



KERN Transmitted light laboratory microscope Instructions

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KERN Transmitted light laboratory microscope



Before use

General notes

You must open the packaging carefully, to make sure that none of the accessories in the packaging fall on the floor and get broken. In general, microscopes should always be handled carefully because they are sensitive precision instruments. When using or transporting the microscope it is particularly important to avoid abrupt movements, as this may damage the optical components. You should also avoid getting dirt or finger prints on the lens surface, because in most cases this will reduce image clarity. To maintain the performance of the microscope, it must never be disassembled. So components such as lenses and other optical elements should be left as they were before use. Also the electrical parts on the rear and base of the device must not be tampered with, as in this area there is an additional risk of triggering an electric shock.

Notes on the electrical system

Before connecting to a mains power supply, you must make sure that you are using the correct input voltage. The information to select the correct mains cable is located on the device, on the rear of the product directly above the connection socket. You must comply with this information. If you do not comply with these specifications, then fires or other damage to the device could occur. The main switch must also be switched off before the mains cable is connected. In this way you will avoid triggering an electric shock. If you are using an extension cable, then the mains cable you use must be earthed. If the original fuse should blow, it must only be replaced by an appropriate fuse. Suitable replacement fuses are included with the delivery.

When carrying out any procedures whereby you come into contact with the electrical system of the device, such as, for example, changing the bulb or fuse, only carry out these procedures when the power is disconnected.

The rechargeable batteries must be replaced by qualified electricians only.

Storage

You should ensure that the device is not exposed to direct sunlight, temperatures which are too high or too low, vibrations, dust or a high level of humidity. The ideal temperature range is between 0 and 40°C and a relative humidity of 85% should not be exceeded. The device should always be located on a rigid, smooth, horizontal

surface. When the microscope is not being used, you should cover it with the enclosed dust protective cover. When doing this, the power supply is stopped by switching off at the main switch and unplugging the mains cable. If the eyepieces are being stored separately, the protective caps must be fitted to the tube connectors. In most cases, if dust and dirt gets inside the optical unit of a microscope this can cause irreversible errors or damage. The best way to store accessories which consist of optical elements, such as, for example, eyepieces and objectives, is in a dry box with desiccant.

Maintenance and cleaning

In any event, the device must be kept clean and dusted regularly. If any moisture should occur, before you wipe down the device you must ensure that the mains power is switched off. When glass components become dirty, the best way to clean them is to wipe them gently with a lint-free cloth. To wipe oil stains or finger prints off the lens surface, moisten the lint free cloth with a mixture of ether and alcohol (70 / 30 ratio) and use this to clean the lens. You must be careful when handling ether and alcohol, as these are highly flammable substances. You must therefore keep it away from naked flames and electrical devices which can be switched on and off, and only use it in well-ventilated rooms. However organic solutions of this type should not be used to clean other components of the device. This could lead to damage to the paint finish. To do this, it is sufficient to use a neutral cleaning product.

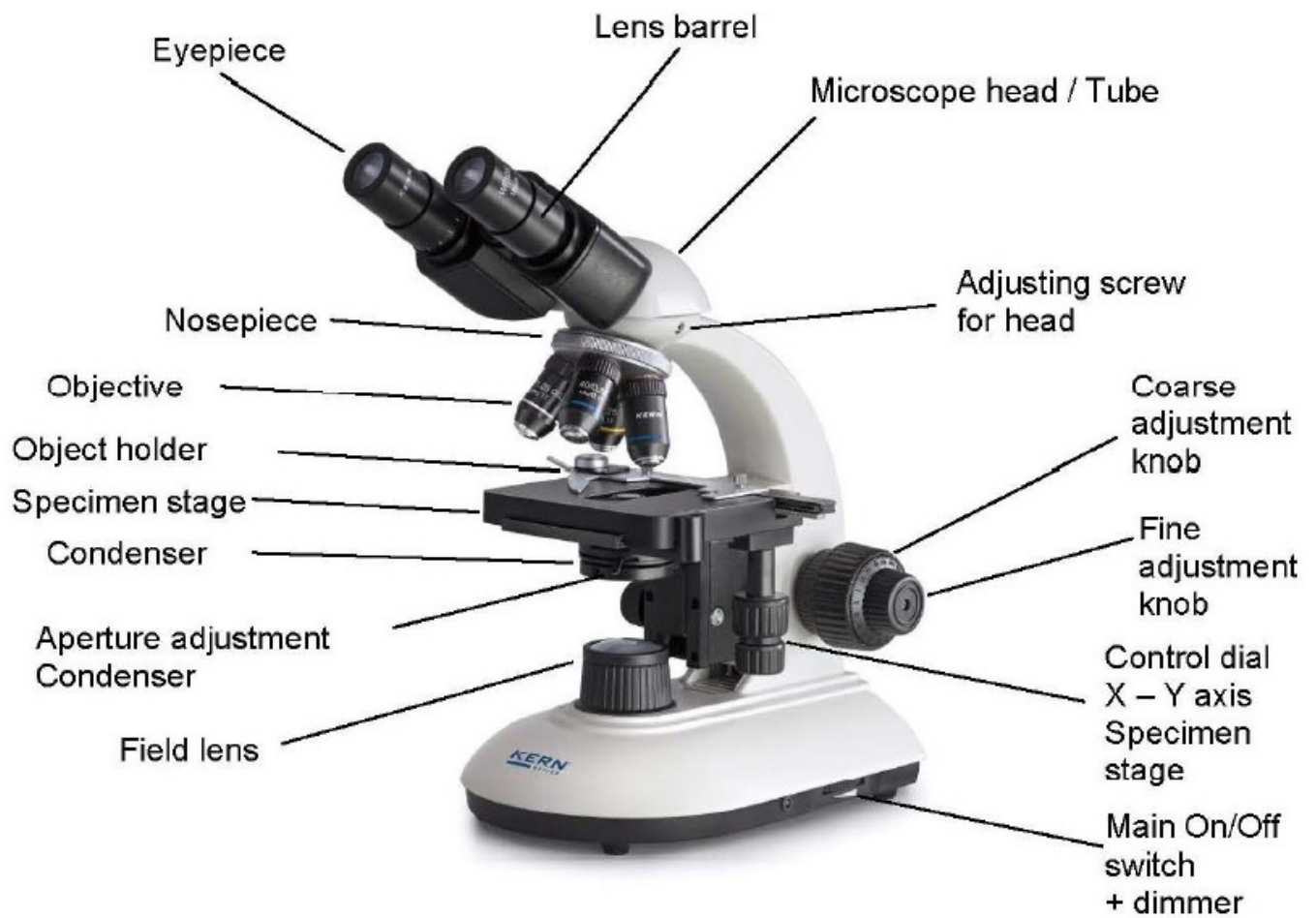
You could also use the following cleaning products to clean the optical components:

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

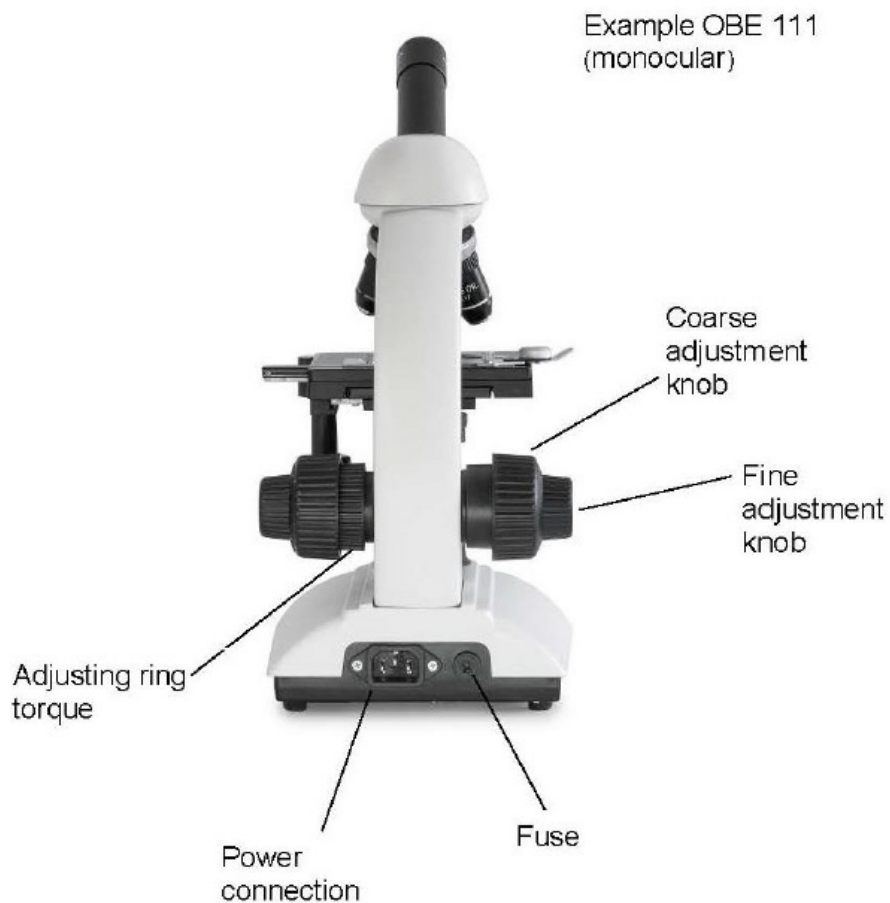
When handled correctly and checked regularly, the microscope should give many years of efficient service.

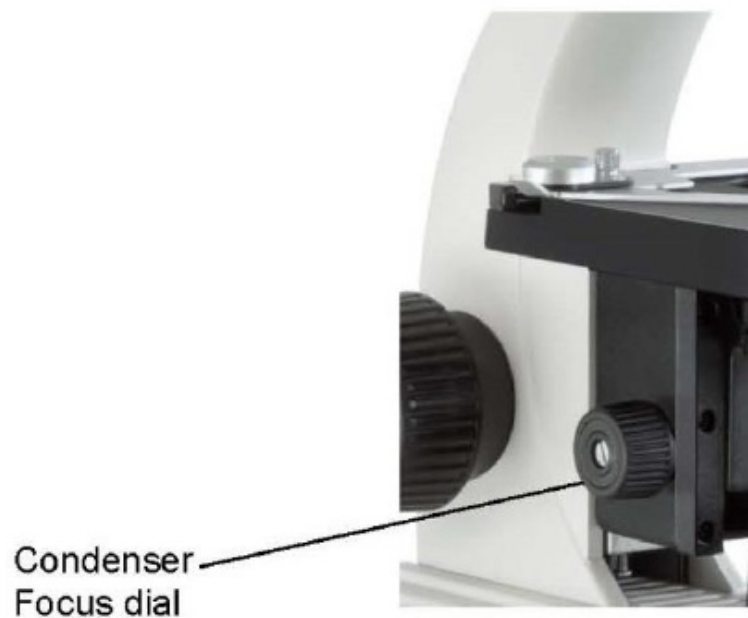
Should repairs still be necessary, please contact your KERN dealer or our Technical Department.

Nomenclature



Rear view





Technical data / Features

Model	Standard configuration				
	Optical system	Tube	Eye pieces	Objectives	Illumination
KERN					
OBE 101	Finite	Monocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x	3W LED (Transmitted)
OBE 102	Finite	Binocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x	3W LED (Transmitted)
OBE 103	Finite	Binocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x	3W LED (Transmitted) (Accu)

OBE 104	Finite	Trinocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x	3W LED (Transmitted)
OBE 107	Finite	Monocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/20x/40x	3W LED (Transmitted)
OBE 108	Finite	Binocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/20x/40x	3W LED (Transmitted)
OBE 109	Finite	Binocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/20x/40x	3W LED (Transmitted) (Accu)
OBE 110	Finite	Trinocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/20x/40x	3W LED (Transmitted)
OBE 111	Finite	Monocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x/100x	3W LED (Transmitted)
OBE 112	Finite	Binocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x/100x	3W LED (Transmitted)
OBE 113	Finite	Binocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x/100x	3W LED (Transmitted) (Accu)
OBE 114	Finite	Trinocular	WF 10x / Ø 18 mm	Achromatic 4x/10x/40x/100x	3W LED (Transmitted)

Product dimensions: 320x180x365 mm
 Packaging dimensions: 425x340x245 mm
 Net weight: 5 kg
 Gross weight: 6 kg
 Input voltage: AC 100-240V, 50-60Hz
 Output voltage: DC 1,2-6V

Fuse:

2A 5x20mm

Assembly

Microscope head

Inside the packaging the microscope head is already mounted but inclined towards the rear. In order to turn it to the front you must loosen the fixing screw on the tube connection point and after the turning fix it again with the screw. In case of removing the head completely from the housing, you should always make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.

Objectives

All four objectives are already mounted to the nosepiece. After removing the protective foil they are ready for use. They are ranged in such a way that if you turn the nosepiece clockwise, the objective with the next higher magnification appears. When the objectives need to be dismantled, you should always 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.

Eyepieces

You must always use eyepieces with the same magnification for both eyes. These are already placed onto the tube connectors and each is fixed with a small silver screw under the eyepiece on the tube connectors, so that they are turnable but you cannot pull them out of the tube. When changing the eyepieces, you must loosen these screws and once the new eyepiece is fitted, then they must be re-tightened. You should always make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.

Condenser

The condenser is firmly fixed onto a holding ring (condenser holder) underneath the microscope stage. The lever for the aperture diaphragm is directed towards the front. There is the ability to adjust the height of the condenser, but not to centre it. We recommend that you use the course adjustment knob to bring the specimen stage to its uppermost position when you need to remove the condenser. Then use the focus dial of the condenser to move the condenser holder to a low position. In this way the condenser can be taken off after loosening the three screws on the holding ring. **If the microscope has no focus dial for the condenser, the height adjustment is done by turning the condenser on its vertical axis.**

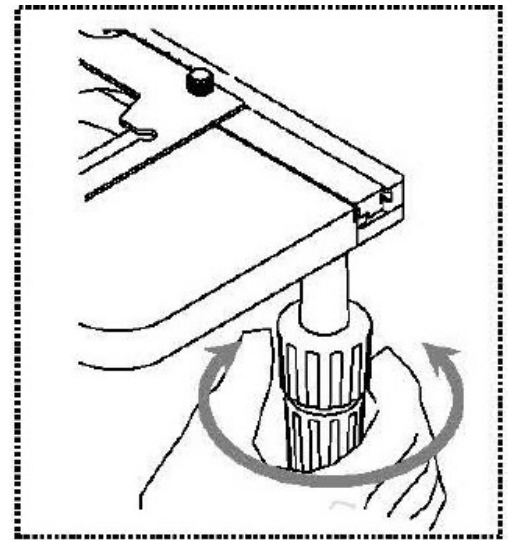
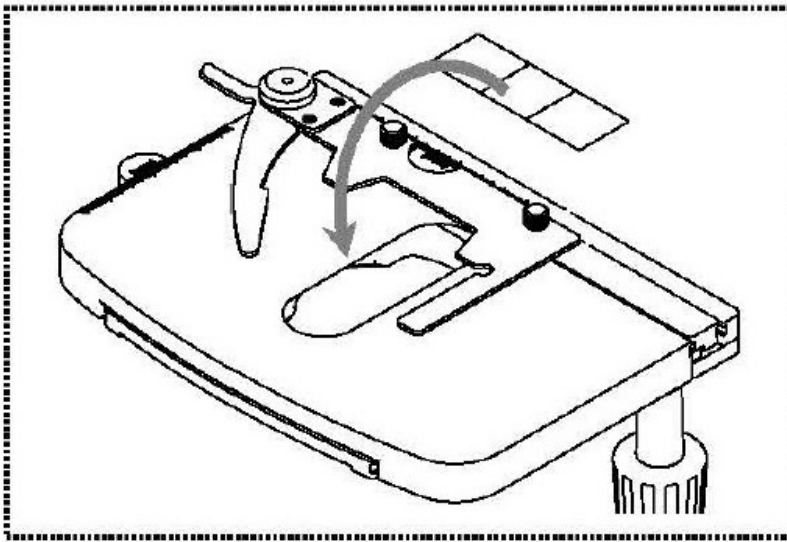
You should avoid touching the optical lenses with bare fingers.

Operation

Getting started

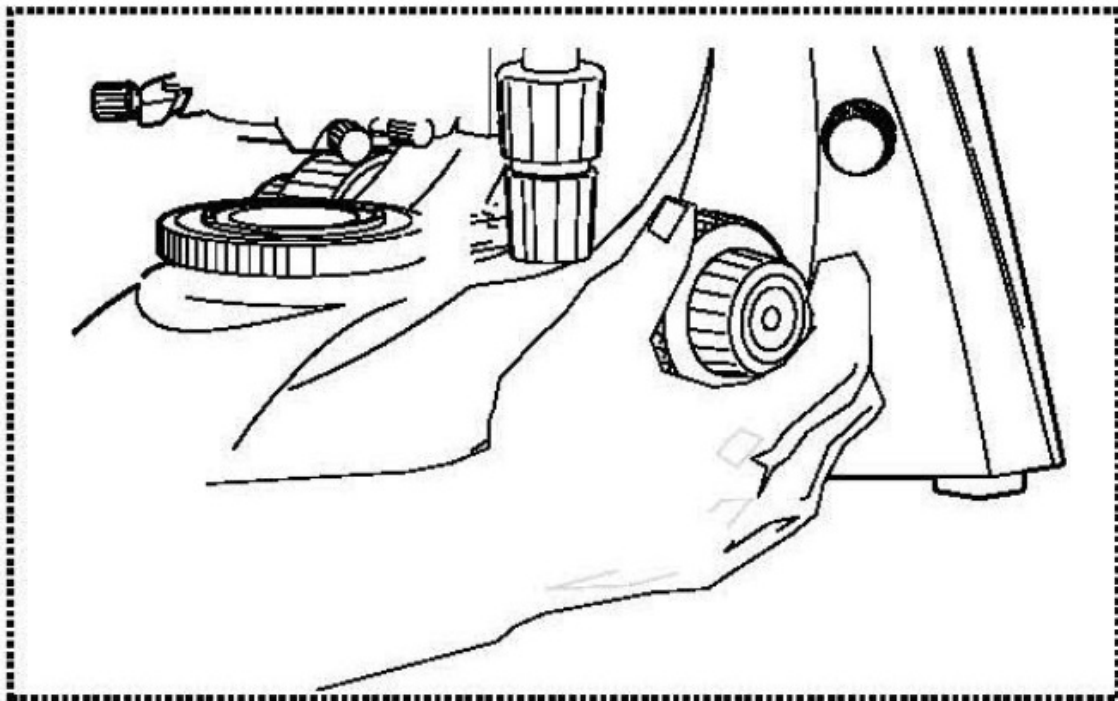
The very first step is to establish a power connection using the mains plug. After switching on the lighting you should first adjust the **dimmer** to a **low level**, so that when you look through the eyepiece for the first time, your eyes are not immediately subject to a high level of light.

The next step is to place an object holder with the sample on the angle table. To do this, the cover glass must be facing upwards. You can fix the object holder to the table using the slide holder (see illustration on the left). To move the sample into the beam path, you must use the adjustment wheels on the right of the angle table (see illustration on the right). You can position only one object holder.



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 recognizable (no matter how sharp), then you should only adjust the focus using the fine adjustment knob.

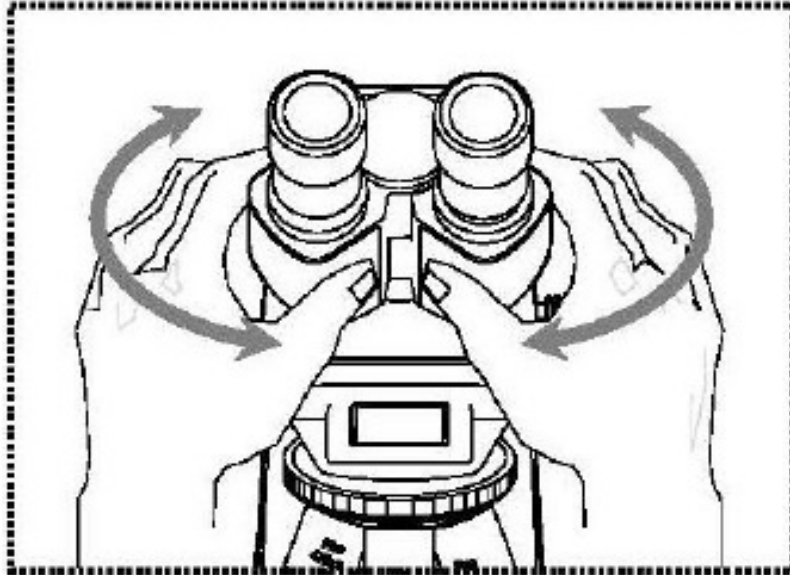
Adjusting the torque of the coarse and fine adjustment knob

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 focusing 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.

Adjusting the interpupillary distance (For binocular and trinocular devices)

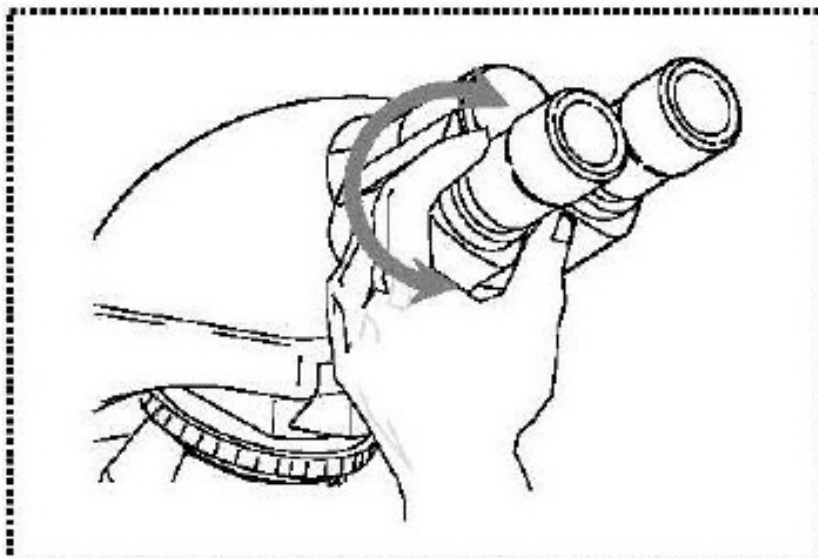
With binocular viewing, the interpupillary distance must be adjusted accurately for each user, in order to achieve a clear image of the object. While you are looking through the eyepieces, use your hands to hold the righthand and left-hand tube housing firmly. By pulling them apart or pushing them together,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



Dioptre adjustment (For binocular and trinocular devices)

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 the left tube connector (dioptre adjustment ring) to compensate for this as follows.

1. Look through the right eyepiece with the right eye and bring the object into focus by using the coarse and fine adjustment knob.
2. Then look through the left eyepiece with the left eye and use the 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.



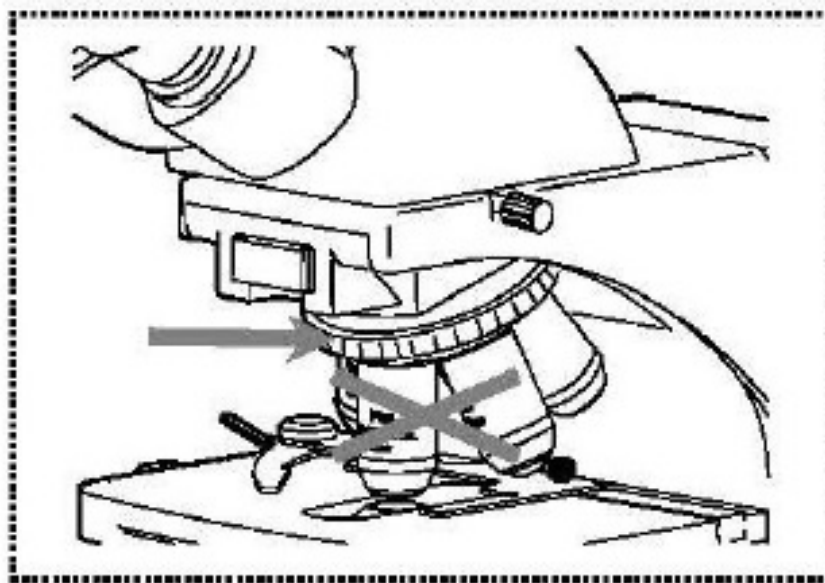
Adjusting the magnification

After prefocusing 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 focused 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.

Adjusting the 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.

The necessary control elements for this are the height-adjustable condenser with aperture diaphragm.

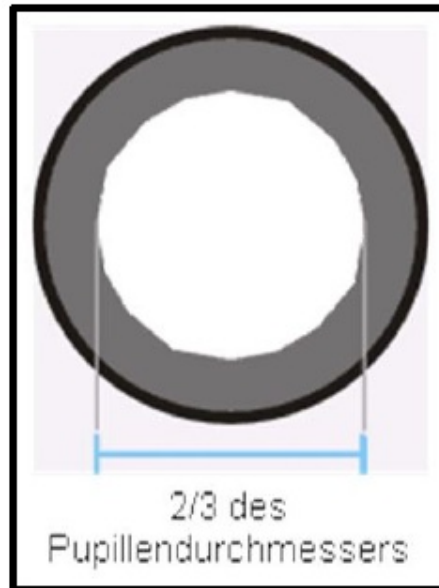
When adjusting the lighting for the first time, you must first select the lowest possible objective magnification, so that you can carry out the following steps.

1. Adjust the height of the condenser by turning the condenser focus dial to get a good contrast of the microscopic image. Normally therefore you have to bring the condenser to just below the maximum height.
2. Use the aperture diaphragm of the condenser to find the very best compromise between contrast and resolution for the microscopic image. For the objective with the lowest magnification the lever of the aperture diaphragm should be placed almost completely on the right-side limit, so that the opening of the diaphragm is very small. The higher the magnification of an objective, the larger the opening should be selected by pushing

the lever towards the left-side limit.

The view in the tube without the eyepiece should look something like the illustration on the right.

The diameter of the aperture diaphragm which is then visible should make up approximately 2/3 of the pupil diameter. If the eyepiece should be removed, for checking, then please make sure that no dirt or dust falls into the tube.



3. The brightness is always controlled by the bulb brightness (using the dimmer) and not by the aperture diaphragm.

Using rechargeable batteries

For OBE 103, OBE 109, OBE 113

There are three models of the series OBE-1, which enable a wireless usage. Therefore **three rechargeable batteries** are integrated in the power supply of these microscopes.

Specification of the batteries:

Battery type:	LR6 (AA)	
Capacity:	1300 mAh	
Nominal voltage:	1.2 V	
Charging time:		ca. 5 h
Operation time with ideal light intensity:		ca. 3 h
Total operation time:		ca. 8 h

The batteries are being charged as soon as the power connection is established using the mains plug. **The first charging time must be approx. 10 hours.** Please consider the above-mentioned data if there is the need of changing the batteries.

The rechargeable batteries must be replaced by qualified electricians only.

Using eye cups

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 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).



Eye cups



High Eye Point eyepiece
(identified by the glasses symbol)

Using oil immersion objectives

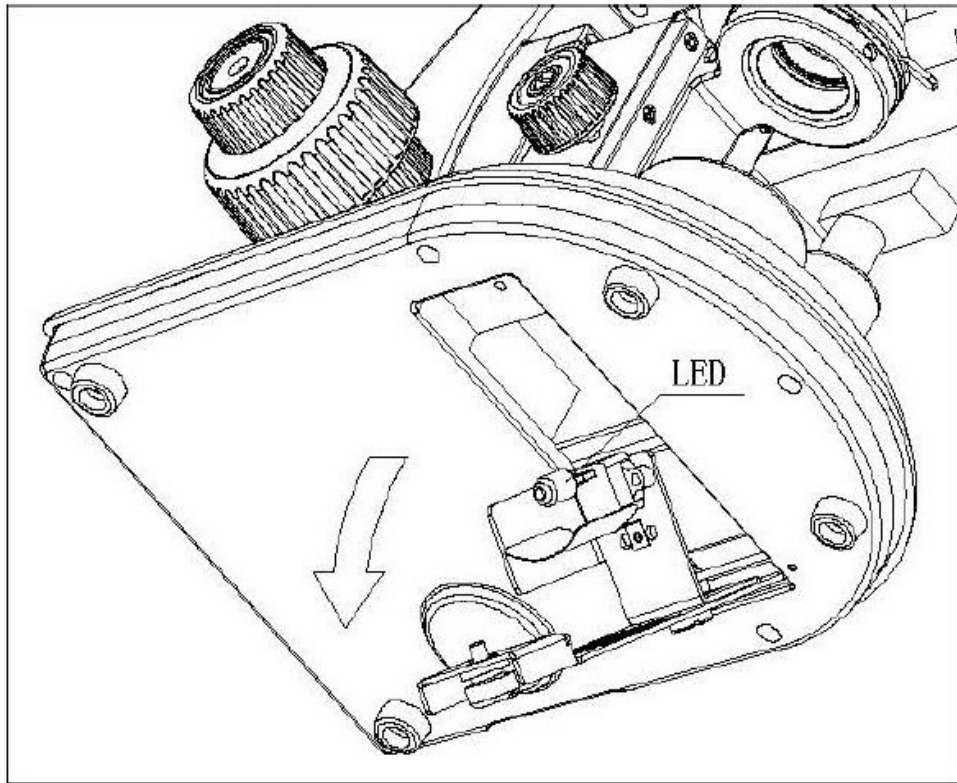
The 100x objectives of the OBE-1 series are objectives which can be used with oil immersion (they are always marked with the word "OIL"). Using these generates a particularly high resolution for microscopic images. To use oil immersion correctly, please follow these steps.

1. Put a drop of oil on the cover glass (with standard thickness of 0.17 mm) of the object slide.
2. Lower the specimen stage and position the 100x objective in the beam path.
3. Bring the specimen stage or object slide to the objective very slowly until there is slight contact.
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 also 1.4 Maintenance and cleaning.

Changing the bulb

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). The defective LED module can be removed by loosening the two screws fixing the module and unraveling the connection point of its cable. Now the new module has to be mounted in the same way as the original one. After the bulb holder has been replaced in the underside of the device and the screws replaced, the bulb replacement procedure is complete.



Changing the fuse

The fuse housing is on the rear of the microscope below the mains power supply socket. With the device switched off and unplugged, you can pull out the housing. When doing this, it is helpful to use a screwdriver or similar tool. The defective fuse can be removed from its housing and be replaced with a new one. After that, you just need to insert the fuse housing back into the insertion point below the mains power supply socket.

Using optional accessories

Polarisation unit

The polarisation unit consists of a polariser and an analyser. Both consist of a round glass plate with an external holder ring. To mount the analyser you have to remove the microscope head at first. Then the analyser has to be inserted into the round aperture of the beam path right above the nose piece. The polariser on the other hand is only placed on the field lens.

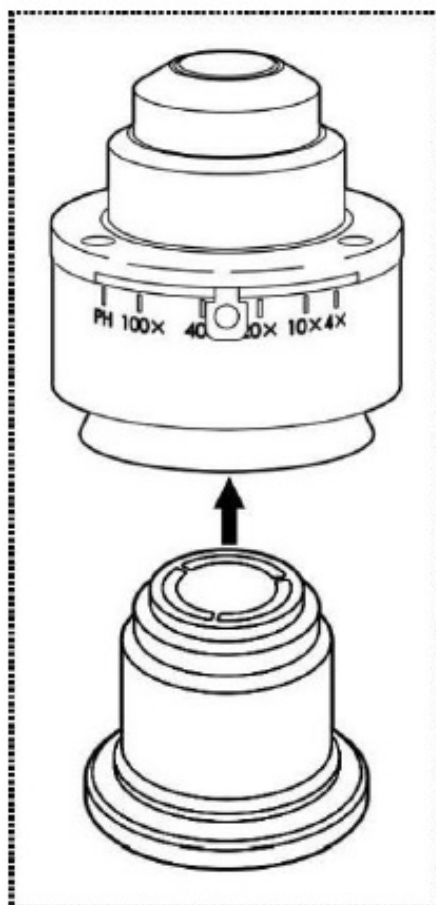
There are two points to take into account when subsequently using the polarisation unit:

- The aperture setting of the condenser must be at the maximum (lever completely on the left side).
- 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).

Dark field unit

There is the following way to carry out dark field applications.

1. A dark field attachment with an integrated black disk can be screwed into the standard condenser of the microscope from below (see right illustration). Please take note of the instruction delivered with the dark field attachment.



Camera connection OBE 104, OBE 110, OBE 114

Due to the trinocular tube, which is a standard fitting for the models OBE 110 and OBE 114, 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 0.5x magnification, see Chapter 3 Features). 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). The tube has a light distribution that guarantees the providing of light for the eyepieces and the camera connection at the same time. This means that it is 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.

Trouble shooting

Problem	Possible causes
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The bulb does not light	The mains plug is not correctly plugged in
	There is no power at the socket
	Defective bulb
	Defective fuse
The bulb blows immediately	The specified bulb or fuse has not been used
The field of view is dark	The aperture diaphragm and/or field diaphragm are not opened wide enough
	The selector switch for the beam path is set to “Camera”
	The condenser is not correctly centered
You cannot adjust the brightness	The brightness control has been set incorrectly
	The condenser has not been correctly centered
	The condenser is too low
	The objective is not positioned correctly on the beam path

The field of view is dark or is not correctly illuminated	The selector switch for the beam path is between two settings
	The nosepiece is not correctly fitted
	The condenser is not correctly fitted
	An objective is being used which doesn't match the lighting area of the condenser
	The condenser has not been correctly centered
	The field diaphragm is closed too tightly
The field of view of one eye does not match that of the other eye	The bulb is not correctly fitted
	The interpapillary distance is not correctly adjusted
	Dioptre setting has not been carried out correctly
	Different eyepieces are used for the righthand and left-hand side
	The eyes are not used to using a microscope

Problem	Possible causes
Blurred details Bad image Bad contrast Vignetted field of view	The aperture diaphragm is not opened wide enough
	The condenser is too low
	The objective does not belong to this microscope
	The front lens of the objective is dirty
	An immersion object has been used without immersion oil
	The immersion oil contains air bubbles
	The condenser is not correctly centred
	The recommended immersion oil has not been used
	Dirt / dust on the objective
	Dirt /dust on the front lens of the condenser
	Dirt / dust on the eyepieces

Dirt or dust in the field of view	Dirt / dust on the front lens of the condenser
	Dirt / dust on the object
One side of the image is blurred	The stage was not correctly fitted
	The objective is not positioned correctly on the beam path
	The nosepiece is not correctly fitted
The image flickers	The upper side of the object is facing down
	The nosepiece is not correctly fitted
	The objective is not positioned correctly on the beam path
The coarse adjustment knob is difficult to turn	The condenser has not been correctly centred
	The rotational resistance brake is too tight
	The angle table is blocked by a solid body

<p>The stage moves down on its own</p> <p>The fine adjustment knob moves on its own</p>	<p>The rotational resistance brake is not tight enough</p>
<p>When you move the table, the image becomes blurred</p>	<p>The stage was not correctly fitted</p>

Service

If, after studying the user manual, you still have questions about commissioning or using the microscope, or if unforeseen problems should arise, please get in touch with your dealer. The device may only be opened by trained service engineers who have been authorised by KERN.

Disposal


The packaging is made of environmentally-friendly materials, which you can dispose of at your local recycling centre. Disposal of the storage box and device must be carried out by the operator in accordance with all national or regional laws in force in the location of use.

Further information

The illustrations may differ slightly from the product.
The descriptions and illustrations in this user manual are subject to change without notice. Further developments on the device may lead to these changes.



Documents / Resources

	<p>KERN Transmitted light laboratory microscope [pdf] Instructions</p> <p>Transmitted light laboratory microscope</p>
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