

# User instructions

## Metallurgical inverted microscope

### KERN OLE-1, OLF-1

OLE 161, OLF 162

Version 1.0  
01/2015







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## User instructions

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# **1 Before use**

## **1.1 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.

## **1.2 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.

### **1.3 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.

## 1.4 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.

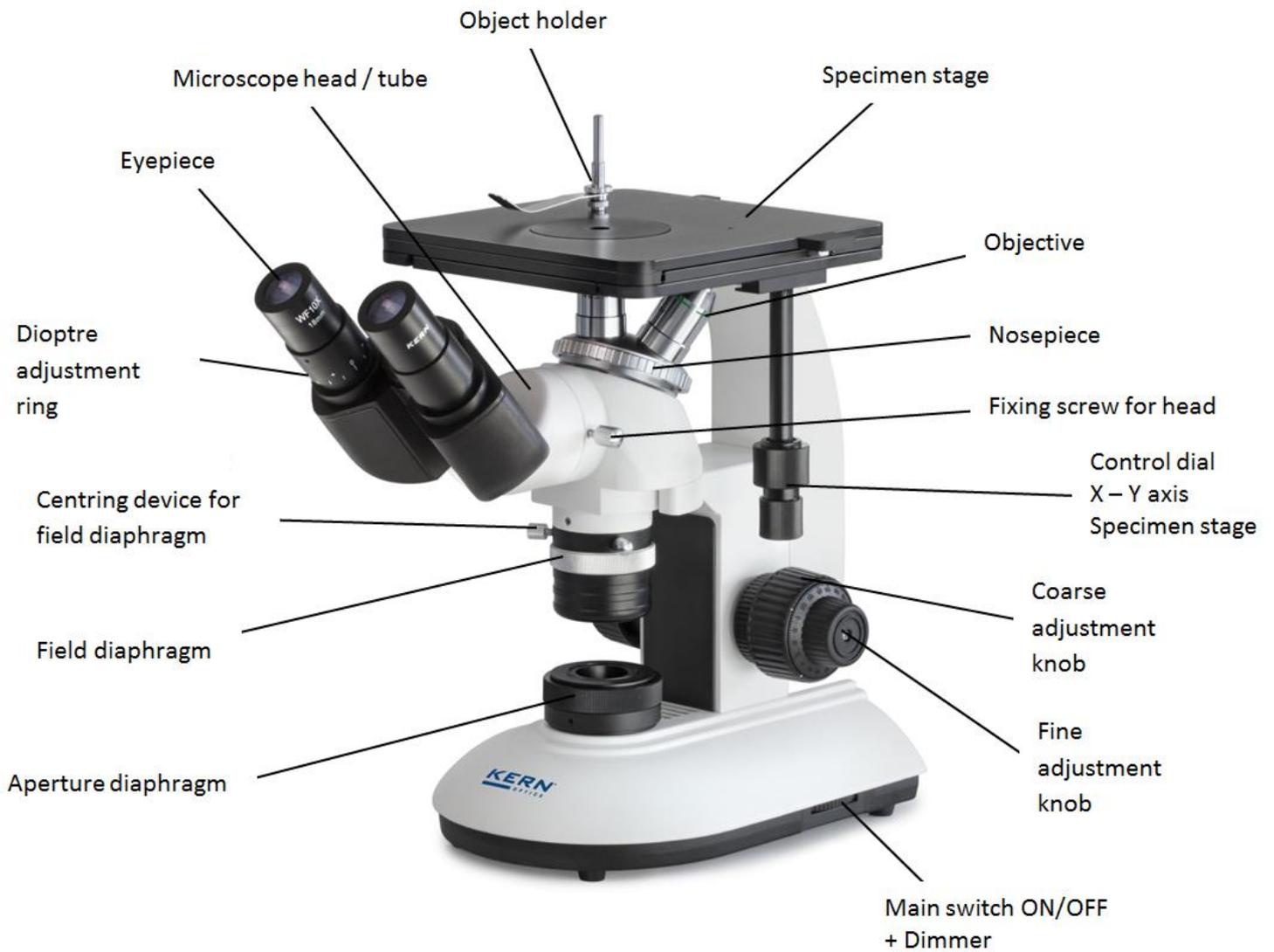
You could also use the following cleaning products to clean the optical components:

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

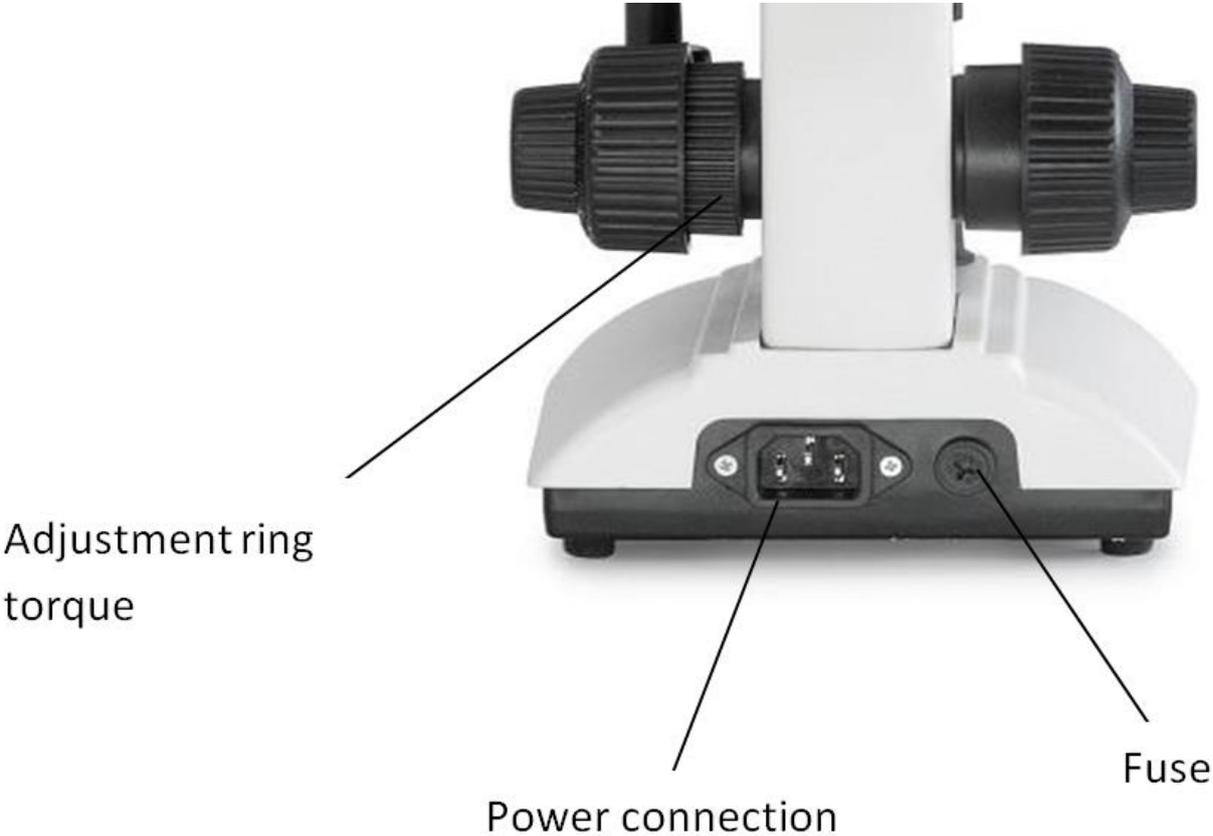
When handled correctly and checked regularly, the microscope should give many years of efficient service.

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

## 2 Nomenclature



**Rear view**



### 3 Technical data / Features

Model	Standard configuration		
	Optical system	Tube	Illumination
KERN			
OLE 161	Finite	Monocular	3W LED (Incident light)
OLF 162	Finite	Binocular	3W LED (Incident light)

**Eyepieces:** WF 10x / Ø 18 mm

**Objectives:** 10x / 20x / 40x

**Product dimensions:** 340x190x330 mm

**Packaging dimensions:** 440x275x530 mm

**Net weight:** 7 kg

**Gross weight:** 8,5 kg

**Input voltage:** AC 100-240V, 50-60Hz

**Output voltage:** DC 1,2-6V

**Fuse:** 2A 5x20mm

Model outfit		Model KERN		Order number	Price excl. of VAT ex works €
		OLE 161	OLF 162		
Eyepieces	WF 10x / Ø 18 mm	●	●●	OBB-A1347	55,-
	WF 12,5x / Ø14 mm	○	○○	OBB-A1353	85,-
	WF 16x / Ø 13 mm	○	○○	OBB-A1354	55,-
	WF 5x / Ø 20 mm	○	○○	OBB-A1355	70,-
	WF 10x / Ø 18 mm (reticule 0,1 mm) (non-adjustable)	○	○○	OBB-A1349	80,-
Plan achromatic objectives	Plan 10x / 0,25	●	●	OBB-A1246	140,-
	Plan 20x / 0,35 (spring)	●	●	OBB-A1253	220,-
	Plan 40x / 0,65 (spring)	●	●	OBB-A1261	220,-
	Plan 100x / 1,25 (spring) (oil)	○	○	OBB-A1242	240,-
	Plan 4x / 0,10	○	○	OBB-A1265	120,-
Infinity Plan achromatic objectives for LWD	PL L 40x / 0,60 W.D. 3,64 mm	○	○	OBB-A1262	420,-
	PL L 50x / 0,70 W.D. 3,01 mm	○	○	OBB-A1267	420,-
	PL L 80x / 0,80 (spring) W.D. 1,08 mm	○	○	OBB-A1272	470,-
Monocular tube	45° inclined	●		OBB-A1228	105,-
Binocular tube	· 45° inclined · With diopter adjustment (one-sided)		●	OBB-A1128	220,-
Nosepiece	Quadplex	●	●		
Mechanical stage	· Stage size: WxD 180x180 mm · Travel: 50x40 mm	●	●		
Extra stage plate	1 (opening Ø 10 mm)	●	●	OBB-A1322	60,-
	2 (opening Ø 20 mm)	●	●	OBB-A1323	60,-
	3 (opening Ø 40 mm)	○	○	OBB-A1324	60,-
Illumination	3W LED illumination system (reflecting)	●	●		
Filter	Blue	●	●	OBB-A1174	30,-
	Green	●	●	OBB-A1190	30,-
	Grey	●	●	OBB-A1184	30,-
Stage micrometer	Specimen slide with scale 0,01 mm	○	○	OBB-A1224	70,-

● = Standard configuration

○ = Option

## **4 Assembly**

### **4.1 Microscope head**

First you must loosen the fixing screw on the connection point of the reflected light unit and remove the black protective cover.

You can then insert the round dovetail bracket on the head into the round dovetail bracket on the light unit 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.

### **4.2 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.

### **4.3 Eyepieces**

For the binocular microscopes you must always use eyepieces with the same magnification for both eyes. These are simply placed onto the tube connectors, once you have first removed the plastic protective caps. There is no way of fixing them. You should always make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.

### **4.4 Colour filters**

Three colour filters are included in the scope of the delivery of all microscopes within the series OLE-1 and OLF-1. Blue, green and grey. In order to use one of them it can be simply inserted into the ring holder of the field lens.

### **4.5 Object holder**

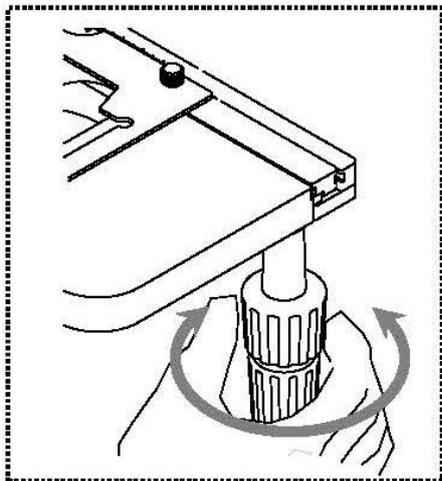
In order to fixate observation samples on the specimen stage it is useful to attach the supplied object holder to one of the thread sockets at the top surface of the specimen stage.

## 5 Operation

### 5.1 Getting started

The very first step is to establish a power connection using the mains plug. 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. You can now switch on the **lighting** using the **main switch**.

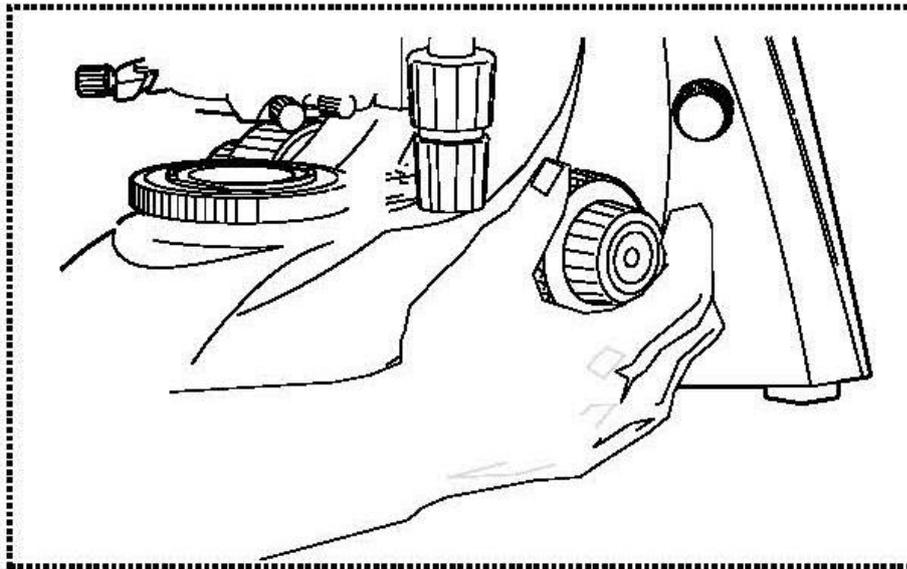
The next step is to **place a sample** on the angle table. To do this, the observed surface of the sample must be facing downwards. You can fix the sample to the table using the object holder. To move the sample into the beam path, you must use the adjustment wheels on the right of the angle table (*see illustration*).



## 5.2 (Pre-) focussing

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 lower the specimen stage (using the coarse adjustment knob) until it is just above the objective and then raise 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.

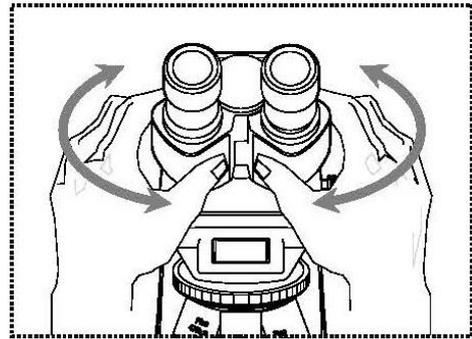
### Important:

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.

### 5.3 Adjusting the interpupillary distance (For binocular 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 lefthand tube housing firmly. By pulling them apart or pushing them together, you can either increase or reduce the interpupillary distance (*see illustration*).



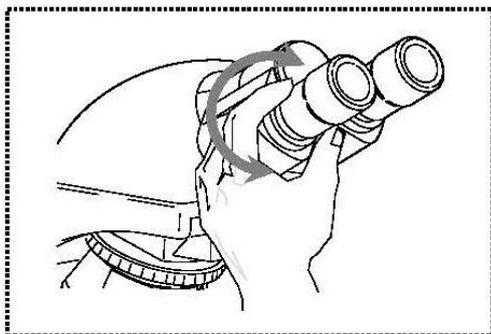
As soon as the field of views of the lefthand and righthand eyepieces completely overlap each other, i.e. they combine to form a circular image, then the interpupillary distance is set correctly.

### 5.4 Dioptre adjustment (For binocular 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.



## 5.5 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.

## 5.6 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 aperture diaphragm and field diaphragm.

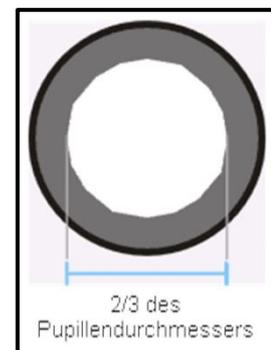
When adjusting the lighting for the first time, you must first select the lowest possible objective magnification, so that you can carry out the following steps.

1. Turn the adjusting ring of the field diaphragm counter clockwise up to the stop. Thus the field diaphragm will be closed. In the field of view there now appears a little bright spot, which is possibly not in a central position (see *left illustration*). Therefore the spot has to be moved to the middle of the field of view by the two centring screws located above the adjusting ring (see *middle illustration*). Afterwards you have to open the field diaphragm until it just disappears out of the field of view (see *right illustration*).

When choosing a higher magnification the opening of the field diaphragm should be reduced accordingly, so that there is always just illuminated the field, which is seen in through the eyepieces.



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 adjustment ring of the aperture diaphragm should be turned counter clockwise almost completely up to the stop, 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 turning the lever clockwise towards the limit on the other side.



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  $\frac{2}{3}$  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.

## 5.7 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)

## 5.8 Using oil immersion objectives

The 100x objectives of the OLE-1 and OLF-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 an object holder of glass between the specimen stage and the observed object.
2. Raise the specimen stage and position the 100x objective in the beam path.
3. Put a drop of oil on top of the objective lens.
4. Bring the specimen stage or object slide to the objective very slowly until there is slight contact.
5. Observe the object.

Please prevent to use too much oil on the objective lens, because there is the risk that the oil running down on the objective.

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

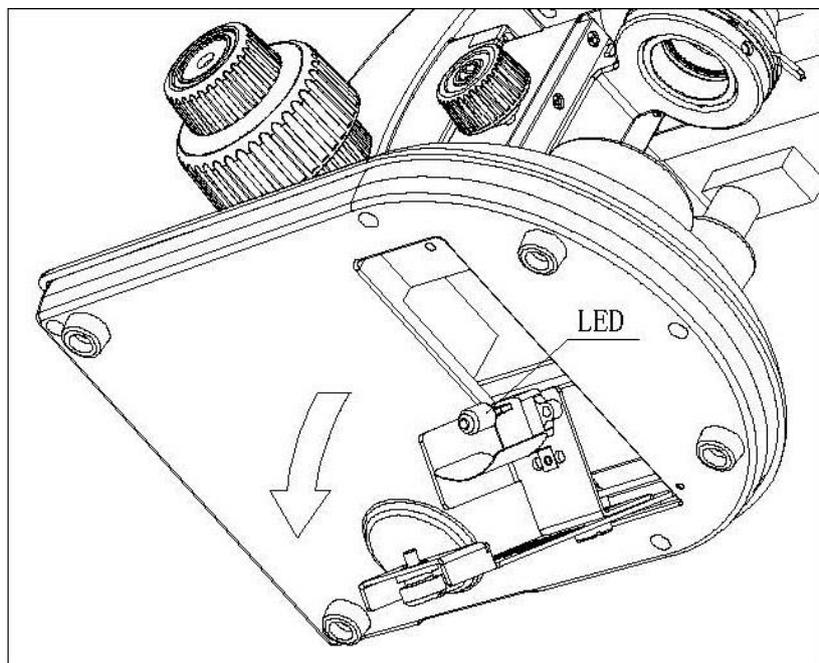
If the contact is made too jerky, there is a chance that existing air bubbles in the oil cannot escape. This would have a negative impact on image clarity.

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.*

## 6 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.



## 7 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.

## 8 Trouble shooting

Problem	Possible causes
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 centred
You cannot adjust the brightness	The brightness control has been set incorrectly
	The condenser has not been correctly centred
	The condenser is too low
The field of view is dark or is not correctly illuminated	The objective is not positioned correctly on the beam path
	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 centred
	The field diaphragm is closed too tightly
	The bulb is not correctly fitted
The field of view of one eye does not match that of the other eye	The interpupillary distance is not correctly adjusted
	Dioptre setting has not been carried out correctly
	Different eyepieces are used for the righthand and lefthand side
	The eyes are not used to using a microscope

<b>Problem</b>	<b>Possible causes</b>
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 or dust in the field of view	Dirt / dust on the objective
	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 condenser
	Dirt / dust on the object
	The stage was not correctly fitted
	The objective is not positioned correctly on the beam path
The image flickers	The nosepiece is not correctly fitted
	The objective is not positioned correctly on the beam path
	The condenser has not been correctly centred
The coarse adjustment knob is difficult to turn	The rotational resistance brake is too tight
	The angle table is blocked by a solid body
The stage moves down on its own The fine adjustment knob moves on its own	The rotational resistance brake is not tight enough
When you move the table, the image becomes blurred	The stage was not correctly fitted

## 9 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.

## 10 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.

## 11 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.



All language versions contain a non-binding translation.  
The original German document is the binding version.

