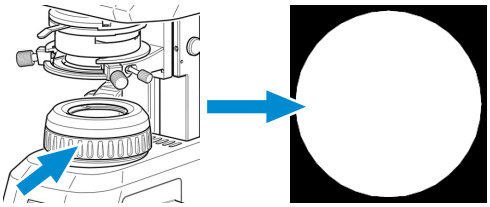
12. Use the knurled knob for vertical adjustment to slowly move the Abbe condenser downwards until the edge of the luminous-field diaphragm becomes sharp.



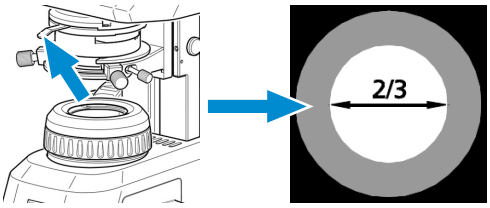
13. Use the centering screws to center the image of the luminous-field diaphragm in the field of view.



14. Open the luminous-field diaphragm until its edges just disappear from the field of view.



15. To adjust the contrast, remove one eyepiece from the tube and look through the tube.
16. Use the control lever of the aperture diaphragm to adjust the aperture diaphragm to approximately 2/3 to 4/5 of the diameter of the exit pupil of the objective.
    → The optimum contrast at almost ideal resolution for most applications (best compromise for the human eye) is set.



17. Reinsert the eyepiece into the tube.

Info

The size of the field of view and the objective aperture change with every objective change. Therefore, the adjustment of the luminous-field diaphragm and the aperture diaphragm according to Köhler has to be repeated to obtain optimum microscopy conditions.

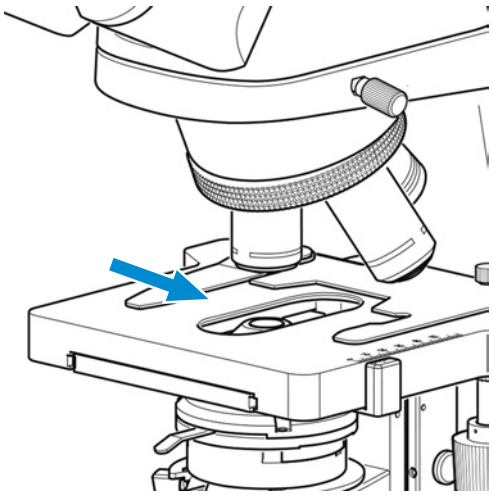
5.5 Adjusting the Transmitted-Light Brightfield on the Fixed-Köhler Microscope

The Fixed-Köhler microscope is supplied factory-adjusted. The operation is restricted to a few manipulations.

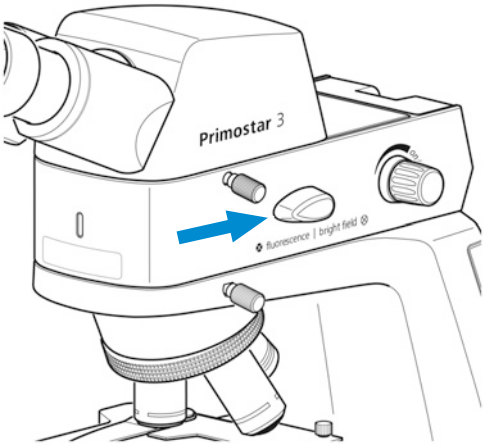
Prerequisite ✓ The microscope is adapted to the user, see *Adjusting the Tube [▸ 61]*.

Procedure

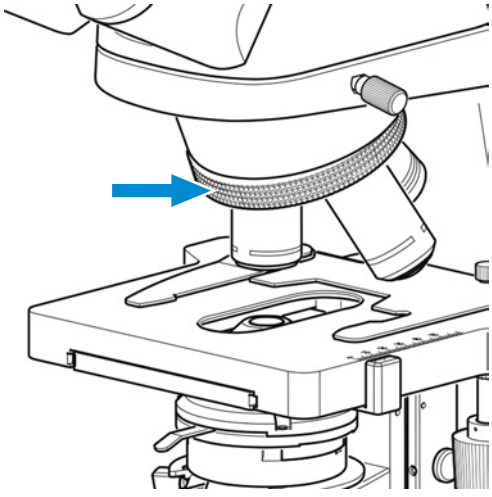
1. Place the specimen in the specimen holder of the mechanical stage.



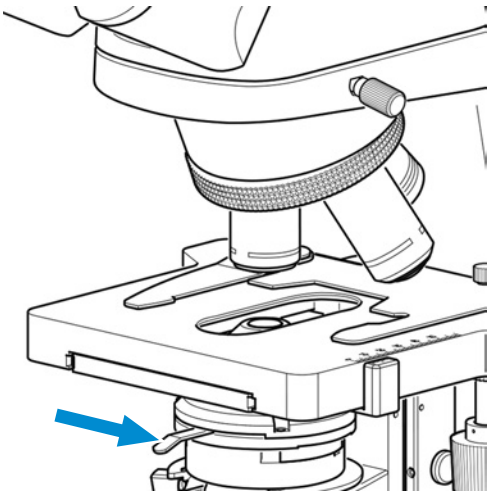
2. If the microscope stand is equipped with a dark-field slider, pull this slider to the left up to the lock-in position.
3. When using the Reflected-light FL iLED, turn the **fluorescence/brightfield** changeover switch to the **Brightfield** position (turn the switch fully upward first).



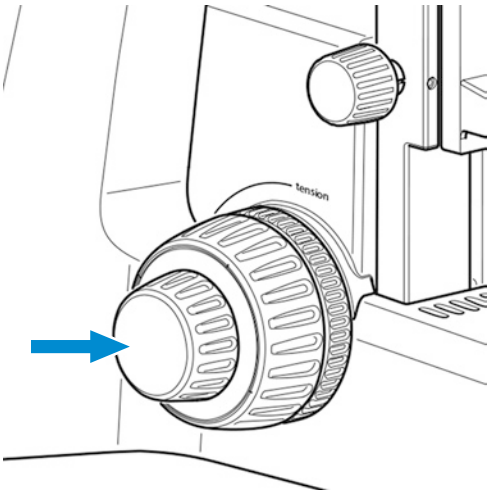
4. Push the slider containing the yellow filter with its filter position into the light path.
5. Adjust to the desired magnification by rotating the corresponding objective into the light path.



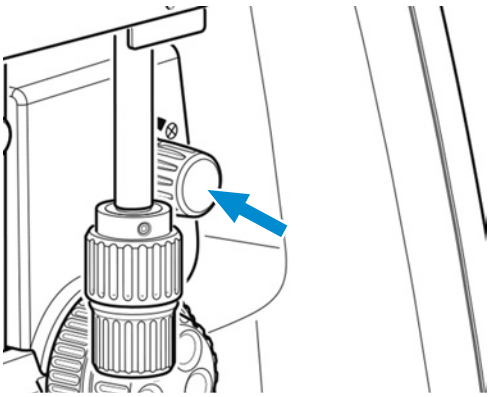
6. Set the control lever of the condenser aperture diaphragm to the value of the selected magnification (**10x**, **40x** or **100x**).



7. Focus on the specimen using the focusing drive.



8. Use the rotary knob for illumination intensity to adjust the illumination to a comfortable setting.



If the condenser has been removed (e.g. for installing the illuminating mirror), make sure to reinstall and center it using the two centering screws, see *Assembling/Removing the Mirror [▸ 51]*.

5.6 Adjusting the Transmitted-Light Phase Contrast or the Transmitted-Light Darkfield Using a Contrast Slider

Parts and Tools

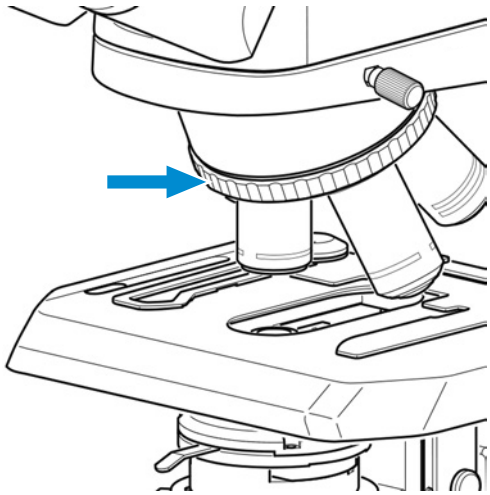
- 2x Hex key, 1.5 mm

Prerequisite

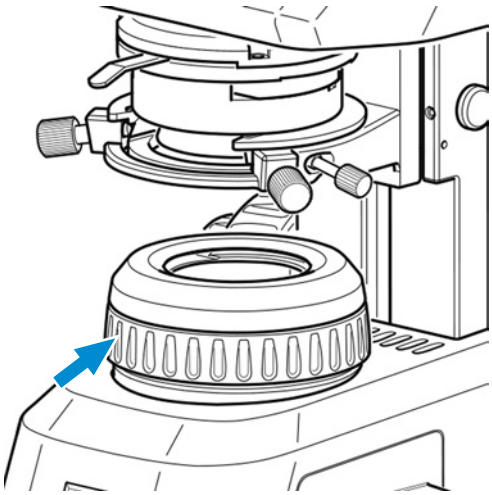
- ✓ The phase contrast method on the microscope requires a stand with Full-Köhler equipment.
- ✓ Contrast slider for phase contrast or darkfield.

Procedure

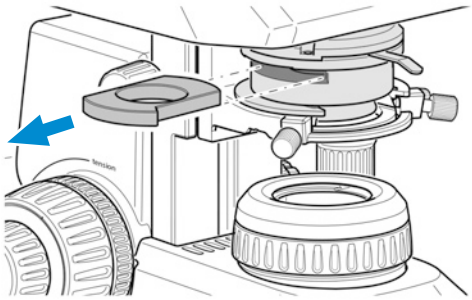
1. Adjust the microscope as you would for transmitted-light brightfield, see *Adjusting the Transmitted-Light Brightfield on the Full-Köhler Microscope [▸ 63]*.
2. Turn the nosepiece to move the phase contrast objective (**Ph 2**) into the light path.



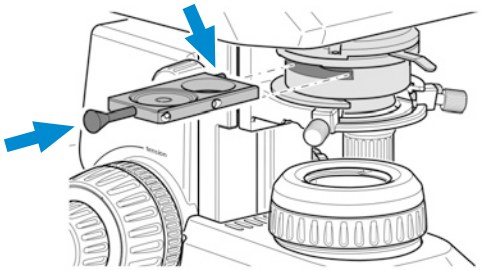
3. Open the luminous-field diaphragm on the stand.



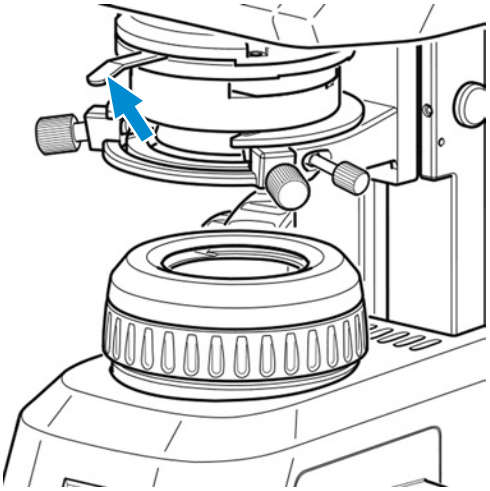
4. Remove the dummy slider from the Abbe condenser.



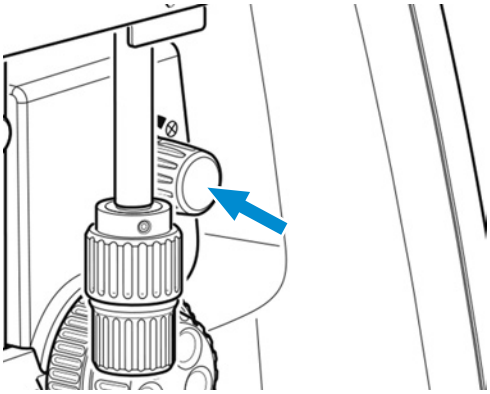
5. Remove the locking screw from the phase contrast slider (fitting the objective used, **Ph 2**). Push the phase contrast slider from the left into the Abbe condenser until it reaches the lock-in position.



6. Screw the locking screw into the contrast slider.
7. Fully open the aperture diaphragm of the Abbe condenser using its control lever (left limit stop).

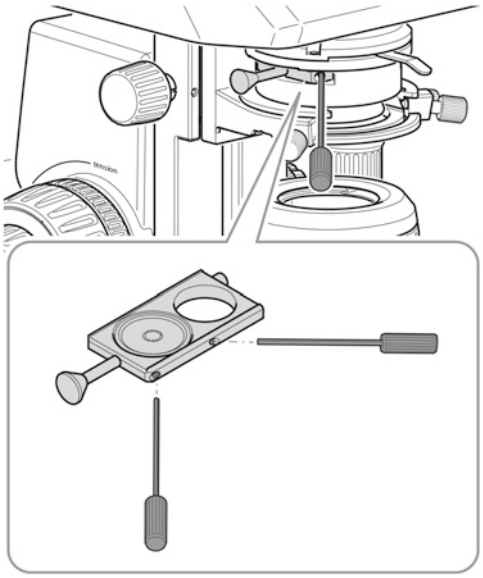


8. Adjust the illumination intensity as required.

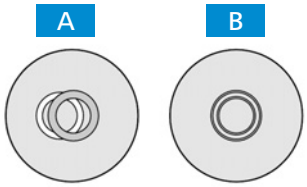


9. To center the phase stop, remove one eyepiece and replace it with the diopter or telescope.

10. If it is necessary to center the phase stop, insert the two Allen wrenches into the adjusting screws of the phase slider.



11. Center the phase stop from position A to position B by turning the two adjusting screws of the slider using the two Allen wrenches.



12. Afterwards, replace the diopter or telescope with the eyepiece again.

Info

For darkfield application, use the darkfield slider instead of the phase contrast slider.

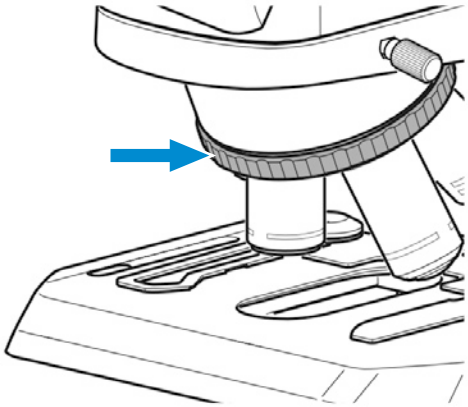
5.7 Adjusting the Transmitted-Light Phase Contrast or the Transmitted-Light Darkfield Using the Turret Condenser

Prerequisite

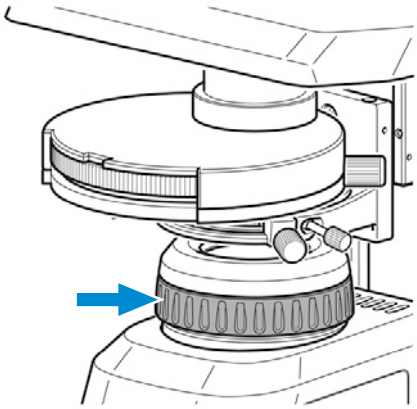
- ✓ The phase contrast method on the microscope requires a stand with Full-Köhler equipment.
- ✓ The turret condenser with phase contrast stop or darkfield stop inserted is required.
- ✓ The microscope is adjusted for *transmitted-light brightfield [▸ 63]*.

Procedure

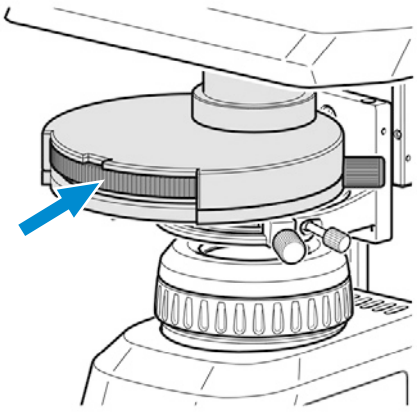
1. Turn the nosepiece to move the phase contrast objective (**Ph 1** or **Ph 2** or **Ph 3**) into the light path.



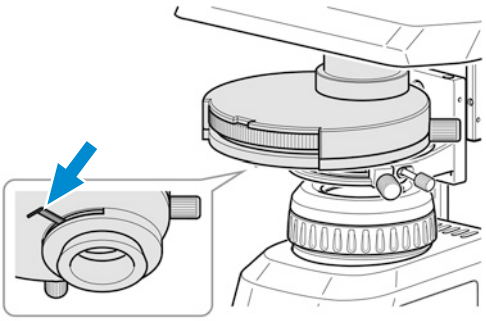
2. Open the luminous-field diaphragm on the stand.



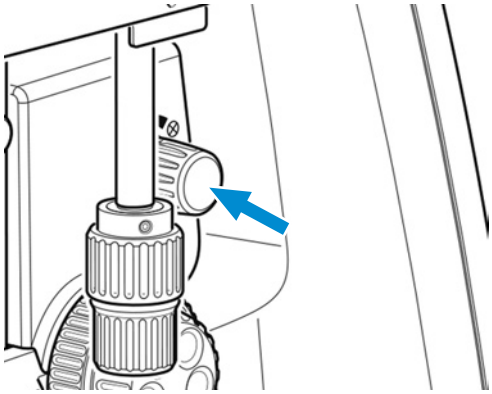
3. Turn the turret disk of the turret condenser to the phase contrast position (**Ph 1** or **Ph 2** or **Ph 3**) that corresponds to the objective being used.



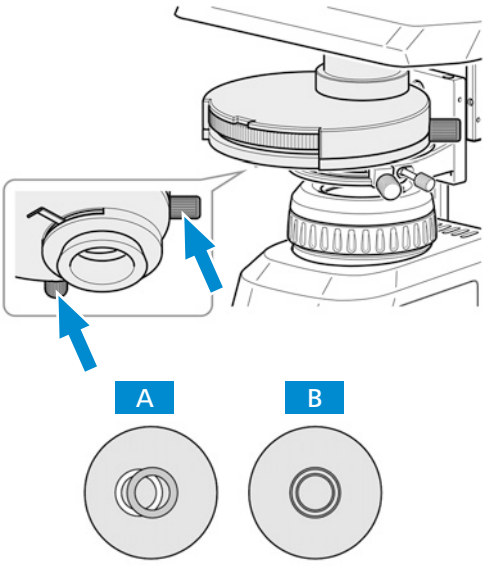
4. Fully open the aperture diaphragm of the turret condenser using its control lever (left limit stop).



5. Adjust the illumination intensity as required.



6. To center the phase stop, remove one eyepiece and replace it with the diopter or telescope.
7. If necessary, center the phase stop from position A to position B by turning the two knurled screws.



8. Replace the diopter or telescope with the eyepiece.

Info

For darkfield application, use the darkfield position of the turret condenser instead of the phase contrast position.

Info

If the turret condenser is not equipped with a darkfield stop, contact an authorized ZEISS service technician for installation.

5.8 Adjusting the Transmitted-Light Simple Polarization Contrast

Prerequisite

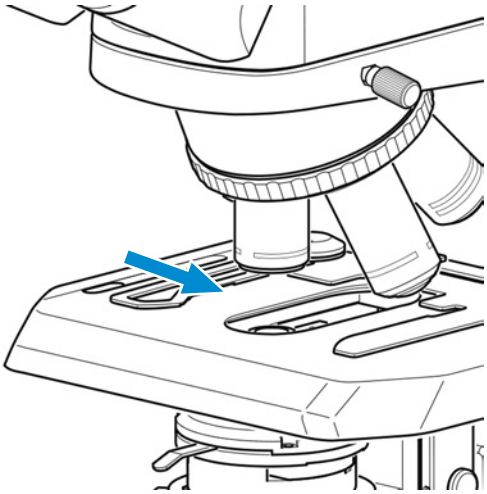
✓ The simple polarization contrast on the microscope requires a stand with Full-Köhler equipment.

✓ The polarizer plate is inserted into the luminous-field diaphragm in the correct position, see *Assembling the Polarizer (Full Köhler Stand) [▸ 44]*.

✓ The analyzer plate is inserted into the stand in the correct position, see *Assembling the Analyzer [▸ 45]*.

Procedure

1. Adjust the microscope as you would for transmitted-light brightfield, see *Adjusting the Transmitted-Light Brightfield on the Full-Köhler Microscope [▸ 63]*.
2. Place the specimen to be examined under polarized light on the stage and fix it using the spring lever of the specimen holder.



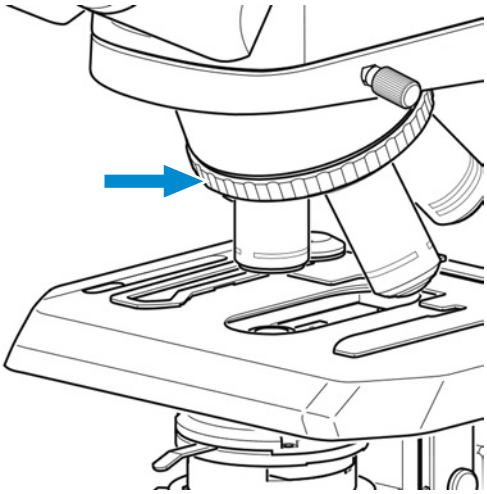
5.9 Adjusting the Reflected-Light Fluorescence

Prerequisite

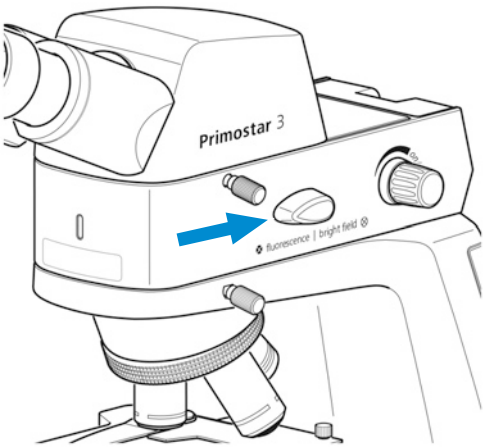
✓ The reflected-light fluorescence method requires the microscope with Reflected-Light FL iLED.

Procedure

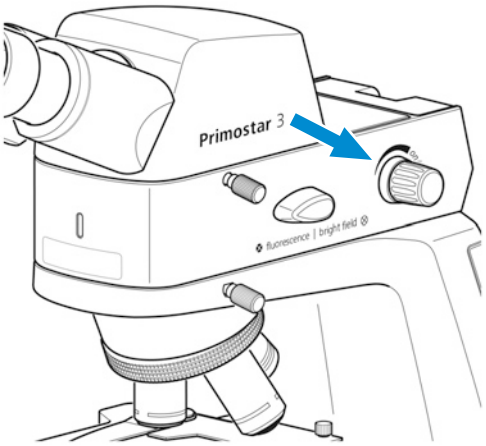
1. Adjust the microscope as you would for transmitted-light brightfield, see *Adjusting the Transmitted-Light Brightfield on the Full-Köhler Microscope [▸ 63]*.
2. Turn the nosepiece to move the objective for fluorescence application into the light path (e.g. objective 40x).



3. Set the **fluorescence/brightfield** changeover switch to the **fluorescence** position (first turn it fully upward).

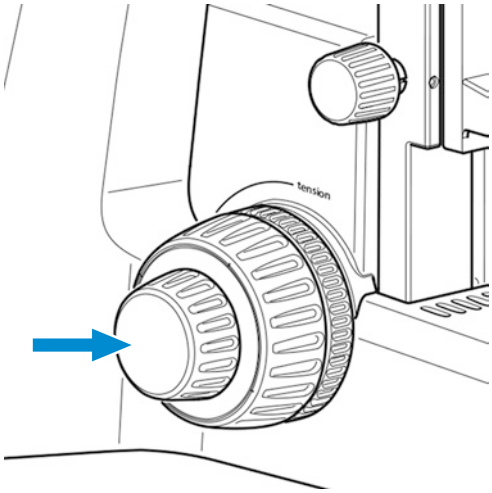


4. Switch on the reflected-light illumination using the rotary knob of the Reflected-light FL iLED and adjust the illumination intensity to a level comfortable for observation.

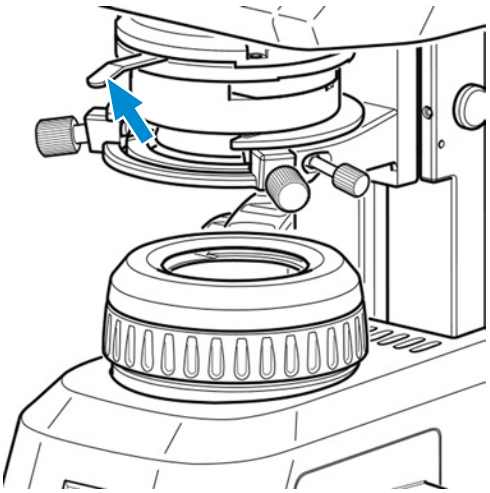


→ The pilot lamp at the front of the Reflected-light FL iLED is blue. The brightness of the pilot lamp corresponds to the illumination intensity adjusted for reflected light.

5. Focus on the specimen using the focusing drive.



6. To avoid interfering fluorescences (caused by the transmitted-light LED), place the yellow filter onto the luminous-field diaphragm (see *Inserting a Color Filter (Full-Köhler Stand) [▸ 44]*) and close the aperture diaphragm of the condenser completely.



Info

If the yellow filter is not available, about 90 % of the interfering fluorescence can be eliminated by closing the condenser aperture diaphragm.

It is also possible to insert the TL cover plate into the slot of the Abbe condenser (see *Assembling the Yellow Filter or the TL Cover Plate (Fixed-Köhler Stand) [▸ 43]*).

Info

Our special eyecups with light protection can be used for microscopic examinations in rooms which are not darkened. They are, however, not suitable for spectacle wearers and must not be folded over because the required dimensional stability would be lost.

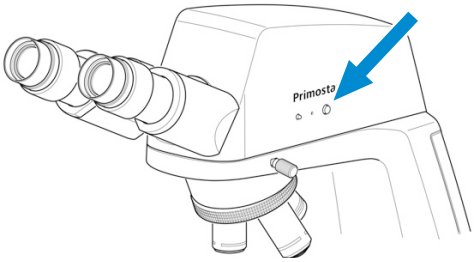
5.10 Acquiring Images and Videos Using the Integrated Camera (8 MPx and 5 MPx)

5.10.1 Acquiring Images and Videos Using the Operator Panel

Prerequisite ✓ The USB flash drive is inserted into the USB A port.

Procedure

1. Position your specimen on the microscope and adjust the microscope to see a focused image through the eyepieces.
2. To take a single image, briefly press the **Snap** button on the camera panel.
   → The image is saved to the USB flash drive.



3. To start video recording, press and hold the **Snap** button on the camera panel for about five seconds.
4. To stop video recording briefly press the **Snap** button on the camera again.
   → The video is saved to the USB flash drive in MP4 format.

5.10.2 Acquiring Images with Labscope

Prerequisite ✓ The Labscope device (PC, laptop, or mobile device) is connected to the binocular tube with integrated camera via network or USB connection.

Procedure

1. Start **Labscope**.
   → When starting **Labscope** for the first time, each screen starts with an overlaying information screen explaining the functions.
2. Refer to the displayed information for using the software.
3. Disable or re-activate the information screens in the software's **Settings** menu on the PC, laptop, or iPad.

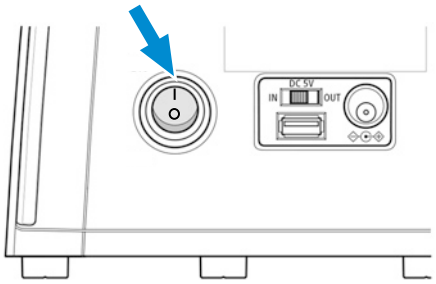
Info

For further support in using **Labscope**, see www.zeiss.com/microscopy/community. Please check the **Labscope** thread for problem-solving notes.

5.11 Switching Off the Microscope

Procedure

1. After finishing work, switch off the microscope at the **main power ON/OFF** button.



2. If connected, switch off the power bank.
3. Cover the microscope with the dust cover.

6 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.

6.1 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

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 live parts from the power supply.

NOTICE

Functional impairment due to dirt and moisture

Dirt, dust, and moisture can impair the microscope functionality and can cause short-circuits.

- Use the dust protection cover if the microscope is not used.
- The ventilation slots must be unobstructed at all times.
- 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.

6.2 Maintenance Schedule

The recommended intervals for maintenance depend on the total uptime of the microscope.

Time Interval	Unit/Component	Activity
If required	6 V/30 W halogen lamp of the halogen module	Replace the 6 V/30 W halogen lamp, see *Exchanging the Halogen Lamp of the Halogen Module [▸ 80]*.

Time Interval	Unit/Component	Activity
If required	Firmware update of the binocular tube 25°/22 with integrated camera	*Updating the Firmware of the Binocular Tubes with Integrated Camera [▸ 80].*

Tab. 1: Maintenance Plan

6.3 Maintenance Work

6.3.1 Cleaning an Optical Surface

NOTICE

Damage of optical surfaces due to improper cleaning

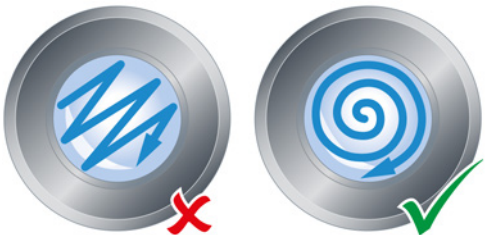
- Remove dust from the optical surface slowly and carefully.
- Remove dust on optical surfaces with a natural-hair brush or blow it off with a rubber bellows.
- Avoid touching optical surfaces with fingers.

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.

6.3.2 Removing Water-Soluble Contamination

Parts and Tools

- Clean cloth
- Lint-free cloth

Prerequisite

✓ The microscope and it's 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.
   → Stubborn dirt can be cleaned with all commercially available water solutions, benzine or alcohol (no solvent!). For cleaning coated parts, use a linen or leather cloth that is moistened with one of these substances.
   Info **Labels on the device may only be cleaned using a dry cloth.**
3. Wipe off the area with the cloth.
4. Dry with a lint-free cloth.

6.3.3 Updating the Firmware of the Binocular Tubes with Integrated Camera

Parts and Tools

- USB flash drive (not included in the scope of delivery)

Prerequisite

- ✓ The binocular tube with integrated camera is connected to a PC or mobile device.
- ✓ Labscope is installed on the PC or mobile device.

Procedure

1. Download the latest firmware from the ZEISS Portal.
2. Save the update file to the root folder of the USB flash drive.
3. Insert the flash drive into the USB port of the binocular tube or into a connected USB hub.
4. In the Labscope software, got to **Configure Microscope** and press the **FIRMWARE UPGRADE** button.

→ The firmware is updated automatically.

6.3.4 Exchanging the Halogen Lamp of the Halogen Module

⚠ DANGER

Electric injury due to live parts

When the microscope is still switched on, coming in contact with live parts can lead to electric shock or burn.

- Switch off the microscope prior to installing and de-installing components.
- Disconnect live parts from the power supply.

⚠ CAUTION

Burning hazard due to hot halogen lamp

The halogen lamp gets hot during operation.

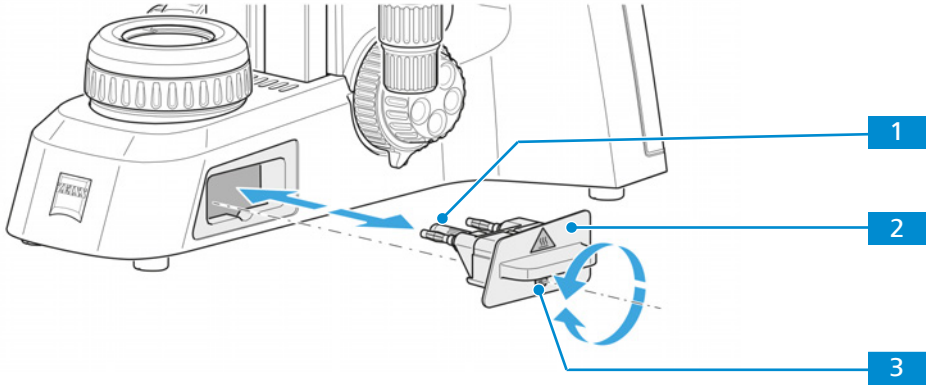
- Do not touch the halogen lamp before it has cooled down.

Parts and Tools

- Hex key, 3.0 mm
- Halogen lamp 30W 6V

Procedure

1. Gently press the fastening screw 3 towards the microscope and turn it clockwise by 90°.



   → The halogen module is released.
2. Pull the halogen module 2 out of the stand.
3. Remove the halogen lamp 1 from the lamp holder and insert the new halogen lamp.
   NOTICE Do not touch the new lamp with bare fingers as this will reduce the life-span of the lamp.
4. Push the halogen module containing the new lamp into the stand.
5. Gently press the fastening screw towards the microscope and turn it counterclockwise by 90°.
   → The halogen module is fixed.

7 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
The field of view is not completely visible.	Nosepiece with objective has not been switched into click-stop position.	Switch nosepiece with objective into click-stop position.
	Condenser has not been set correctly.	Set condenser correctly.
	The aperture diaphragm has not been adjusted correctly.	Adjust aperture diaphragm correctly.
	The luminous-field diaphragm has not been adjusted correctly.	Adjust luminous-field diaphragm correctly.
	The filter has not been inserted correctly into the filter mount.	Insert filter correctly into filter mount.
Low resolving power, poor image contrast	The aperture diaphragm has not been opened to correct size.	Set opening of aperture diaphragm to correct size.
	Condenser not focused correctly.	Focus the condenser.
	Wrong cover glass thickness selected for use of transmitted-light objectives corrected for 0.17 mm cover glass.	Use standard 0.17 mm cover glass.
	Use of no or non-specified immersion oil with immersion objective	Use the supplied immersion oil.
	Air bubbles in immersion oil	Remove the bubbles by applying new oil or moving the objective to and fro.
	Immersion oil on the front lens of a dry objective	Clean the front lens of the dry objective.
	Dirt or dust on the optical surfaces of objectives, eyepieces, condenser, or filters	Clean the respective optical components.
Greater focus differences after changing the objective	The adjustable eyepieces have not been set correctly.	Set the adjustable eyepieces to the corresponding defective vision.

Symptom	Cause	Measure
The 6 V/30 W halogen lamp or the LED source does not light up although the microscope has been switched on.	The power plug has not been plugged into the power outlet.	Connect power plug to power outlet.
	6 V/30 W halogen lamp or LED source is defective.	Replace the defective 6 V/30 W halogen lamp or the LED module.
The 6 V/30 W halogen lamp flickers, its light intensity is unstable, the illumination inhomogeneous	End of average service life of 6 V/30 W halogen lamp has been reached.	Replace the 6 V/30 W halogen lamp.
	Power cable incorrectly installed or broken.	Connect the power cable correctly or replace it.
	The pins of the 6 V/30 W halogen lamp have not been inserted correctly into the lamp holder.	Insert the pins of the 6 V/30 W halogen lamp correctly into the lamp holder.
	The pins of the 6 V/30 W halogen lamp have not been inserted symmetrically into the lamp holder.	Insert the pins of the 6 V/30 W halogen lamp symmetrically into the lamp holder.
Stage comes down by itself, image focus is unstable	Adjusted torque of coarse focusing drive is too low.	Increase the torque of the coarse focusing drive to make motion stiffer.
Transmitted-light illuminator cannot be switched on.	**Fluorescence/brightfield** changeover switch is in **fluorescence** position.	**Fluorescence/brightfield** changeover switch to **brightfield** position.
Reflected-light FL iLED cannot be switched on.	**Fluorescence/brightfield** changeover switch is in **brightfield** position.	**Fluorescence/brightfield** changeover switch to **fluorescence** position.
	Reflected-light FL iLED not sufficiently aligned to microscope stand or displaced, causing interruption of power supply by interlock function.	Align the Reflected-light FL iLED exactly to microscope stand and tighten clamping screw sufficiently.
The X direction range is smaller than expected.	Normal behaviour after long hours of use.	Recover the stage travel range: ▪ Hold the specimen holder's two screws. ▪ Unsing the control knob, move the specimen holder to the left and right until it hits the end stop. The stage travel range is reset.

7.1 Troubleshooting Binocular Tube with Integrated Camera

Symptom	Cause	Measure
LED indicator is off.	The camera is not powered on properly.	Check RJ12 cable connection to stand.
LED indicator flashes red.	The camera is updating firmware or being reset.	Warning! Do not switch off the main power supply on the stand.
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 is full.	Make sure there is enough free space on the flash drive for storage.
	USB flash drive otherwise not recognized.	Restart the camera by powering off the main power supply on the stand.
Firmware update does not function.	The USB flash drive is not recognized or the firmware is not uploaded properly.	Insert a FAT32-formatted USB flash drive with latest firmware in the root folder and make sure the drive has at least 200 MB free memory space. Be sure to follow the instructions in the firmware update menu.
Date/Time is wrong on the camera.	The buffer battery is empty.	Please contact service to change the battery.
The image is very noisy.	The amplification (gain) is set too high.	Open denoise; reduce the gain.
	The exposure time is set too high.	Open denoise; reduce the exposure time.
	The light intensity is set too low.	Open denoise; increase the light intensity.
The image is too dark or too bright.	Light source intensity too high or too low; or auto exposure time too short	Adjust light source intensity, or change to manual exposure.
The camera forgets the settings (e.g. manual white balance, HDMI resolution) if the power supply is disrupted.	Settings are not stored.	It takes 5 seconds for the settings to be automatically stored.
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. Press factory reset button on the camera, see *Binocular Tube 25°/22 with Integrated Camera [▸ 32]*.

Symptom	Cause	Measure
When switching to 4K, the monitor becomes black and then reverts to 1080p.	The monitor may not support 4K.	Use a 4K monitor.
The image appears distorted on full screen monitor	The image aspect ratio is 16:9. The monitor may be set to a different aspect ratio and causes the distortion.	Set the monitor aspect ratio to 16:9.
The image is blurred on the screen but the sample is in focus through eyepieces	Focus plane of the camera is different from that of the eyepieces	Make sure the sample is focused correctly through eyepieces and calibrate the camera adaptor until image is in focus on the monitor.
No list of network names is shown when trying to connect the camera to a router via Wi-Fi USB adapter.	When the Wi-Fi setting is switching between modes, it takes ~10 s for the new mode to load.	Wait for 10 s and click again to refresh the drop-down list.
Buttons do not react when pressed.	The buttons are temporarily locked, as the camera is being accessed exclusively from the PC or network.	Control the camera via PC software or ZEISS app, or close the PC software or ZEISS app.
The camera shows unexpected behavior.	The camera settings may have been changed unintentionally.	Press factory reset button on the camera, see *Binocular Tube 25°/22 with Integrated Camera [▸ 32]*.

8 Decommissioning and Disposal

This chapter contains information on the decommissioning and disposal of the microscope and its expansions/components or accessories.

8.1 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 live parts from the power supply.

Procedure

1. Switch off the microscope.
2. Pull the power supply plug.

8.2 Transport and Storage

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 temperature

Allowable temperature during on-site storage and transport in packaging:

- Between -40 °C and +70 °C
- Relative humidity less than 93 % at 40 °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.

8.3 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 please 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.

8.4 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.

9 Technical Data and Conformity

This chapter contains important technical data as well as information on the conformity.

9.1 Performance Data and Specifications

The microscope must only be operated in closed rooms. It is recommended to install the microscope in a dark room where artificial illumination, sunlight or other light sources cannot interfere with image acquisition. The microscope should not be installed near windows with direct sunlight or radiators. Compliance with the installation requirements of the microscope and the availability of the requested supplies is the responsibility of the customer and has to be provided at the time of installation. Due to continuous development, we reserve the right to change specifications without notice.

The microscope must be plugged into a properly installed power socket with protective earth contact using the supplied mains cable. The protective earth connection must not be impaired by the use of extension cables.

Info

Your ZEISS Sales & Service Partner will provide you with the detailed installation requirements.

Weight and Sizes

Main Components: Stand with ...	Length (mm)	Width (mm)	Height (mm)	Weight (kg)
Binocular tube	417	208	395	8.2
Phototube	417	208	395	8.3-9.2*
Binocular tube 25°/22 with integrated camera (5 MPx or 8 MPx)	417	208	395	9.4-10.1*
Tube/phototube turned 180°	306	208	395	
Reflected-light FL iLED	444	208	471	9.6-11.4*

* Depending on the configuration

Location requirements

Installation site	Exclusively inside buildings
Altitude	Max. 2000 m above sea level
Atmospheric pressure	Min. 800 hPa

Air Conditioning and Quality

Temperature range for operation with indicated performance (24 h per day, regardless of whether the microscope is in operation or switched off)	+5 to +40 °C
Relative humidity	< 80 % at 40 °C
Atmospheric pressure	800 to 1060 hPa
Pollution degree	2

Mains connection

Nominal AC voltage	L / N 100 to 240 VAC ± 10 %
Nominal frequency	50 / 60 Hz
Main Power Plug	Local mains plug will be supplied.
Power consumption	max. 100 VA
Protection class	IP20 (IEC 60529)
IEC earth class	Class II of IEC 61140
Overvoltage Category	II

9.2 Performance Data and Specifications of the Optional Components

The customer is responsible for ensuring that the installation conditions for the microscope are met and that the required equipment is already available at the time of installation. Changes are reserved due to continuous technical developments.

Halogen lamp

Voltage	6 V
Power consumption	30 W
Adjustability of light source, continuous	from 1.5 to 6 VDC
Color temperature at 6 V	2800 K
Luminous flux	280 lm
Average service life	1000 h
Luminous area	1.5 x 3 mm

LED illumination

LED	white light
Constant, brightness-independent color temperature	5600 K
Homogeneous field illumination	20 mm (diameter)
Suitable for objectives with magnifications of	4x to 100x
Analogous brightness adjustment from	approx. 15 to 100 %

LED in LED modules

Power consumption	max. 3.5 W
Wavelength	455 / 470 nm

Stand with stage focusing

Coarse focusing drive	45 mm / rev
Fine focusing drive	0.20 mm / rev
x-axis stage lift	20 mm

Nosepiece	Objective change	manual via quadruple objective nosepiece
	Objectives	infinity-corrected objective range
	Mounting thread	W 0.8
Eyepieces	Tube size	30 mm
	Field-of-view number	20 or 22
	Magnification	10x
	Suitable for spectacle wearers	Br.
	Focusable	Foc.
Specimen stage	Type	Rackless
	Dimensions (width x depth)	140 x 135 mm
	Stage travel (X x Y)	75 x 40 or 75 x 50
	Coaxial drive	optional right or left
	Vernier scales	readable from the right
	Specimen holder	with spring lever, left
Condenser	Abbe condenser 0.9/1.25; Fixed-Köhler	for V_{obj} 4x to 100x
	Abbe condenser 0.9/1.25; Full-Köhler	for V_{obj} 4x to 100x
	Turret condenser 0.9/1.25; Full-Köhler	for V_{obj} 4x to 100x
Illuminating mirror	Plane surface and spherical surface with f'	75 mm

Binocular Phototube		**Small binocular phototube 25°/20**	**Big binocular phototube 25°/22**
	Maximum field-of-view number	20	22
	Interpupillary distance	adjustable from 48 to 75 mm	adjustable from 48 to 75 mm
	Tube angle	25°	25°
	Viewing height	380 to 415 mm	380 to 415 mm
	Viewing port, tube factor	1x	1x
	Photo/video port, tube factor	1x	1x
	Photo/video port, mount	60 mm	60 mm
	Invariable splitting ratio	50 vis/50 doc %	50 vis/50 doc %

9.3 Performance Data and Specifications of the Binocular Tubes 25°/22 with Integrated Camera

The customer is responsible for ensuring that the installation conditions for the microscope are met and that the required equipment is already available at the time of installation. Changes are reserved due to continuous technical developments.

	Power consumption	12 VDC 1.0 A
Binocular tube 25°/22	Maximum field-of-view number (eyepiece)	22
	Acquired visual field of the camera	14.2 x 8.0 mm 16.3 mm (diagonal)
	Eyepiece (interpupillary) distance	adjustable from 48 to 75 mm
	Viewing angle	25°
	Eyepoint height	from 385 to 420 mm
	Fixed graduation	50 / 50
	Optical adaptation	0.5x for the 8 MPx camera 0.3x for the 5 MPx camera
Integrated 5 MPx camera	Sensor type	Sony CMOS color sensor, rolling shutter
	Effective sensor pixel count	2592 (H) x 1944 (V) = 5.04 megapixels (MPx)
	Selectable resolution	5 MPx (snap) and 2 MPx (live and snap)
	Resolution 5 MPx	2592 x 1944
	Pixel size (physical)	2.0 µm x 2.0 µm
	Sensor size (physical)	5.2 mm x 3.9 mm, diagonal 6.5 mm equivalent to 1/2.8"
	Resolution 2 MPx	1920 x 1080
	Pixel size (calculated)	2.67 µm x 2.67 µm
	Sensor size (used)	5.1 mm x 2.9 mm, diagonal 5.9 mm
	Spectral Sensitivity	Approx. 400 to 660 nm, IR filter, RGB Bayer color mask
	Gain (Signal Amplification)	0 to 27x adjustable
	Live image frame rate	up to 30 fps via Ethernet in Labscope only with 2 MPx resolution (1920 x 1080) 1 ms exposure time
	Digitization	24-bit (3 x 8 Bit RGB) A/D conversion
	Exposure time range	30 µs to 1 s

Interface	RJ45 (LAN), USB 3.0 Type A, RJ12 for power supply
Optical interface	integrated adapter
Power interface	RJ12
Cooling	passive cooling

Integrated 8 MPx camera

Sensor type	Sony CMOS color sensor, rolling shutter
Number of pixels	3840 (H) x 2160 (V) = 8.3 megapixels (MPx)
Pixel size	1.85 x 1.85 µm
Sensor size	7.1 mm x 4.0 mm, diagonal 8.15 mm equivalent to 1/1.9"
Live image frame rate	up to 30 fps via HDMI with 8.3 MPx resolution (3840 x 2160)
Digitization	24-bit (3 x 8 Bit RGB) A/D conversion
Exposure time range	61 µs to 1 s
Interface	USB 3.0 Type B, RJ45 (LAN), HDMI, 3 x USB 3.0 Type A, RJ12 for power supply
Optical interface	integrated adapter
Power interface	RJ12
Cooling	passive cooling

Info

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

9.4 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 equip-

		ment (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
	EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
Primostar 3 only	(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
Primostar 3 cam only	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
	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
	EN IEC 61010-2-130:2021	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-130: Particular requirements for equipment intended to be used in educational establishments by children

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).

10 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

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

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: ▪ Slider H/Ph2 f/Primostar 3 ▪ Slider H/Ph1/Ph2/Ph3 ▪ Slider DF f/Primostar 3 ▪ Polarizer f/Primostar 3 ▪ Analyzer f/Primostar 3
Color filters	The following color filters are available: ▪ Set of color filters blu/grn/yel d45x1.5
Eyepieces	The following eyepieces and accessories are available: ▪ Eyepiece 10x/20 Br. foc. ▪ Eyepiece 10x/22 Br. foc. ▪ Pair of special eyecups ▪ Pinhole diaphragm D= 30 mm
Condensers	The following condensers are available: ▪ Abbe condenser 0.9/1.25 ▪ Turret condenser with BF/Ph1/Ph2/Ph3/DF
Sample holders	The following sample holders are available: ▪ Specimen holder lh ▪ Specimen holder work f/two slides lh
Light sources	The following light sources are available:

Name	Description/Info
	▪ Transmitted-light illumination 3W 5600K ▪ Transmitted-light illumination 6V/30W ▪ Reflected-light FL iLED 455 nm ▪ Reflected-light FL iLED IDC 455 nm ▪ Reflected-light FL iLED 470 nm
Tubes	The following tubes are available: ▪ Binocular tube 25°/20 ▪ Binocular phototube 25°/20 (50.50) ▪ Binocular phototube 25°/22 (50.50)
Cameras	The following cameras and accessories are available: ▪ Educam 105 ▪ Axiocam 208 color ▪ WiFi USB adapter for Labscope connection ▪ Binocular tube 25°/22 with integrated 5 MPx camera demo kit ▪ Binocular tube 25°/22 with integrated 8 MPx camera demo kit ▪ Camera adapter P90-C 2/3" 0.65x ▪ Camera adapter P90-C 1/2" 0.5x
Transport and storage cases	The following transport and storage cases are available: ▪ Case for transport and storage of Primo Star ▪ Transport+storage case f/Primostar 3

Revision History

Revision	Date of Issue	Introduced Modifications
8	08/2024	▪ Change of address of the manufacturer ▪ Editorial rework
7	06/2024	▪ Corrections
6	04/2024	▪ Primostar 3 cam/5 MPx camera added ▪ Regulatory rework
5	03/2023	▪ Editorial rework
4	01/2023	▪ Editorial rework ▪ Change of Technical Data: *Stand with stage focusing [▸ 89]* ▪ Implementation of UKCA marking
3	03/2022	▪ Implementation of revision history ▪ Adaptation to Regulation (EU) 2017/746 (IVDR)

Glossary

HDMI (High Definition Multimedia Interface)

A digital interface for audio and video that is capable of transmitting high-quality and high-bandwidth streams of audio, video, and signal data (e.g. control signals) between devices.

LED (Light emitting diode)

Solid state device embodying a p-n junction, emitting optical radiation when excited by an electric current.

NA

Numerical Aperture

PPE (Personal protective equipment)

Equipment used to protect persons from harm in the working environment.

TL (Transmitted Light)

Light used for illuminating a object, where the light is transmitted through the object.

Transmitted-light brightfield

Transmitted-light brightfield microscopy is the most common of all optical microscopic techniques, as it permits high-contrast or stained samples (e.g. blood smears) to be viewed easily and quickly. Beside the so-called direct bundles of rays, the indirect bundles (i.e. those diffracted and scattered by sample details) are also of major importance for providing true imaging of the sample. The higher the proportion of indirect bundles of rays (aperture), the more realistic the microscopic image according to ABBE. To fully exploit the optical performance of the microscope, particularly that of the objective, the condenser, luminous-field diaphragm and aperture stop should be set based on the rules of the KÖHLER illumination principle.

USB (Universal Serial Bus)

An industry standard that defines cables, connectors and communications protocols for connection, communication, and power supply between computers and devices.

User

Person examining a sample under the microscope.

Wi-Fi

Wireless Fidelity

ZEISS Sales & Service Partner

The Sales & Service Partner is generally in the field for customer support in a regional area and / or a clearly defined customer group.

ZEISS service representative

Specially trained service expert, either ZEISS staff or authorized service partner of ZEISS.

Instruction Manual ZEISS Primostar 3
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