

# User instructions

## Transmitted light laboratory microscope

### **KERN**      **OBN-13**

OBN 132, OBN 135

Version 1.1  
2025-02

EN





# KERN OBN-13

Version 1.1 02/2025

User instructions

Transmitted light laboratory microscope

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## 1 Technical data

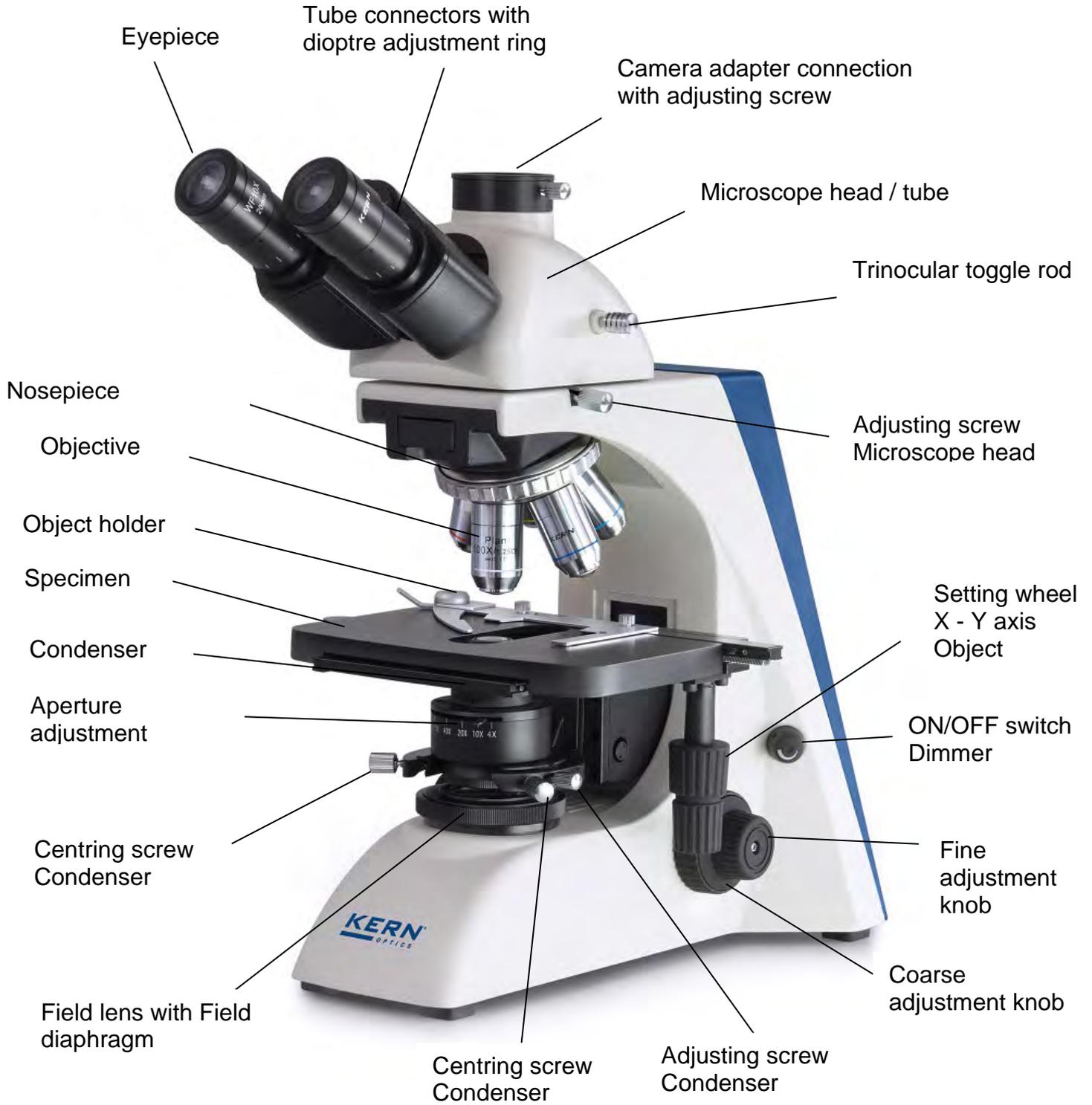
Kern model	OBN 132	OBN 135
Item number/type	OBN 132	TOBN 135-A
Dimensions (WxDxH)	306x200x395 mm	
Tubus Art	Trinocular	
Optical system	Infinity	
Revolving nosepiece screw-in positions	5	
Lens quality	Infinity Plan	
Standard objectives	4x 10x 20x 40x 100x	
Eyepiece field width	HWF	
Illuminance Transmitted light	20W	3W
Type of lighting Transmitted light	Halogen	LED
Lighting equipment	Transmitted light	
Condenser type	ABBE	
Condenser aperture	1,25	
Input voltage power supply / current [ Max ]	100 – 240V AC 50/60Hz 2A	100 - 240V AC 50/60Hz 0.3A
Input voltage device / current [ Max ]	100 – 240V AC 50/60Hz 2A	5V DC, 1A
Plug-in power supply type	Built-in power supply unit	Plug-in power supply
Fuse	2A 5x20mm	-
Focusing mechanism	Coaxial coarse and fine drive	
Packaging dimensions	570x310x410 mm	
Net weight	9.983 kg	
Gross weight	11 kg	

## **2 Declaration of conformity**

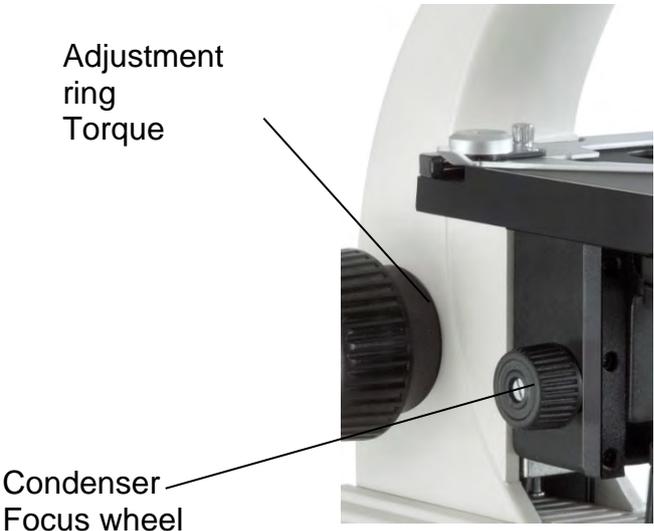
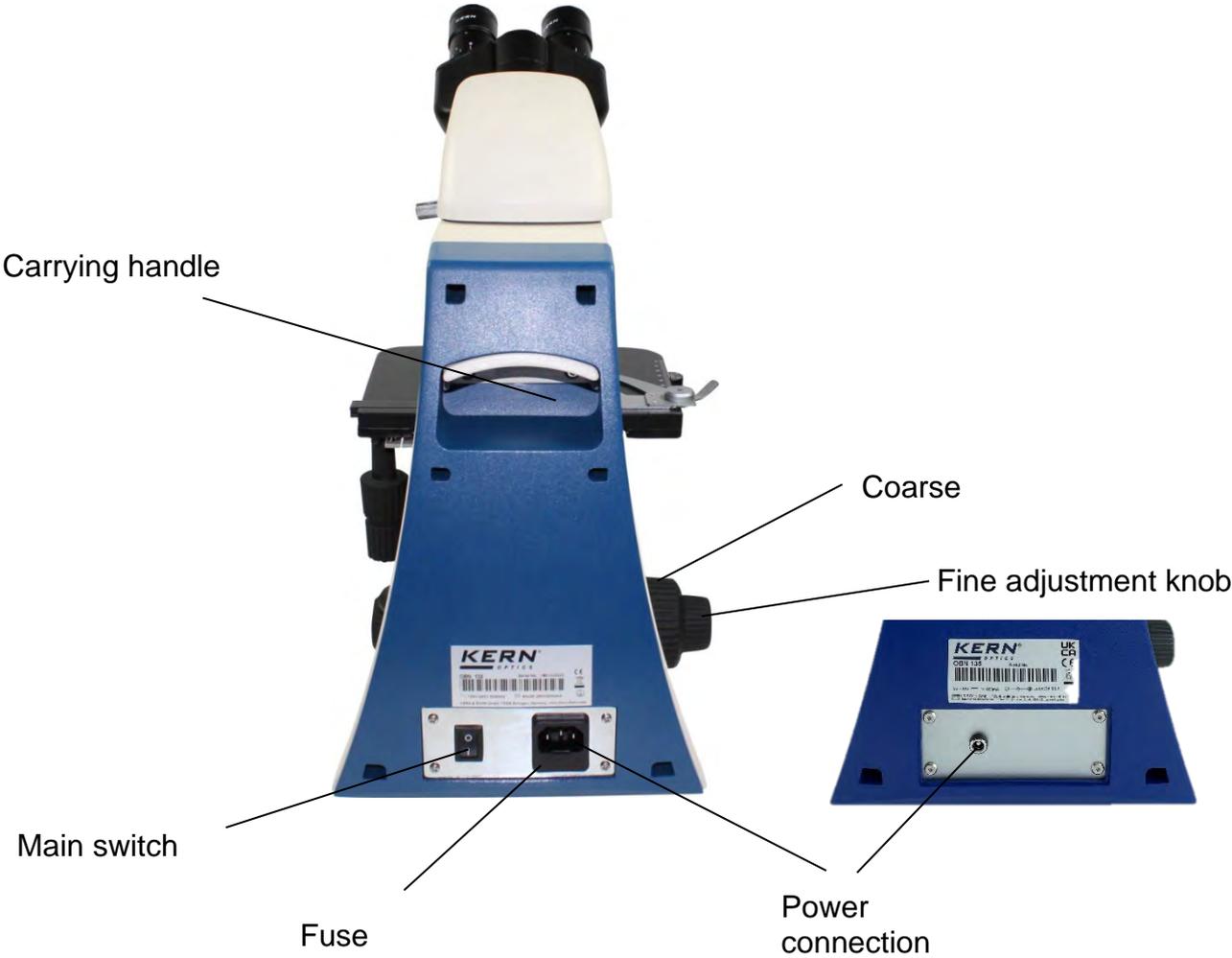
The current EC/EU Declaration of Conformity can be found online at:

<https://www.kern-sohn.com/shop/de/DOWNLOADS/>

### 3 Device overview



Rear view OBN 132/ OBN 135



## 4 Before use

### 4.1 General information

The packaging must be opened carefully to prevent the accessories inside from falling to the floor and breaking.

In general, a microscope should always be handled with great care, as it is a sensitive precision instrument. Avoiding abrupt movements during operation or transportation is therefore particularly important, especially to avoid endangering the optical components.

You should also avoid dirt or fingerprints on the lens surfaces, as in most cases this impairs the sharpness of the image.

If the performance of the microscope is to be maintained, it must never be disassembled. Parts such as objective lenses and other optical components should therefore be left as they are at the start of operation.

## 5 Basic information (general)

### 5.1 General information on warnings

Warnings are used in these operating instructions to warn you of possible personal injury or damage to property in certain situations.

Signal word	Description
<b>DANGER</b>	Failure to observe the instructions will lead directly to serious injury, permanent impairment (e.g. loss of a limb) or death of the user or third parties
<b>WARNING</b>	Failure to observe the instructions may result in serious injury, permanent impairment (e.g. loss of a limb) or death of the user or third parties
<b>CAUTION</b>	Failure to observe the instructions may result in minor injuries or temporary damage to the user or third parties (e.g. minor cuts)
<b>NOTE</b>	Failure to observe the instructions may result in damage to property

### Symbols in warning notices:

Icon	Meaning
<b>Warnings</b>	Warning signs warn you of dangers that could lead to injury. The symbol indicates the type of danger.
	Indicates general hazards or a danger point
	Warning of electrical voltage
	Warning of explosive substances
	Warning of optical radiation

Icon	Meaning
<b>Commandment sign</b>	Mandatory signs prescribe measures that you must take to avoid personal injury or damage to property. The symbol indicates the necessary actions or objects to prevent damage.
	Indicates a prescribed action

### 5.2 Intended use

The OBN-13 is versatile and is mainly used to analyze cell and tissue cultures. It is used in the analysis of blood and tissue samples from the human body as well as samples of plant and animal origin.

### 5.3 Improper use

Do not use the device in potentially explosive atmospheres or for measurements in liquids or on live parts.

Unauthorized structural changes, additions and conversions to the appliance are prohibited.

### 5.4 Warranty

The guarantee expires in the event of

- Non-compliance with our specifications in the operating instructions
- Use outside the described applications
- Changing or opening the device
- Mechanical damage and damage caused by media, liquids, natural wear and tear

- Improper set-up or electrical installation
- Improper assembly or electrical installation

## **5.5 Notes on the electrical system**

Before connecting the device to the mains, you must ensure that you are using the correct input voltage. The information for selecting the correct mains cable can be found on the device, on the back of the product directly above the connection socket. It is essential that you follow this information. If you do not adhere to these instructions, this may result in fire or other damage to the appliance.

The main switch must also be switched off before the mains cable is connected. In this way, you avoid triggering an electric shock.

If you are using an extension cable, the mains cable you are using must be earthed. Only carry out work that comes into contact with the electrical system of the appliance when it is de-energized.

## **5.6 Storage and transportation**

Avoid exposing the device to direct sunlight, high or low temperatures, shocks, dust and high humidity.

The suitable temperature range is 0 - 40 °C and a relative humidity of 85% should not be exceeded.

The appliance should always be placed on a firm, smooth and horizontal surface.

When the microscope is not in use, it is best to cover it with the dust cover supplied. Dust or dirt inside the optics of a microscope can in many cases lead to irreversible malfunctions or damage.

Accessories consisting of optical elements, such as additional lenses, are preferably stored in a drying box with desiccant.

### **Note**

If you store or transport the device improperly, the device may be damaged. Observe the instructions for transporting and storing the appliance.

### **Packaging / return transportation**

Returns are only possible within the framework of the General Terms and Conditions. Keep all parts of the original packaging for any necessary return transportation.

- Only the original packaging may be used for return transportation.
- Disconnect all connected cables and loose/movable parts before shipping.
- Reattach any existing transport locks.
- Secure all parts against slipping and damage.

## 6 Basic warnings and safety instructions

### 6.1 Observe the notes in the operating instructions



Read the operating instructions carefully before commissioning/using the device, even if you already have experience with KERN devices. Always keep the instructions in the immediate vicinity of the appliance.

### 6.2 Staff training

The appliance may only be used by persons who have read and understood the operating instructions, in particular the chapter on safety.

### 6.3 Safety

<b>⚠ WARNING</b>	
	<p><b>Read all safety information and instructions.</b> Failure to observe the safety information and instructions may result in electric shock, fire and/or serious injury. <b>Keep all safety information and instructions for future reference.</b></p> <ul style="list-style-type: none"><li>• The design of the device must not be modified. This can lead to incorrect measurement results, safety defects and destruction of the device</li><li>• Do not operate the appliance in potentially explosive rooms or areas and do not install it there.</li><li>• Do not operate the device in an aggressive atmosphere.</li><li>• Do not immerse the appliance in water. Ensure that no liquids penetrate the inside of the device.</li></ul> <p>The device may only be used in a dry environment and under no circumstances in rain or relative humidity above the operating conditions.</p> <ul style="list-style-type: none"><li>• Protect the device from permanent direct sunlight.</li><li>• Do not expose the appliance to strong vibrations.</li><li>• Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in a legible condition</li><li>• Do not open the device</li><li>• The lamp generates a lot of heat during operation. Avoid touching the lamp housing during operation and for some time afterwards.</li><li>• Do not operate the device in an aggressive atmosphere.</li></ul> <p><b>Important warnings regarding the use of an HBO lamp</b></p> <ul style="list-style-type: none"><li>• The lamp generates a lot of heat during operation. Avoid touching the lamp housing during operation and for some time afterwards.</li><li>• Under no circumstances should the lamp be switched off during the pre-glow time. This will result in a considerable reduction in service life.</li><li>• The lamp must not be switched on again immediately after it has been switched off.</li><li>• When there is a pause in observation, the control lever for the lighting should always be pushed in to interrupt the light beam. The light spectrum of the HBO lamp can often be harmful to microorganisms.</li></ul>

	<ul style="list-style-type: none"> <li>• Never look into the eyepieces when the beam path is open (using the control lever for illumination) and an empty filter position is selected on the FL module. There is an acute risk of blindness here.</li> </ul>
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 <b>WARNING</b>	
	<p><b>Risk of injury due to electric shock!</b></p> <ul style="list-style-type: none"> <li>• Risk of short circuit due to penetration of liquids into the housing!</li> <li>• Do not immerse the appliance or accessories in water. Make sure that no water or other liquids get into the housing.</li> <li>• Work on electrical components may only be carried out by an authorized specialist company!</li> <li>• Take care not to twist or kink the mains cable.</li> <li>• Only use the original adapter supplied.</li> </ul>

 <b>WARNING</b>	
	<p><b>There is a risk of suffocation!</b></p> <p>Do not leave the packaging material lying around carelessly. It could become a dangerous toy for children. The appliance is not a toy and does not belong in the hands of children.</p> <ul style="list-style-type: none"> <li>• This device can be dangerous if it is used improperly or not as intended by untrained persons! Observe the personnel qualification!</li> </ul>

 <b>WARNING</b>	
	<p><b>Electrostatic sensitive device!</b></p> <ul style="list-style-type: none"> <li>• The device can be destroyed by electrostatic discharge. Connectors for HF signals are particularly at risk. Please observe the handling instructions for electrostatically sensitive components.</li> </ul>

## ⚠ WARNING



Never touch the glass housing of the built-in HBO replacement lamp with bare hands. Contamination increases the risk of explosion during operation. The lamp must be cleaned if it becomes contaminated.

- An HBO lamp has a certain service life. The closer it is brought to its limit, the greater the risk of the lamp exploding and releasing toxic mercury vapor. This must be prevented by all means.

## ⚠ WARNING



### **There is a risk from optical radiation!**

Gas discharge lamps, LED lights and other white light sources generate intense optical radiation, including UV (ultraviolet), visible light (VIS) and IR (infrared). This radiation can cause both skin and eye damage. The extent of the damage is determined by the wavelength, the duration of exposure and the operating mode (continuous or pulsed).

- Do not expose your eyes and skin to radiation.
- Do not insert any reflective objects into the beam entrance.
- **Use** suitable protective equipment/protective clothing if necessary.
- Never remove the cover or cladding during operation.
- Never look into the eyepieces when the beam path is open (using the control lever for illumination) and an empty filter position is selected on the FL module. There is an acute risk of blindness here.

## CAUTION

Keep a sufficient distance from heat sources.

Do not use the device in environments with high humidity or water mist

## ! NOTE

To avoid damaging the device, do not expose it to extreme temperatures, extreme humidity or moisture.

- Do not use harsh cleaning agents, abrasives or solvents to clean the appliance.

## 7 Unpacking and commissioning

### 7.1 Unpacking

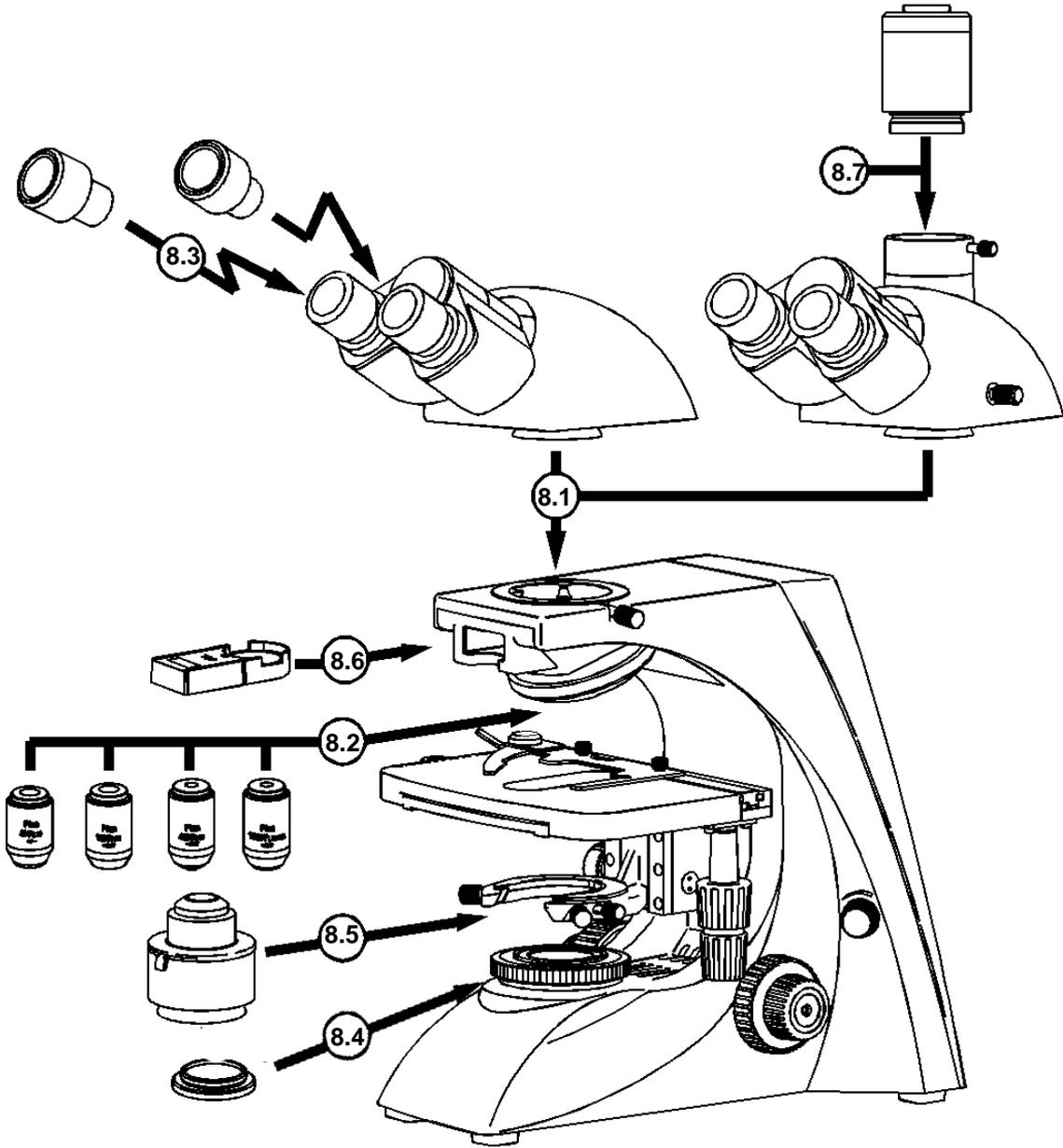


In the event of a return shipment, please observe the instructions in the chapter "Packaging/return transportation"

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On receipt of the device, please check in advance whether there is any damage caused during transportation and whether the outer packaging, the housing, other parts or even the device itself are damaged. If any damage is apparent, please notify KERN & Sohn GmbH immediately.

8 Assembly



## **8.1 Microscope head**

First you must loosen the fixing screw on the tube connection point and remove the black protective cover. You can then insert the round dovetail bracket on the head into the round dovetail bracket on the housing and fix it with the fixing screw. When doing this, you should always make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.

## **8.2 Objectives**

The specimen stage must be in its lowest position so that the objectives can be screwed into the nosepiece. You can then screw the objectives into the nosepiece so that when you turn the nosepiece in a clockwise direction, the objective with the next strongest magnification appears. You must make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures. For objectives which are marked "OIL", you must use an immersion oil with the lowest level of inherent fluorescence.

## **8.3 Eyepieces**

Eyepieces with the same magnification for both eyes must always be used. These are simply placed on the tube sockets once the plastic protective caps have been removed. Care should always be taken to ensure that the lenses are not touched with bare fingers and that no dust enters the openings.

## **8.4 Colour filter ( OBN 132 )**

A blue colour filter can simply be placed in the ring holder of the field lens.

## **8.5 Condenser**

We recommend that you use the course adjustment knob to bring the specimen stage to its uppermost position. Use the focus dial of the condenser to move the condenser holder to the central position. In this way the condenser can be fitted at the right place in the condenser holder and fixed with the adjusting screw. When doing this, you should be able to read the scale from the front. You should avoid touching the optical lenses with bare fingers.

***For points 8.6 (polarization unit) and 8.7 (camera connection), see chapter 11 Using optional accessories.***

## 8.6 Operation and function of the microscope

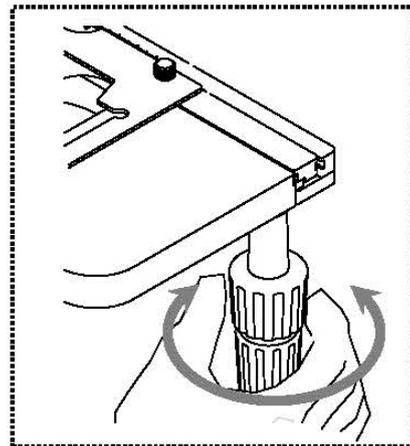
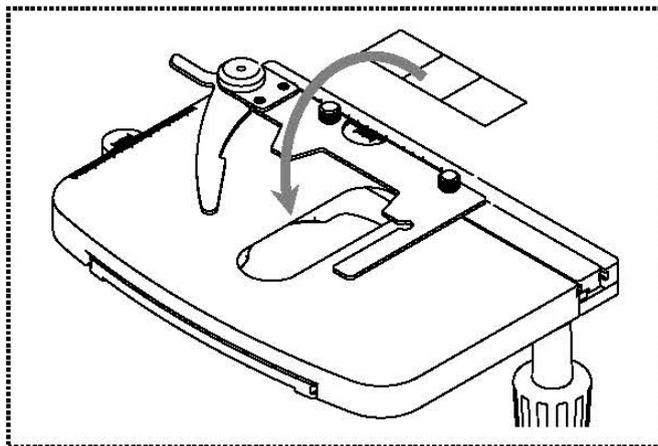
When the microscope is ready for use after assembly, it must first be connected to the mains via the mains cable. Only insert the mains plug into a suitable socket. Ensure that the mains cable is laid correctly.

The following sections describe all the important functions that are useful for operating the device.

The first thing to do is to **connect the power supply using the mains plug**. The **light intensity control (dimmer)** should first be set to a **low level so that** the eyes are not immediately exposed to too much light when looking into the eyepieces for the first time. The **lighting** can now be switched on using the **main switch**.

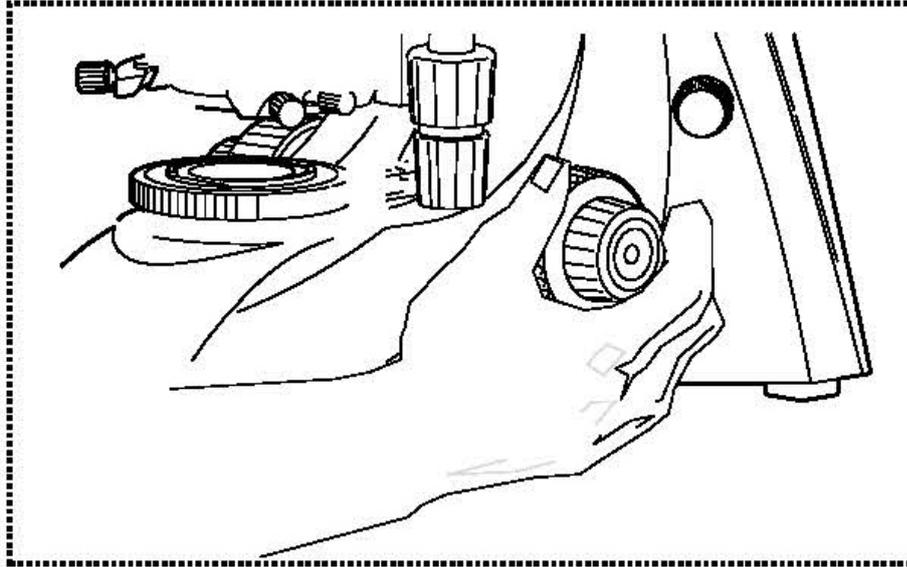
The next step is to **place a slide** with a sample on the stage. The cover glass must be facing upwards for this. The object holder can be used to fix the slide on the stage (see *illustration on the left*). To move the sample into the beam path, the adjustment wheels on the right-hand side of the mechanical stage must be operated accordingly (see *illustration on the right*).

A total of two slides can be placed at the same time.



## 8.7 (Pre-) focusing

When you are observing an object, you must have the correct distance to the objective to achieve a sharp image. In order to find this distance at the beginning (without other default settings of the microscope) place the objective with the lowest magnification in the beam path, look through the right eyepiece with the right eye and turn it slowly using the coarse adjustment knob (see illustration).



The simplest way of doing this would be to first raise the specimen stage (using the coarse adjustment knob) until it is just under the objective and then lower it slowly. As soon as an image is recognisable (no matter how sharp), then you should only adjust the focus using the fine adjustment knob.

### Adjusting the torque of the coarse and fine adjustment knob

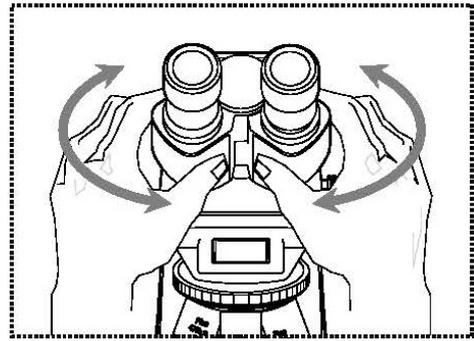
Next to the left adjustment wheel for the coarse and fine adjustment knob there is a ring which you can use to alter the torque of these wheels. Turning it in a clockwise direction reduces the torque and turning it in an anti-clockwise direction increases it. On one hand, this function can help to make it easier to adjust the focus and on the other hand it can prevent the specimen stage from slipping down unintentionally.

### Important

In order to avoid damaging to the focussing system, the left and right adjustment wheels for the coarse and fine adjustment knob must never be rotated at the same time in opposite directions.

## 8.8 Adjusting the interpupillary distance

With binocular viewing, the interpupillary distance must be adjusted accurately for each user, in order to achieve a clear image of the object. While you are looking through the eyepieces, use your hands to hold the righthand and lefthand tube housing firmly. By pulling them apart or pushing them together, you can either increase or reduce the interpupillary distance (see illustration). As soon as the field of views of the lefthand and righthand eyepieces completely overlap each other, i.e. they combine to form a circular image, then the interpupillary distance is set correctly.



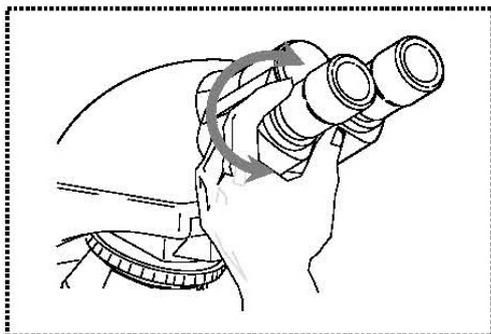
## 8.9 Dioptre adjustment

The eye strengths of each eye of the microscope user can often be slightly different, which in daily life has no consequences. But when using a microscope this can cause problems in achieving precise focussing.

You can use a mechanism on both tube connectors (dioptre adjustment rings) to compensate for this as follows.

1. Put the right dioptre adjustment ring to position 0.
2. Look through the right eyepiece with the right eye and bring the object into focus by using the coarse and fine adjustment knob.

Then look through the left eyepiece with the left eye and use the lefthand dioptre adjustment ring to focus the image. To do this, you just need to turn the ring in both directions (see illustration), to find out where the image is at its most focussed.

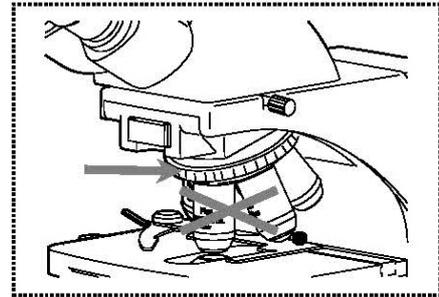


## 8.10 Adjusting the magnification

After prefocussing has been carried out using the objective with the lowest magnification (see section 5.2), you can then adjust the overall magnification using the nosepiece, as necessary. By turning the nosepiece you can bring any one of the four other objectives into the beam path.

When adjusting the nosepiece, you must take the following points into account:

- The required objective must be properly locked in place at all times.
- The nosepiece should not be rotated by holding individual objectives, you should use the silver ring above the objectives (see illustration).
- When rotating the nosepiece you must always make sure that the objective which is about to be positioned in the beam path does not touch the object holder. This can lead to significant damage to the objective lens. We recommend that you always check from the side to make sure that there is sufficient leeway. If this should not be the case, the specimen stage must be lowered accordingly.



If you have focussed the object to be observed for a specific magnification, then if you select the objective with the next greatest magnification, then the object will be slightly out of focus. Use the fine adjustment knob to make a slight adjustment and restore the focus

## 8.11 Adjusting the Koehler Illumination

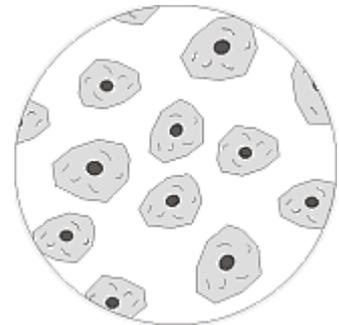
To make sure that perfect image results are achieved during microscopic observation, it is important that the direction of light of the microscope is optimised. If, as with the devices in the KERN OBN-13 series, the lighting can be set in accordance with Koehler, the result is homogenous illumination of the slide and avoidance of disruptive stray light.

The necessary control elements for this are

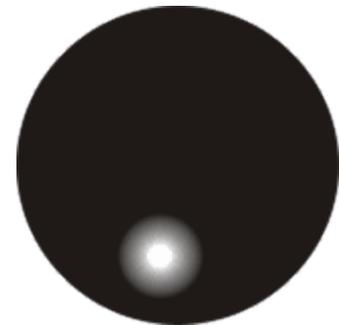
- Height-adjustable and centre-adjustable condenser with aperture diaphragm
- Field diaphragm

When adjusting the Koehler lighting for the first time, you must first select the lowest possible objective magnification, so that you can carry out the following steps.

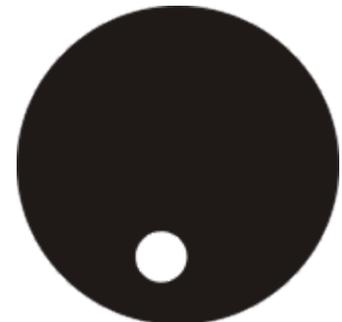
1. Use the condenser focus wheel to position the condenser directly below the specimen stage. Switch on the lighting and use the coarse and fine adjustment knob to bring the slide with the cover glass positioned facing upwards into focus.



2. Close the field diaphragm completely using its adjusting ring. When you look in the microscope a blurred image appears in the aperture. If the microscopic image is completely dark, the image for the field diaphragm is outside the field of view and must be brought into the field of view using the centring screws on the condenser.



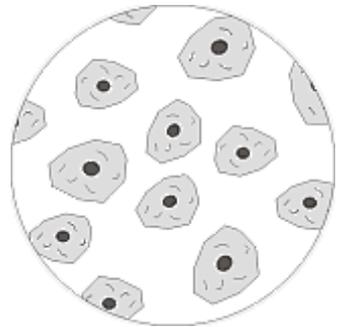
3. Adjust the height of the condenser until the image of the field diaphragm appears sharp in the field of view. With some microscopes, there is a danger of raising the condenser too high and causing a collision with the specimen slide. A little caution is therefore required here.



4. Use the centring screws of the condenser holder to bring the image from the field diaphragm into the centre of the field of view.



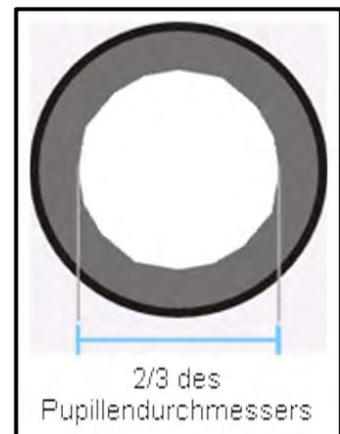
5. Open the field diaphragm until it just disappears from the field of view.  
If necessary, slightly re-center with the centering screws of the condenser carrier.



6. The aperture diaphragm of the condenser can be used to set the optimum compromise between contrast and resolution for the microscopic image. The scale graduation on the condenser serves as a guide. Select according to the objective lens used..

The view into the tube without the eyepiece should look something like the picture on the right.

The diameter of the then visible aperture diaphragm should be about  $\frac{2}{3}$  of the pupil diameter



If the eyepiece is to be removed for inspection, please ensure that no dirt or dust can fall into the tube.

7. It is possible to alter the brightness of the bulb using the **dimmer**. The brightness is always controlled by the bulb brightness and not by the aperture diaphragm.
8. Possibly there is the need of re-adjusting the focus and x-y axis.
9. Observe the object.

If another magnification is selected afterwards, then the Koehler illumination does not have to be reset from scratch, only the aperture diaphragm and field diaphragm need to be adjusted as required. As a result you can always check whether the condenser needs to be re-centred

## 8.12 Using the eyecups

The eye cups supplied with the microscope can basically be used at all times, as they screen out intrusive light, which is reflected from light sources from the environment onto the eyepiece and the result is a better image quality.

But primarily, if eyepieces with a high eye point (particularly suitable for those who wear glasses) are used, then it may also be useful for users who don't wear glasses, to fit the eye cups to the eyepieces.

These special eyepieces are also called High Eye Point eyepieces. They can be identified by the glasses symbol on the side. They are also marked in the item description by an additional "H" (example: HSWF 10x Ø 23 mm).

When fitting the eye cups, make sure that the dioptre setting is not moved. We would therefore advise that you hold the dioptre compensation ring on an eyepiece with one hand while you fit the eye cup with the other.

Before using the microscope, users who wear glasses must remove the eye cups, which you may find on High Eye Point eyepieces.

As the eye cups are made of rubber, you must be aware that when you are using them, they can become slightly dirty through grease residues. In order to maintain hygiene, we would therefore recommend that you clean the eye cups regularly (e.g. with a damp cloth).



Eyecups



High Eye Point eyepiece  
(recognizable by the glasses symbol)

### 8.13 Use oil immersion lenses

The 100x objectives of the OBN-13 series are objectives which can be used with oil immersion (they are always marked with the word "OIL"). Using these generates a particularly high resolution for microscopic images.

To use oil immersion correctly, please follow these steps.

1. Place a drop of oil on the cover slip (with a standard thickness of 0.17 mm) of the preparation.
2. Lower the stage and bring the 100x objective into the beam path.
3. Very slowly move the specimen stage or the specimen towards the objective until light contact is made.
4. Observe the object.

The object slide and objective must not be pressed against each other. The oil constitutes the contact layer.

If the contact is made too jerky, there is a chance that existing air bubbles in the oil cannot escape. This would have a negative impact on image clarity.

After use or before changing the slide, any components which have been in contact with the oil must be cleaned thoroughly. See *chapter Maintenance and cleaning*.

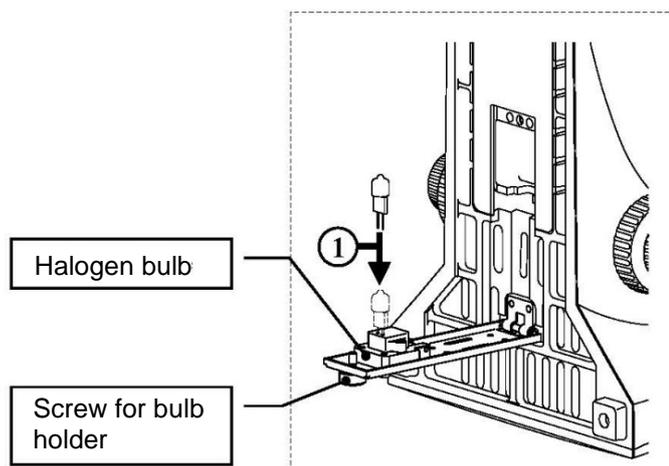
## 9 Changing the bulb

### Halogen

You must not attempt to change the bulb immediately after the microscope has been used, as the bulb will still be hot and so there is a risk that the user could be burnt. Before changing the bulb the device must be switched off and unplugged. To change the bulb, tip the device carefully to the back or side. When doing this, please make sure that all microscope components are firmly fixed. The bulb holder is on the underside of the device. It can be opened by undoing the screws on the holder (see illustration). We recommend that here you should also test again, to check that heat is no longer being produced. The defective bulb can be pulled out of the socket and be replaced with a new one. After the bulb holder has been replaced in the underside of the device and the screws replaced, the bulb replacement procedure is complete.

#### Important:

When fitting the new bulb into the socket, it must only be handled with sterile gloves or using the bulb packaging film. Grease and dust residue can have a negative effect on the light quality and service life.



### LED

The OBN 135 is equipped with LEDs.

Due to the long service life of LED lighting, regular lamp replacement will not be necessary with this microscope.

In most cases, problems with the lighting would therefore be caused by defects in the electrical system. In such a case, our Technical Service can help.

## 10 Changing the fuse (OBN 132)

The fuse housing is located at the rear of the microscope below the mains plug connection. When the device is switched off and the mains plug is removed, the housing can be pulled out. It is advisable to use a screwdriver or similar tool to help with this. The defective fuse can now be removed from its housing and replaced with a new one.

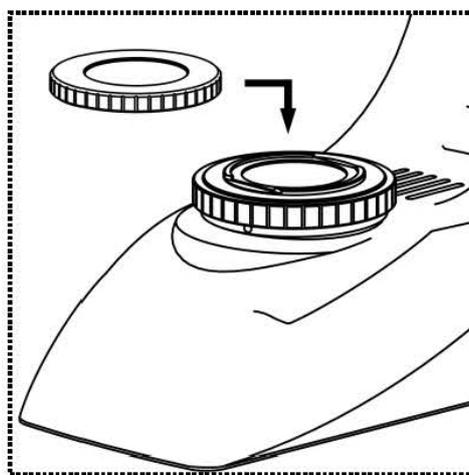
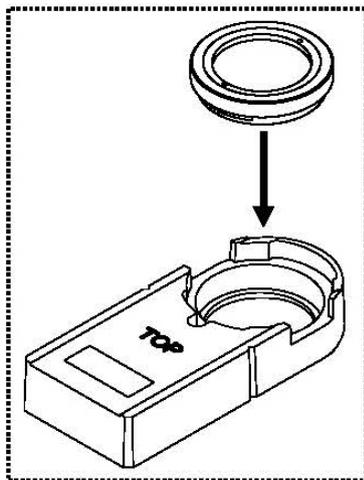
## 11 Use of optional accessories

### 11.1 Polarization unit

The polarization unit consists of two parts: Polarizer and analyzer.

Both parts consist of a round glass plate with an outer retaining ring. To attach the analyzer, a slider with holder is attached to the front of the microscope directly above the nosepiece (see *illustration on page 16*), where the analyzer can be easily inserted (see *illustration on the left*).

The polarizer, on the other hand, is simply placed on the ring holder of the field lens (see *illustration on the right*).



There are two points to note for the subsequent use of the polarization unit:

- The aperture setting of the condenser must be in position **PH**.
- For its starting position, the polariser must be turned to the position in which you can see the highest level of darkness in the field of view (without object slide).

## 11.2 Camera connection

Due to the trinocular tube, which is a standard fitting for the whole OBN-13 series, it is possible to connect microscope cameras to the device, in order to digitally record images or sequences of images of an object being observed.

After the plastic cover has been removed from the camera adapter connector on the top of the microscope head, then a suitable adapter must be fitted. In general there are two C-mount adapters available for this (1x and 0.57x magnification). After fitting one of these adapters it can be fixed with the fixing screw. A camera which has a C-mount thread is then screwed on top of the adapter.

We recommend that you first adjust the field of view using the eyepieces on the device for the existing requirements, and then carry out the observation using the microscope camera (i.e. using the PC screen which is connected). To do this, the trinocular toggle rod on the righthand side of the microscope head must be pulled out. The light from the microscope lighting is deflected so that it is completely in the beam path for the camera, which causes a dark field of view in the eyepieces. This means that it is not possible to simultaneously observe by the eyepieces and PC screen.

For C-mount adapters, which have their own integrated magnification, the image which is shown on the camera connected to the device can often have a different level of focus compared with the image on the eyepiece. In order to be able to bring both images into focus, the focus can be adjusted by those adapters.

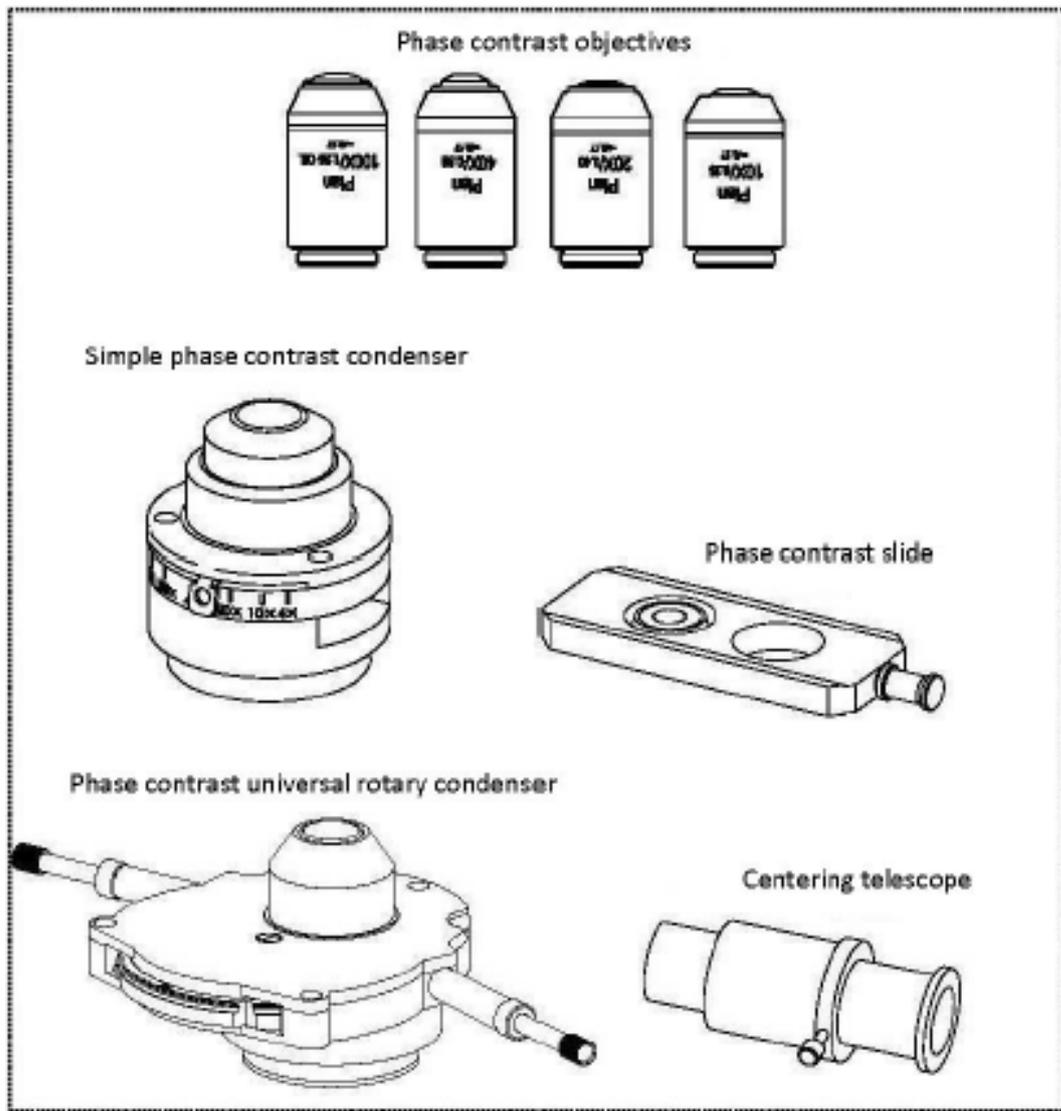
## 11.3 Dark field units

The following option is available for realizing dark field applications.

1. A special dark field condenser can be used in place of the standard condenser. This is a paraboloid construction and also meets the requirements of professional application fields, in contrast to a dark field attachment.

## 11.4 Phase contrast units

Basically, there are two different ways to enable the use of phase contrast methods. A simple and a more extensive method.



### 1. Simple phase contrast unit

This consists of a simple PH condenser, a PH objective with a specific magnification (10x, 20x, 40x or 100x), a PH slider, which is adapted to the lens being used, a centring telescope and two green filters.

To use this, you need to replace the standard condenser of the microscope with the PH condenser. One of the objectives in the nosepiece is also replaced with the PH objective and this is positioned in the beam path.

With the surface marked "TOP" facing up, the PH slider is pushed upwards into the insertion point on the PH condenser until it clicks into the first position. At this first position, the phase ring of the PH slider is in the beam path. If the aperture setting on the PH condenser is set to "PH", then the phase-contrast application can begin. In order to return to the bright field application, you must push the PH slider further to the second click position. At this point there is no PH ring as in position 1; the beam can pass without being affected by the PH slider.

The PH objective has a PH ring in its lens system, just like the PH slider. Due to their size on one hand and their positioning on the other, these two rings must be aligned to one another in the beam path. The position of the ring in the objective cannot be altered, that of the ring in the slider however can be. Although it has been pre-centred, it may still be necessary that after a certain period of use it will need to be re-centred using the three Allen bolts on the side of the slider and the centring telescope. *For further information on adjusting the PH rings, please see page 31.*

Depending on the preferences of the user, using a green filter can produce a more effective and pleasant image. To achieve this, the green filter must be screwed onto the underside of the PH condenser..

## 2. Comprehensive phase contrast unit

This consists of a PH universal rotary condenser, four PH objectives (10x, 20x, 40x and 100x), a centring telescope, two centring turnscrews and a green filter. To use this, you need to replace the standard condenser of the microscope with the PH universal rotary condenser. The required objectives are also screwed into the nosepiece and one of these is positioned in the beam path. The two centring turnscrews can be fitted to the relevant points on the sides of the condenser using the screw connection on their spring retainer.

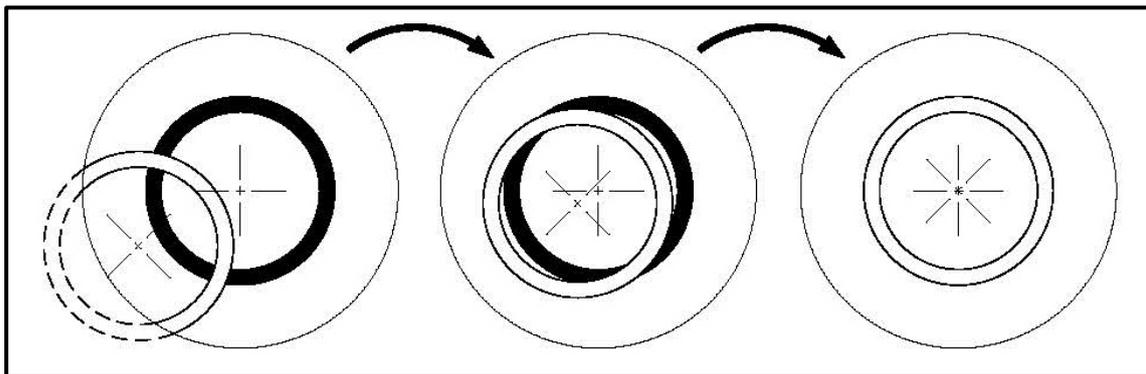
The condenser has a hub with six positioning options. Four of these are fitted with a phase ring, which matches only one specific objective magnification. When doing this you must note the marking on the rotary knob at the relevant position. The other two positions are intended for bright field applications.

A PH objective has a PH ring in its lens system, just like the individual positions of the PH universal rotary condenser. Due to their size on one hand and their positioning on the other, the two related rings must be aligned to one another in the beam path. The position of the ring in the objectives cannot be altered, that of the rings in the condenser disc however can be.

The adjustment procedure is as follows.

- a. First adjust the microscope using bright field mode.
- b. Move the hub to the required PH position (e.g. "10x").
- c. Open the aperture diaphragm on the condenser to its maximum (slider to the left).
- d. Bring the relevant PH objective (e.g. 10x) into the beam path.
- e. Place the centring telescope onto one of the two tube connectors, in place of a standard eyepiece.
- f. Undo the fixing screw of the centring telescope and pull out (move) the front part of the telescope, so that you can focus both phase rings in the field of view. You can also use the focus wheel of the condenser holder when doing this. Then retighten the screws.

In the field of view you will now see the image of a white (condenser) and a black (objective) ring. The black one is central and the white one possible is pushed to one side (*see left illustration*).



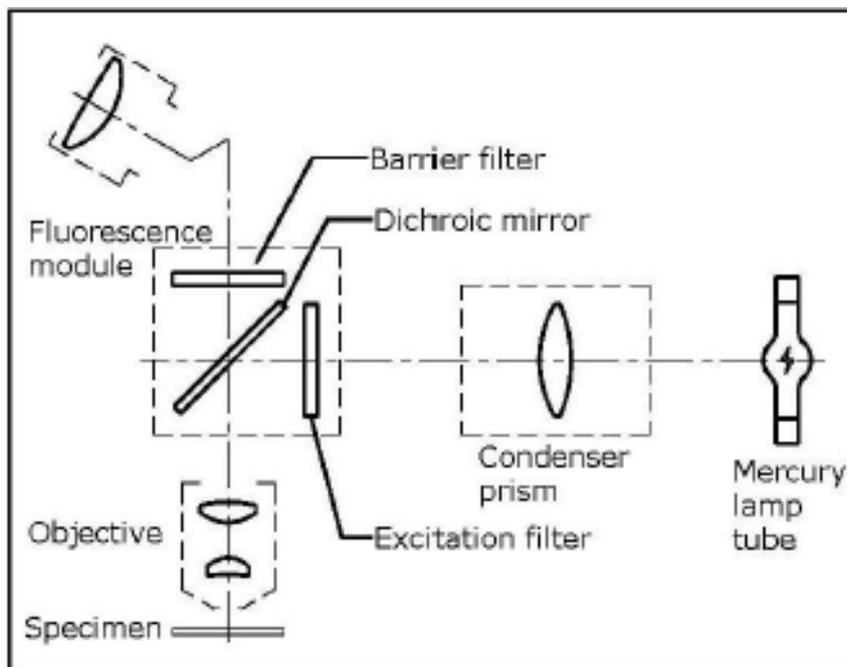
- g. Now press the turn screws fitted on the side of the condenser towards the centre until they grip the screws. Then by turning the screws and at the same time watching the rings through the centring telescope, move the white ring to the centre (*see central illustration*).
- h. As soon as both the rings overlap each other (*see right illustration*) the adjustment is successfully completed and can also be carried out for the pairs of rings of the other magnifications.
- i. After the adjustment, the centring telescope must be replaced by the standard eyepiece, so that you are able to observe the object on the angle table in phase contrast mode..

Depending on the preferences of the user, using a green filter can produce a more effective and pleasant image. To achieve this, the green filter can simply be placed in the ring holder of the field lens.

## Fluorescence reflected light unit

There are samples, which can be excited by light beams and thereby show emissions, which have different wave lengths than the previous excitation beams. The wave length of the emission is always bigger than the wave length of the excitation (Stokes shift). This process is called fluorescence and can serve as the base of a microscopic contrasting method. For the most common way to realise this, an upright light microscope is extended by a fluorescence reflected light unit.

### Principle



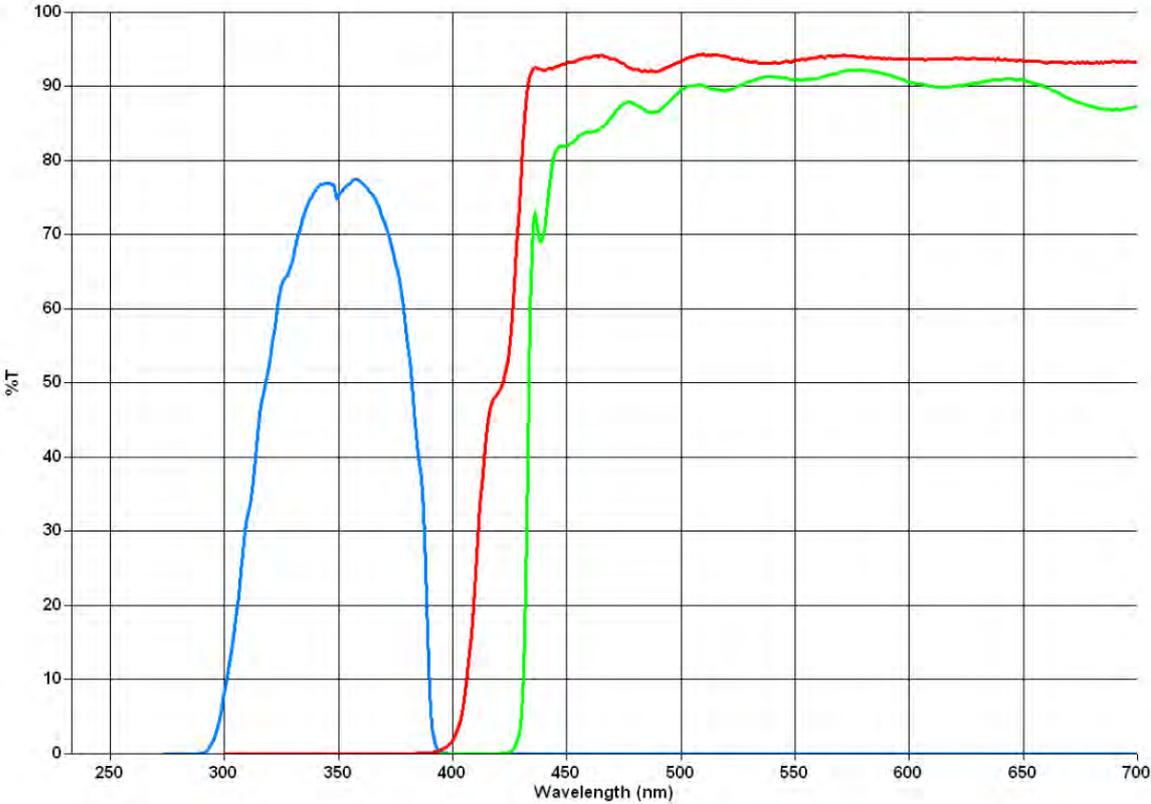
Depending on the sample there is an excitation light needed, that is contained in the spectrum of the light source (HBO or LED). The excitation filter is only permeable for the according wave length. After that the excitation light hits a dichroic mirror, which reflects it towards the objective and the sample. After the sample absorbed the excitation light, the emission of the fluorescent light occurs (with a bigger wave length than the excitation light). The part of the fluorescent light, which is beamed into the objective, can pass the dichroic mirror. The dichroic mirror additionally prevents the remaining part of the excitation light from advancing towards the eyepieces. The barrier filter finally eliminates all wave ranges out of the beam path not belonging to the observed fluorescence. Thus the resulting image is just developed by the fluorescent light emitted from the sample.

Overview of the wavelengths for excitation and emission per excitation filter

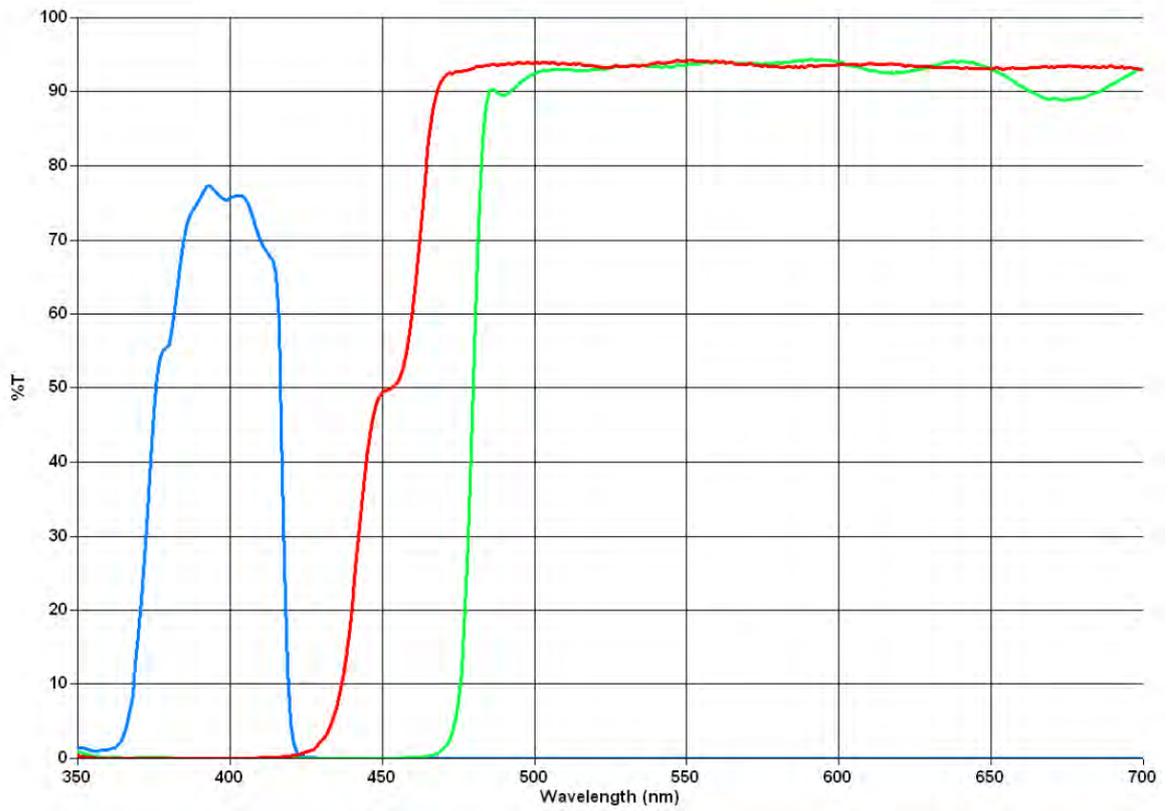
UV	Wavelength range for excitation:	330-380nm
	Wavelength range for emission:	435nm
V	Wavelength range for excitation:	380-420nm
	Wavelength range for emission:	460nm
B	Wavelength range for excitation:	420-490nm
	Wavelength range for emission:	520nm
G	Wavelength range for excitation:	500-550nm
	Wavelength range for emission:	590nm

Blue line: Wavelength excitation  
 Green line: wavelength emission

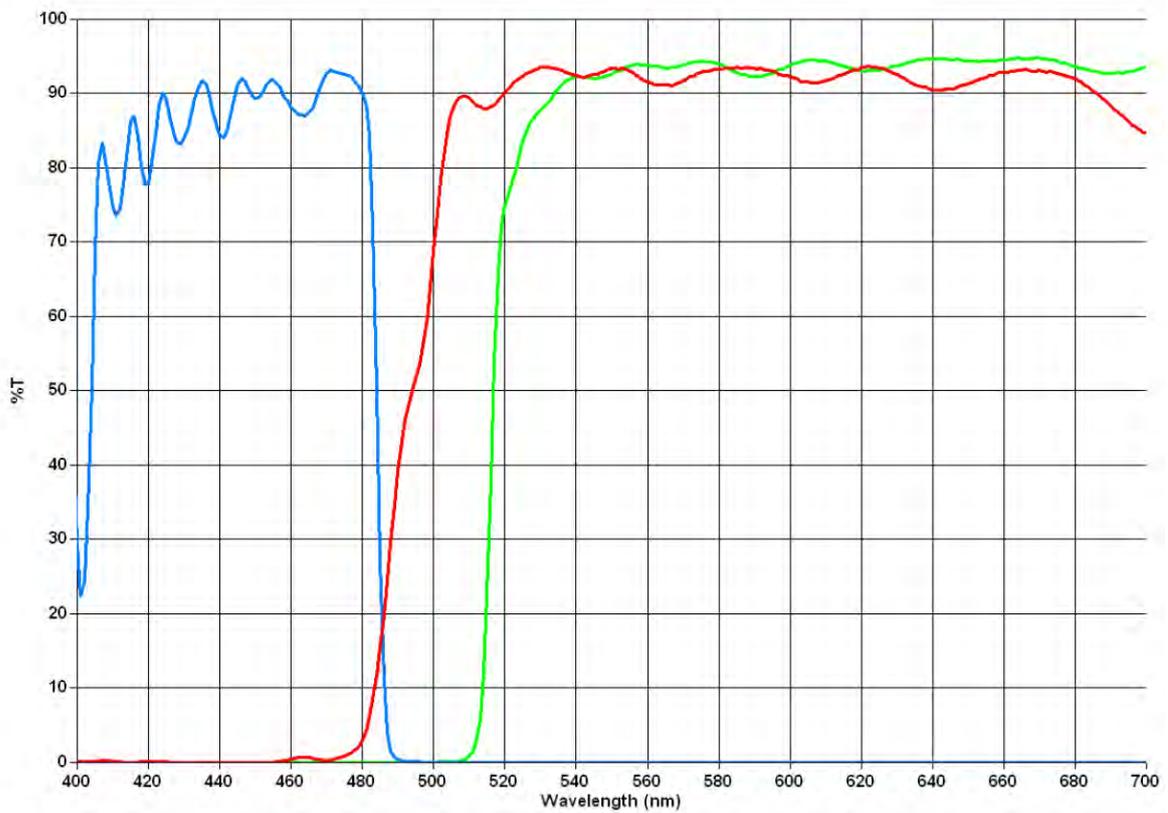
U:



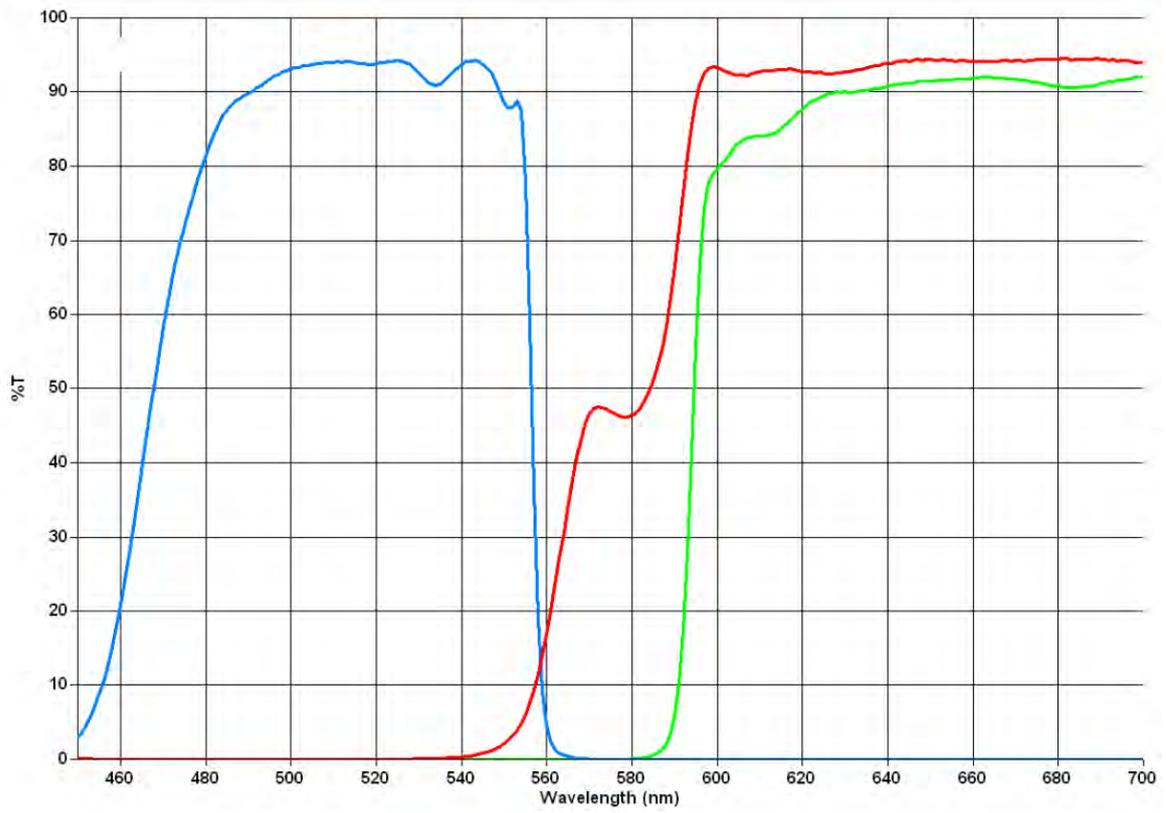
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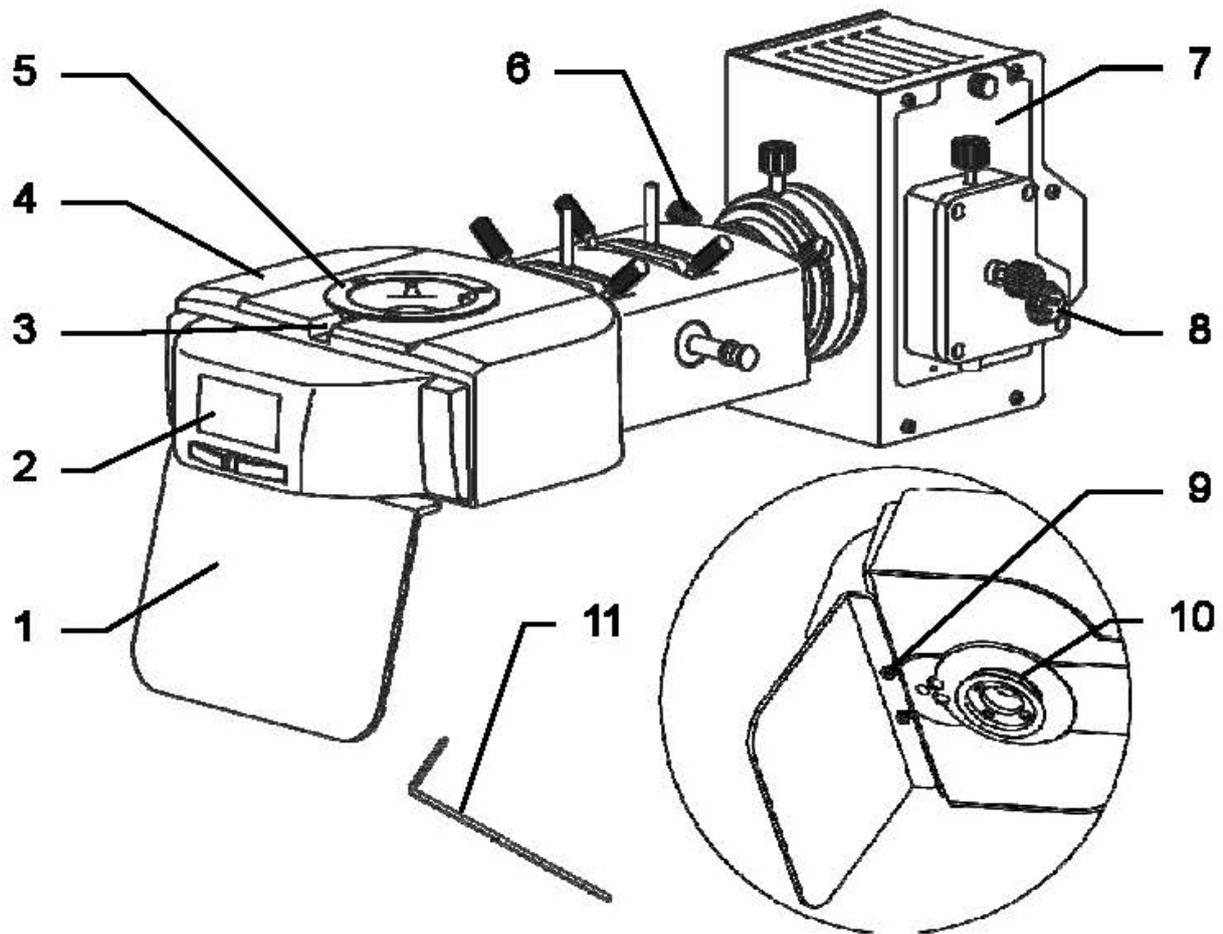
B:



G:



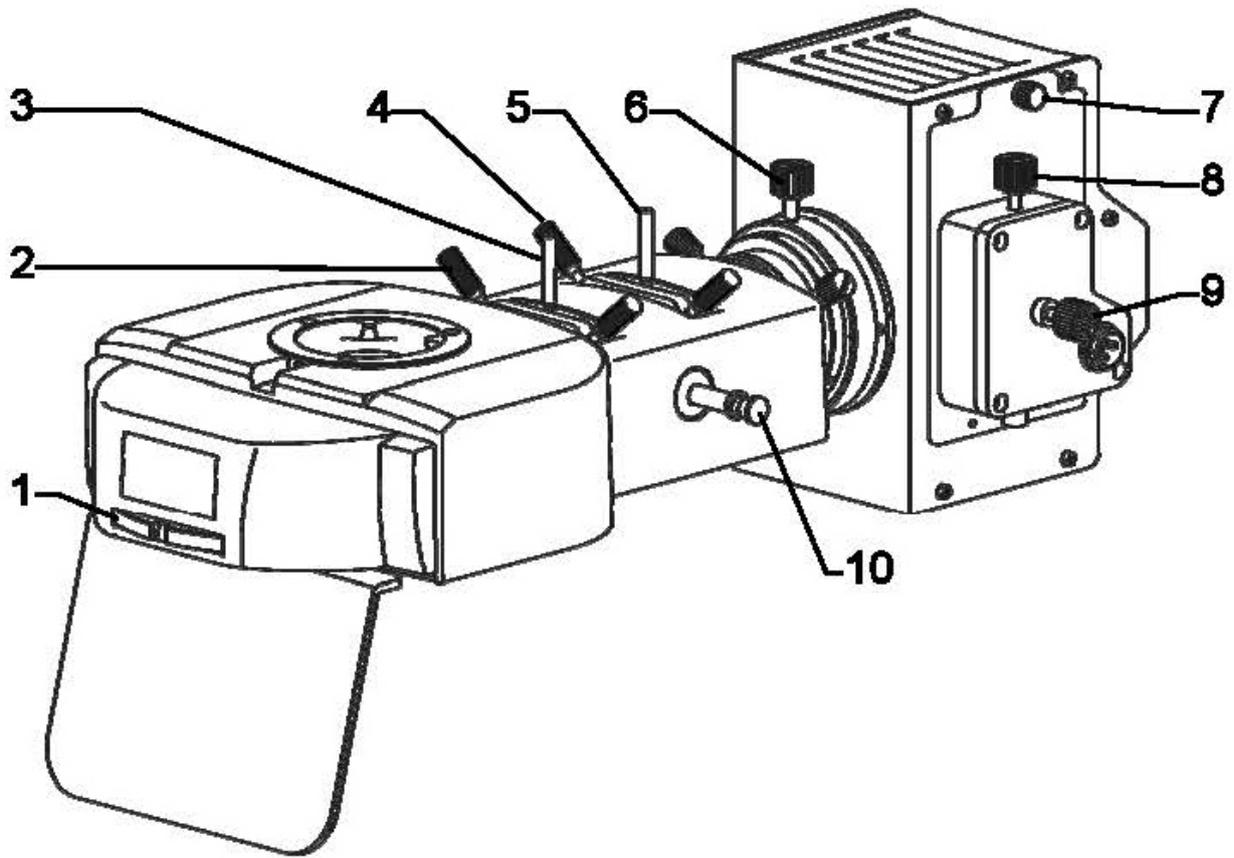
Nomenclature (components)



- 1 Protective plate
- 2 Cover for FL module
- 3 Fixing Allen screw for microscope head
- 4 Main body
- 5 Connection point for microscope head
- 6 Fixing screw for lamp housing

- 7 HBO/LED lamp housing
- 8 Power connection
- 9 Screw for attaching the protective plate
- 10 Connection point for microscope housing
- 11 Allen wrench

Nomenclature (control elements)



- 1 Control wheel for FL module
- 2 Centring device for field diaphragm
- 3 Control lever for field diaphragm
- 4 Centring device for aperture diaphragm
- 5 Control lever for aperture diaphragm

- 6 Condenser control
- 7 Screw for cover of lamp housing
- 8 Centring screw for lamp (vertical)
- 9 Centring screw for lamp (horizontal)
- 10 Control lever for illumination

Nomenclature (power supply unit for HBO lamp)



Basic data

Four different fluorescence incident light units are optionally available for the OBN-13 series microscopes, which have the following specifications.

Article number	Illumination	Excitation filter	Centering objective	Input voltage	Power supply unit
OBB-A1155	100W HBO	UV / V / B / G	Yes	100-240V	
OBB-A1153	100W HBO	B / G	Yes	100-240V	
OBB-A1156	5W LED	B / G	Yes	100-240V	
OBB-A1654	5W LED	UV / V / B / G	Yes	100-240V	

## Assembly

The following steps must be carried out in order to correctly assemble the fluorescence incident light unit or mount it on the microscope housing.

1. If the microscope is already set up without the FL unit, the microscope head must first be removed.
2. Turn the main part of the FL unit to the side and screw the protective plate to the appropriate position on the underside.
3. Attach the main part of the FL unit to the designated connection point on the microscope housing and secure it with the fixing screw.
4. Bring the lamp housing and the main part together via the connection points and fasten with both fixing screws.
5. Attach the microscope head to the main part of the FL unit and secure it with the fixing Allen screw.
6. Install the connecting cable between the lamp housing and the power supply unit.
7. Establish the power connection using the mains cable.

## Operation

Before the reflected light unit is put into operation for special fluorescence applications, it is advantageous to set up the microscope in bright field mode. This includes sample placement, setting the interpupillary distance, pre-focusing, diopter compensation, etc. You can then proceed to use the fluorescence reflected light unit.

1. When using a HBO lamp at first there must be ensured, that the control lever for the illumination is slid-in.
2. Establish the power supply. When using a HBO lamp, check the setting of the input voltage by using the appropriate slide on the rear of the power supply unit (100V/240V).
3. Press the main switch. When using a HBO lamp, you have to press the ignition after that in order to illuminate the lamp. It lasts about 15 minutes until the lamp has gained a maximum and stable illuminating power.
4. After placing the sample you can bring the needed objective into the beam path.
5. Choose the right position of the control wheel for the FL module.
6. When using a HBO lamp, now the control lever for the illumination can be pulled out.
7. Start the observation.

## Control elements for illumination

The following control elements for the illumination play a role within the fluorescence microscopy:

Field diaphragm, aperture diaphragm, condenser:  
Optimisation of the contrast and the light field.

Control lever for illumination:

When located at the medium position there is a filter, which softens the lighting, so that samples, which are not stable enough for the full illuminating power, can be observed as well.



### **Important warnings regarding the use of an HBO lamp**

- During operation the lamp is showing a strong heat development. It should be avoided to come into contact with the lamp housing while and after some time of running the reflected light unit.
- The lamp must not in any circumstances be switched off during the pre-heating. It could cause a significant reduction of the lamps life time.
- Equally the lamp must not be switched on directly after a switch-off process.
- When pausing the observation you should always slide in the control lever for the illumination in order to interrupt the light beam. The light spectrum of the HBO lamp often can be harmful for microbes.
- Never look inside the eyepieces when the beam path is opened (by the control lever for illumination) and there is set an empty position of the FL module at the same time. There is the risk of blinding.
- A HBO lamp has a certain service life. The closer it is brought to its limit, the greater the risk of the lamp exploding and releasing toxic mercury vapor. This must be prevented by all means.

The following instruments provide information on the need to replace lamps (applies to 100W HBO lamps):

- Ampere meter on the power supply unit  
As soon as 4.8 A is reached → Lamp replacement
- Life time display on the power supply unit  
As soon as 100 h are reached → Lamp replacement

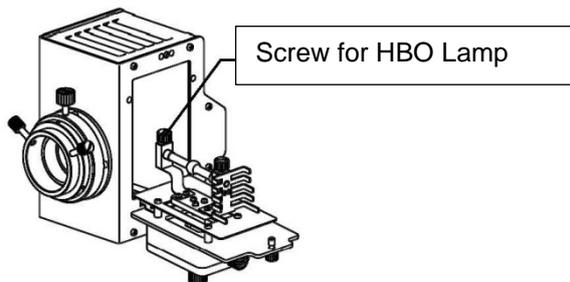
### Lamp centering (HBO)

As the operating time of the HBO lamp progresses, it is possible that its holder will become deformed due to the strong heat development and thus move from its center. As this means that the field of view is no longer evenly illuminated, this situation must be corrected as follows if it occurs.

1. Screw the centering objective into the turret instead of a standard objective.
2. Bring the centering lens into the beam path.
3. Set the FL module to position G (this setting produces a relatively subdued light, which is pleasant for the eyes).
4. When looking through the eyepieces, a crosshair and the off-centered light spot of the lamp (also cross-shaped) appear.
5. Now use the two centering screws on the lamp housing to move the light spot into the center of the crosshairs (caution: heat build-up on the lamp housing).

### Lamp replacement (HBO)

1. Disconnect the FL incident light unit from the power supply.
2. Check whether the lamp housing has cooled down.
3. Loosen the screw for the lamp housing cover (only if the housing is cool).
4. Carefully fold out the lamp holder.
5. Loosen the two fixing screws for the HBO lamp.
6. Replace the old lamp with a new one.
7. Tighten the two fixing screws again.
8. Close cover and secure with screw.



The new installed spare lamp may under no circumstances be touched with naked hands. Impurities will benefit the risk of explosion during operation.

If there should be nevertheless impurities, the lamp has to be cleaned. We recommend for this purpose to use a lint-free cloth soaked with an ether alcohol mixture (Proportion: 70/30).

## 12 Troubleshooting

Problem	Possible causes
Lamp does not burn	Mains plug not plugged in correctly
	No power available at the socket
	Lamp defective
	Fuse defective
Lamp burns out immediately	The prescribed lamp or fuse is not used
Field of vision is dark	Aperture diaphragm and/or field diaphragm are not open wide enough
	The beam path selector slider is set to "Camera"
	The condenser is not centered correctly
Brightness cannot be adjusted	The brightness control is set incorrectly
	The condenser was not centered correctly
	The condenser is lowered too far
Field of vision is dark or not correct illuminated	The lens was not swiveled in correctly
	The beam path selector slide is in an intermediate position
	The object turret is not mounted correctly
	The condenser is not fitted correctly
	A lens is used that does not match the illumination range of the condenser
	The condenser was not centered correctly
	The luminous field diaphragm is closed too far
	The lamp is not mounted correctly
The field of vision of one eye does not match that of the other eye	The interpupillary distance is not set correctly
	The diopter setting was not made correctly
	Different eyepieces are used on the right and left
	The eyes are not used to microscopy

<b>Problem</b>	<b>Possible causes</b>
Blurred details Bad picture Poor contrast Vignetted field of view	Aperture diaphragm is not open wide enough
	Condenser is lowered too far
	The objective does not belong to this microscope
	The front lens of the lens is dirty
	An immersion lens is used without immersion oil
	The immersion oil contains air bubbles
	The condenser is not centered
	The recommended immersion oil is not used
Dirt or dust in the field of vision	Dirt / dust on the lens
	Dirt / dust on the front lens of the condenser
	Dirt / dust on the eyepieces
One side of the image is blurred	Dirt / dust on the front lens of the Condensers
	Dirt / dust on the object
	The table was not assembled correctly
	The lens is not correctly swiveled into the beam path
The picture flickers	The nosepiece is not mounted correctly
	The object rests with the top side facing down.
	The nosepiece is not correct mounted
The coarse drive is difficult to turn	The lens is not mounted correctly swiveled into the beam path
	The condenser was not installed correctly centered
	The rotary resistor brake is closed Tightened
The table moves down by itself The fine adjustment drive adjusts itself	The cross table is operated by a Solid body blocked.
	The rotational resistance brake is not tightened enough
Touching the table blurs the image	The table was not assembled correctly

## 13 Service

If, despite studying these operating instructions, you still have questions about commissioning or operation, or if, contrary to expectations, a problem should occur, please contact your specialist dealer. The device may only be opened by trained service technicians authorized by KERN.

## 14 Power supply

### 14.1 Mains connection



The microscope may only be connected to the mains if the information on the microscope ( sticker ) and the local mains voltage are identical.



**Important:**

- Check the mains cable for damage before commissioning
- Ensure that the power supply unit does not come into contact with liquids
- The mains plug must be accessible at all times.

## 15 Maintenance, servicing and disposal



Disconnect the appliance from the power supply before carrying out maintenance, cleaning or repair work.

### 15.1 Maintenance and cleaning

The appliance must always be kept clean and regularly freed from dust.

Before wiping the appliance when it gets wet, make sure that the power is switched off.

Glass components should preferably be wiped lightly with a lint-free cloth if they become dirty.

To wipe oil stains or fingerprints from lens surfaces, the lint-free cloth is moistened with a mixture of ether and alcohol (70/30 ratio) and then cleaned

Ether and alcohol must always be handled with care as they are highly flammable substances. It is therefore essential to keep them away from naked flames and electrical appliances that are switched on and off and only use them in well-ventilated rooms.

However, organic solutions of this type should not be used to clean other components of the appliance. This could cause changes to the paintwork. It is sufficient to use a neutral cleaning agent for this purpose.

Other cleaning agents for the optical components include:

- Special cleaner for optical lenses
- Special optical cleaning cloths
- Bellows
- Brush

If handled correctly and checked regularly, the microscope will function smoothly for many years.

Should a repair nevertheless be necessary, please contact your KERN dealer or our Technical Service.

## 15.2 Waste disposal



Old appliances and accessories must not be disposed of with household waste.

The operator must dispose of the packaging and the device at the place of use in accordance with the applicable national or regional legislation. The device consists of various components and materials, such as

- Electronic components (printed circuit boards, electrical cables)
- Plastic (housing)
- Metal

Improper disposal of the appliance can have harmful effects on people and the environment.

Proper and environmentally friendly disposal can prevent harmful effects and recover raw materials.

## 16 Further information

The illustrations may differ slightly from the product.

The descriptions and illustrations in these operating instructions are subject to change without notice. Further developments to the device may result in such changes.



All language versions include a non-binding translation. The original German document is binding.