

User instructions

Metallurgical inverted microscope

KERN

OLM-1

OLM 171

Version 1.0
12/2016





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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.

Under no circumstances should you touch the integrated halogen bulb either during operation or directly after use. These bulbs produce significant heat and therefore there is a risk that the user could be severely burnt. So before handling the bulbs, you must check that they have cooled down.

The microscope housing, on the other hand, is constructed so that no significant heat radiation emanates from the device and that there is absolutely no risk of the user burning themselves from the housing outer surfaces.

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.

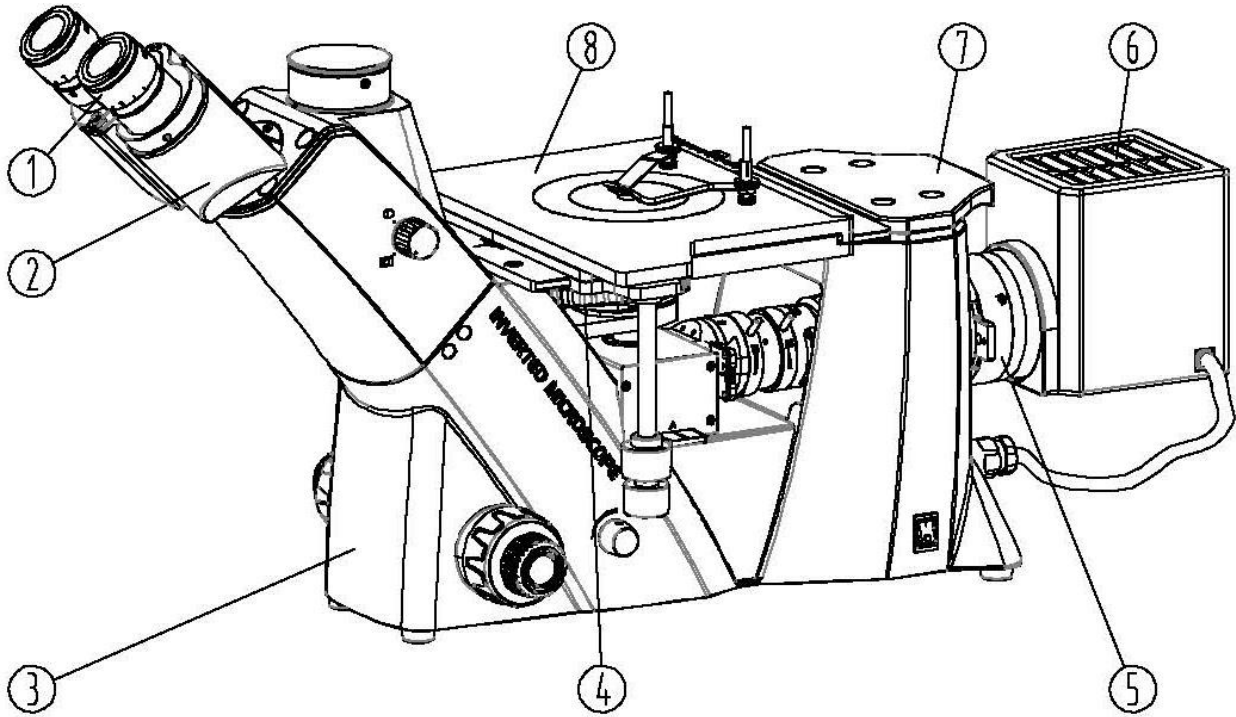
You could also use the following cleaning products to clean the optical components:

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

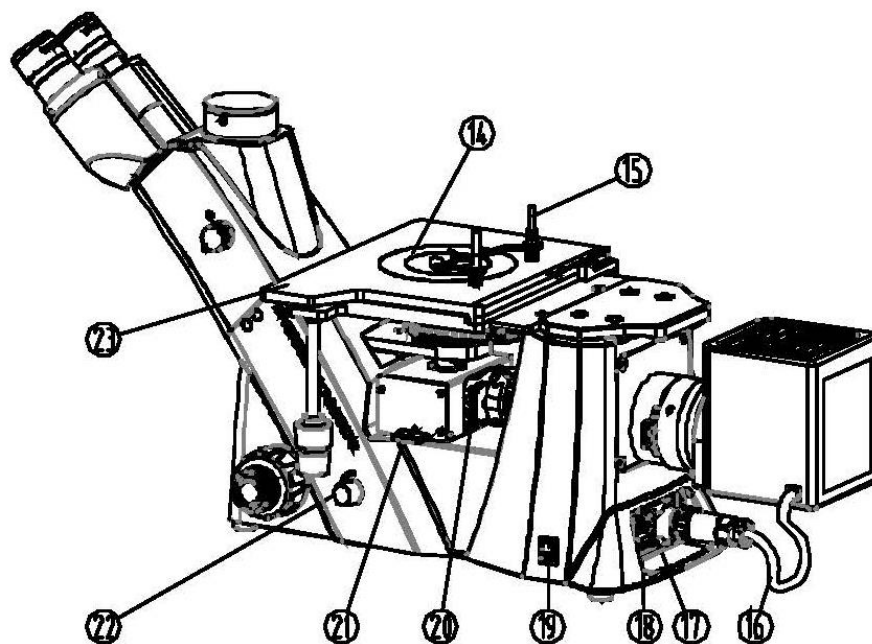
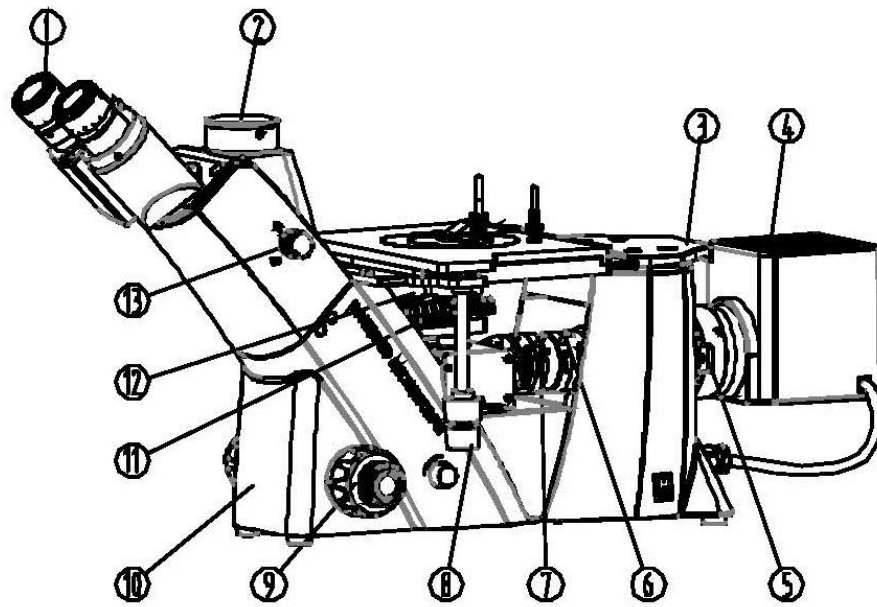
When handled correctly and checked regularly, the microscope should give many years of efficient service.

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

2 Nomenclature



- ① Eyepiece
- ② Microscope head
- ③ Housing
- ④ Nosepiece
- ⑤ Reflected light illumination
- ⑥ Lamp housing
- ⑦ Carrier handle
- ⑧ Specimen stage



- | | |
|---------------------------------|----------------------------------|
| 1) Eyepiece | 12) Objectives |
| 2) Trinocular connection | 13) Trinocular toggle wheel |
| 3) Carrier handle | 14) Stage plate |
| 4) Lamp housing | 15) Object holder |
| 5) Filter slide | 16) Power cable for illumination |
| 6) Lever for aperture diaphragm | 17) Socket |
| 7) Lever for field diaphragm | 18) Fuse housing |
| 8) Control dial specimen stage | 19) Main switch |
| 9) Coarse and fine adjustment | 20) Polariser slide |
| 10) Housing | 21) Analyser slide |
| 11) Nosepiece | 22) Dimmer |
| | 23) Specimen stage |

3 Technical data / Features

Model	Standard configuration				
	Tube	Eyepiece	Objective quality	Objectives	Illumination
KERN					
OLM 171	Trinocular	WF 10×/∅ 22 mm	Infinity Plan	LWD5×/LWD10×/ LWD20×/LWD50×	12 V/50 W Halogen (incident)

Product dimension: 271×379×747 mm

Packing dimensions: 660x590x325 mm

Net weight: 12,5 kg

Gross weight: 17 kg

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

Output voltage: DC 1,2-6V

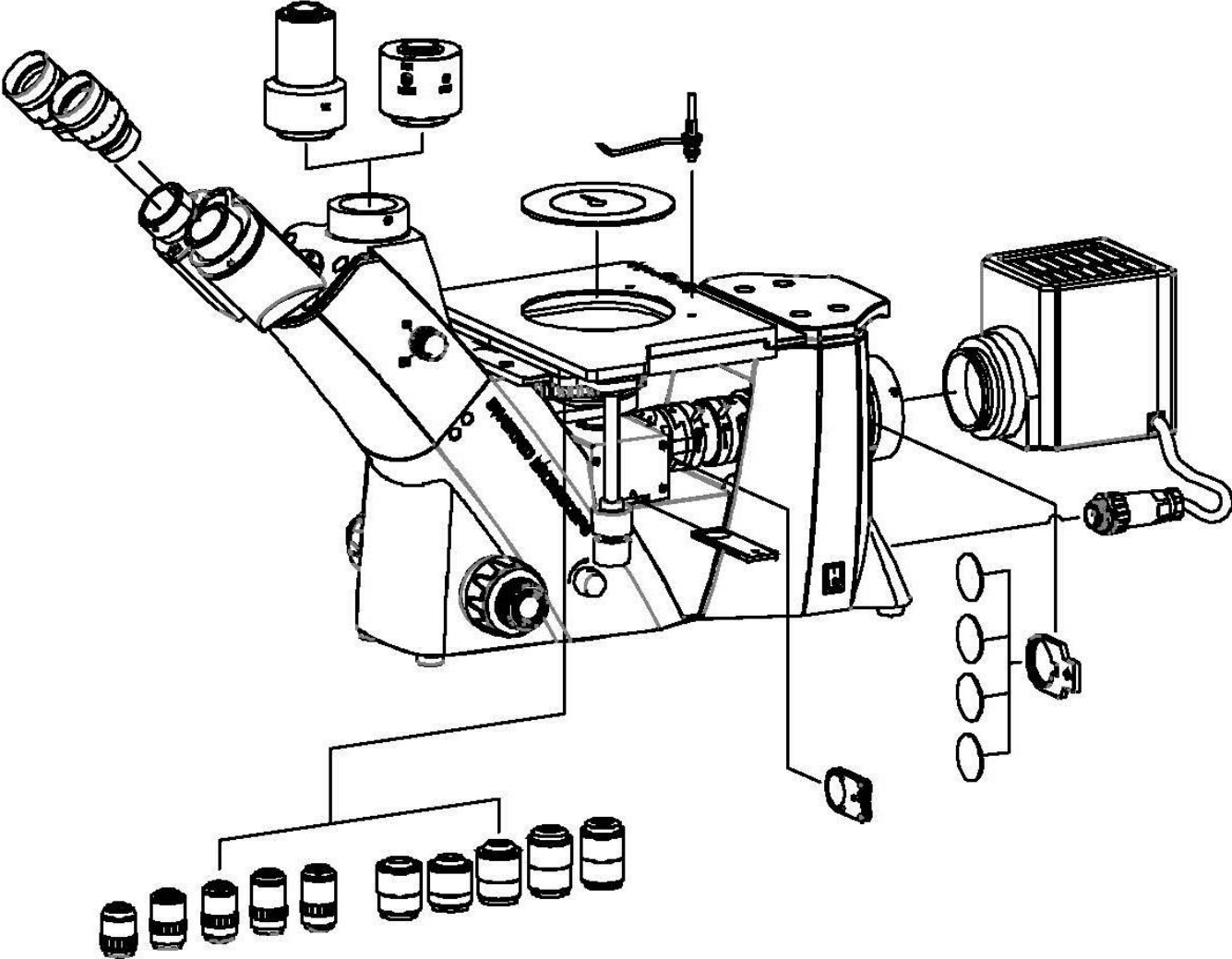
Fuse: 2A 5x20mm

Model outfit		Model KERN	Order number
		OLM 171	
Eyepieces (30 mm)	HWF 10×/∅ 22 mm (adjustable)	✓	OBB-A 1491
	HWF 10×/∅ 22 mm (reticule 0,1 mm) (adjustable)	✓	OBB-A 1523
Infinity Plan achromatic objectives for long working distance	5×/0,13 W.D. 24,23 mm	✓	OBB-A 1525
	10×/0,25 W.D. 18,48 mm	✓	OBB-A 1526
	20×/0,40 W.D. 8,35 mm	✓	OBB-A 1527
	50×/0,70 (spring) W.D. 1,95 mm	✓	OBB-A 1528
	40×/0,65 W.D. 3,90 mm	○	OBB-A 1529
	80×/0,80 (spring) W.D. 0,85 mm	○	OBB-A 1530
Trinocular tube	<ul style="list-style-type: none"> • 30° inclined • Interpupillary distance 48-76 mm • Light distribution 100:0 • Diopter adjustment: Both-sided 	✓	
Mechanical stage	<ul style="list-style-type: none"> • Stage size W×D 210×180 mm • Travel 50x50 mm • Coaxial coarse and fine focusing knobs 	✓	
Illumination	12 V/50 W Halogen spare bulb (incident)	✓	OBB-A 1207
Reflected illumination unit	Polarising unit (Incl. analyser, polariser and colour filter slide)	✓	
Colour filters for transmitted illumination	Blue	✓	OBB-A 1510
	Green	○	OBB-A 1511
	Yellow	○	OBB-A 1512
	Gray	○	OBB-A 1513
C-Mount	0,5×	○	OBB-A 1515
	1×	○	OBB-A 1514

✓ = Included with delivery

○ = Option

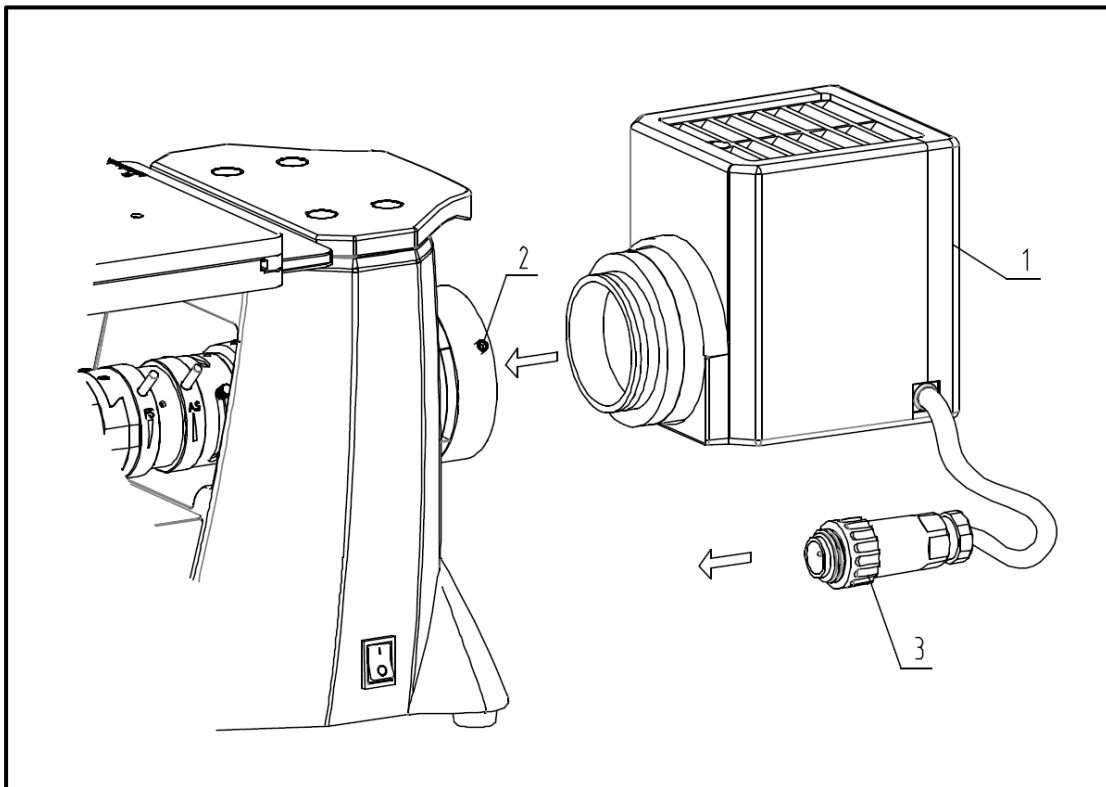
4 Assembly



4.1 Reflected light unit

At first you have to unite the lamp housing [1] and the reflected light unit on their connection points. After that the connection has to be fixated by two Allen screws, which are attached to the connection point [2]. 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.

Afterwards you must establish the electrical connection between the lamp housing and the integrated power supply unit of the microscope. The plug of the connection cable [3] has to be installed to the according socket on the rear of the microscope housing. Please do also use the screw lock on the plug.



Now the slides for analyser, polariser and colour filter can be attached to the appropriate slots.

Refer to page 7:

Analyser slide / bears the inscription „A“: **21)**

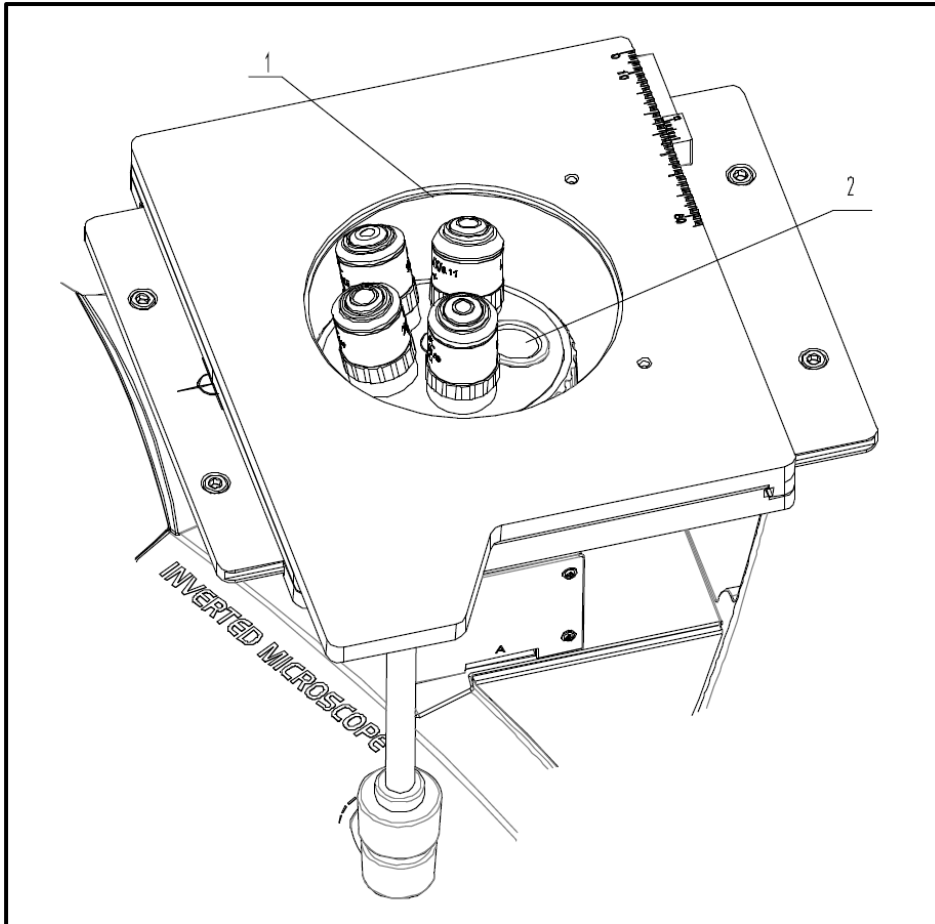
Polariser slide / bears the inscription „P“: **20)**

Colour filter slide / the supplied blue filter needs to be previously inserted: **5)**

4.2 Objectives

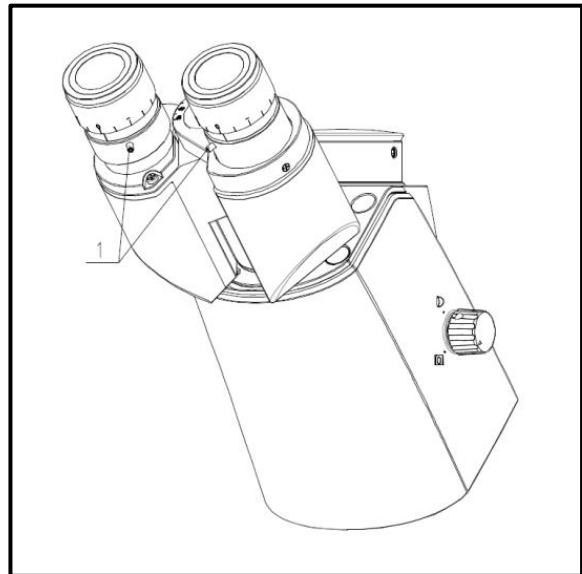
The nosepiece must be in its lowest position so that the objectives [1] can be screwed into it. You can then pass the objectives through the opening of the specimen stage and screw them into the nosepiece, so that when you turn the nosepiece in a clockwise direction, the objective with the next strongest magnification appears. You must make sure that you do not touch the lenses with your bare fingers and that no dust enters the apertures.

To the screw locations which are not filled with an objective [2], you must attach the protective cap.



4.3 Eyepieces

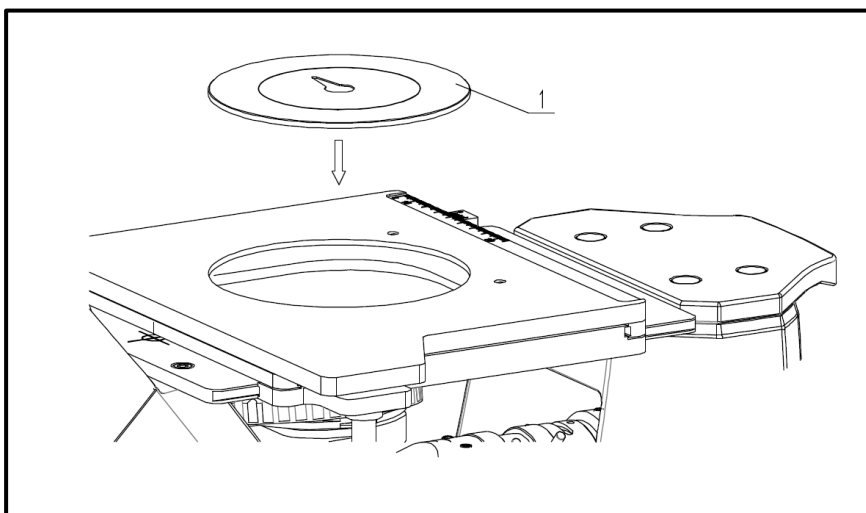
You must always use eyepieces with the same magnification for both eyes. These are simply placed onto the tube connectors, once you have first removed the plastic protective caps. There is a way of fixing them by an Allen screw [1] for each eyepiece that is located on the tube connector (see *illustration*). 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 Specimen stage

The supplied stage plate [1] needs to be fitted to the opening of the specimen stage, in order to get a support area for relatively small observation objects and to protect the objectives which are located underneath.

Furthermore you can attach an object holder to one of the threads on stage surface (see page 7 > [15]).



For the connection of a camera, please see Chapter 8 Use of optional accessories.

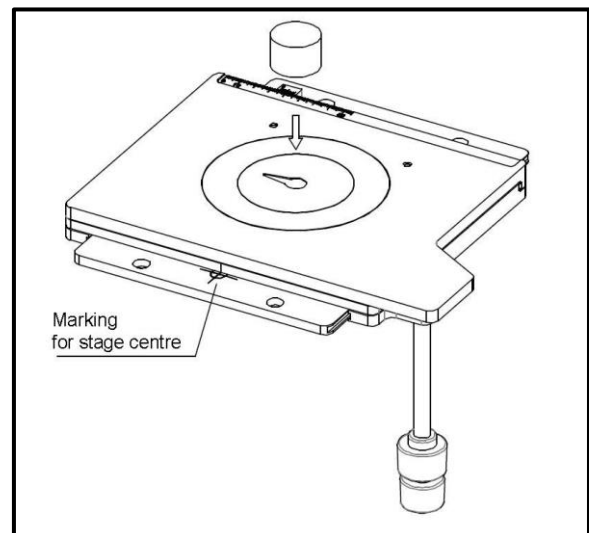
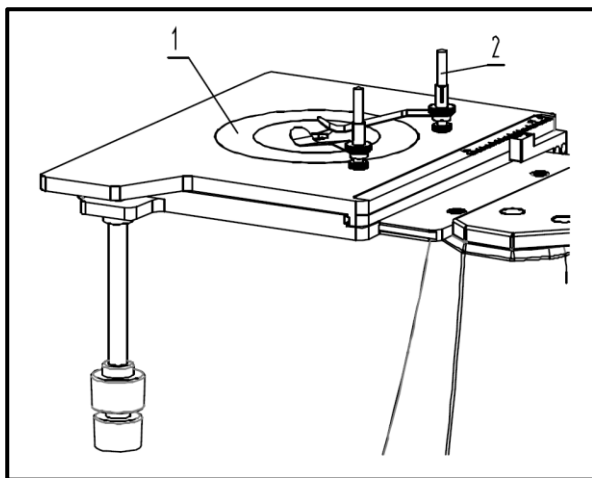
5 Operation

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 specimen stage (see *left illustration [1]*). For the models of the OLM-1 series you can fixate the samples on the stage with help of the object holder.

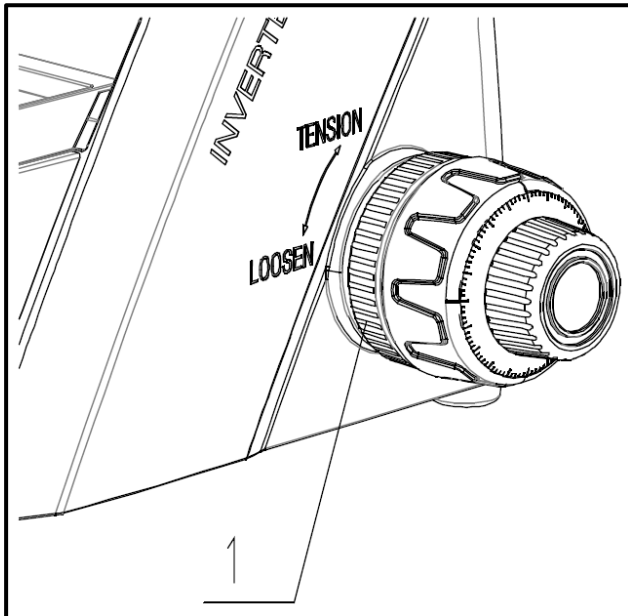
To move the part to be observed of the sample into the beam path, you must use the adjustment wheels on the right of the specimen stage. For centre-adjusting the specimen stage you can take the according markings on the side of the stage as points of reference (see *right illustration*).



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.



The simplest way of doing this would be to first raise the nosepiece (using the coarse adjustment knob) to the top position 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 (see *illustration [1]*) 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 nosepiece from slipping down unintentionally.

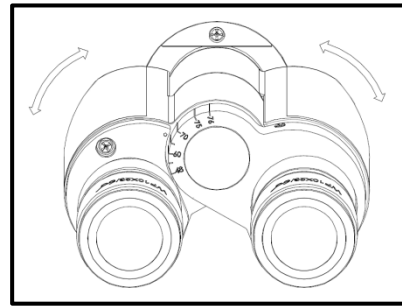
Important:

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

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.

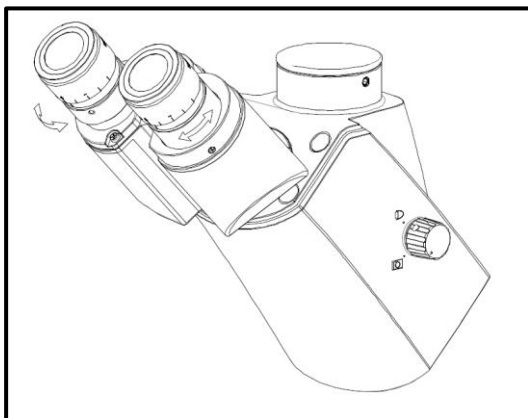


5.4 Dioptre adjustment

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.
3. 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.



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 black ring below the objectives.
- 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 stage plate. 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 nosepiece 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, the object will be slightly out of focus. Use the fine adjustment knob to make a slight adjustment and restore the focus.

5.6 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)

5.7 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 following components of the reflected light unit can be adjusted according to the application requirements.

Field diaphragm and aperture diaphragm

(See page 7 > [6] + [7])

The field diaphragm is responsible for the optimum illumination of the field of view. It is able to reduce undesired stray light.

The aperture diaphragm is used to find the very best compromise between contrast and resolution for the microscopic image.

To open and close these diaphragms you have to operate the levers located at the top of the reflected light unit.

Colour filter

(See page 7 > [5])

The colour filter slide has one round aperture. If needed, the supplied blue filter has to be inserted into this aperture. Subsequently the filter slide must be put into the slot on the connection point between the reflected light unit and the lamp housing.

Polarising unit (Analyser / Polariser)

(See page 7 > [20] + [21])

The microscopes from the OLM-1 series provide the possibility to apply the contrasting method of polarised light. For this purpose the analyser and polariser (both of them are included with the scope of delivery) are used.

In order to bring the analyser into the beam path you must attach the analyser slide to the slot, located underneath the nosepiece. Both the slide and the slot bear the inscription "A".

Next to the field and aperture diaphragm the slot for the polariser is located. Both the slide and the slot bear the inscription "P". The integrated wheel on the polariser slide is facing out after attaching it to the slot. With the wheel you can control the required alignment of the polariser.

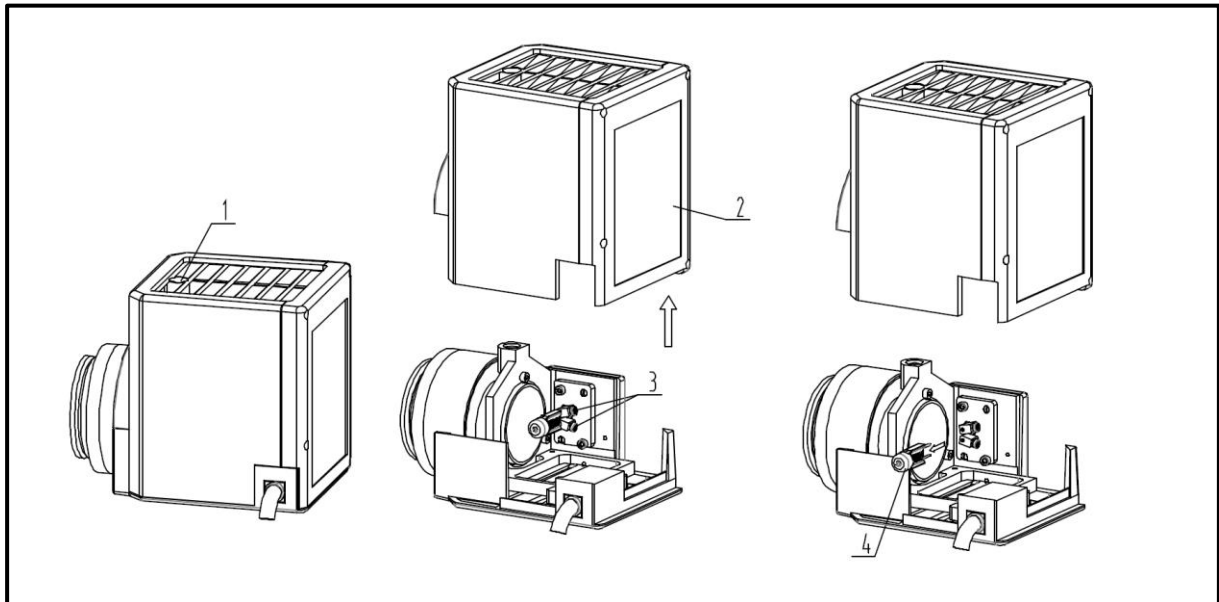
6 Changing the bulb

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 the cover of the lamp housing [2] needs to be removed. Therefore you previously have to loosen the appropriate Allen screw [1]. Now the defective bulb can be pulled out of the socket and be replaced with a new one [4]. We recommend that here you should also test again, to check that heat is no longer being produced. After the cover has been reattached and fixated, the bulb replacement procedure is complete.

Important:

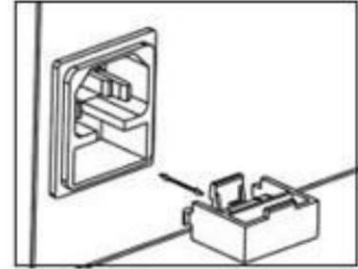
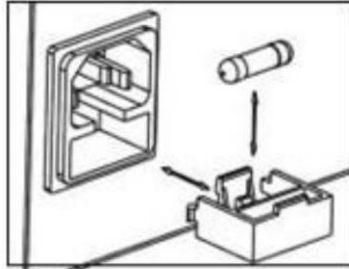
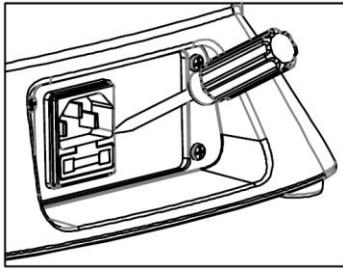
When fitting the new bulb into the socket, it must only be handled with sterile gloves or using the bulb packaging film. Grease and dust residue can have a negative effect on the light quality and service life.



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 (see *left illustration*). The defective fuse can be removed from its housing and be replaced with a new one (see *middle illustration*).

After that, you just need to insert the fuse housing back into the insertion point below the mains power supply socket (see *right illustration*).



8 Using optional accessories

8.1 Camera connection

Due to the trinocular tube 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.

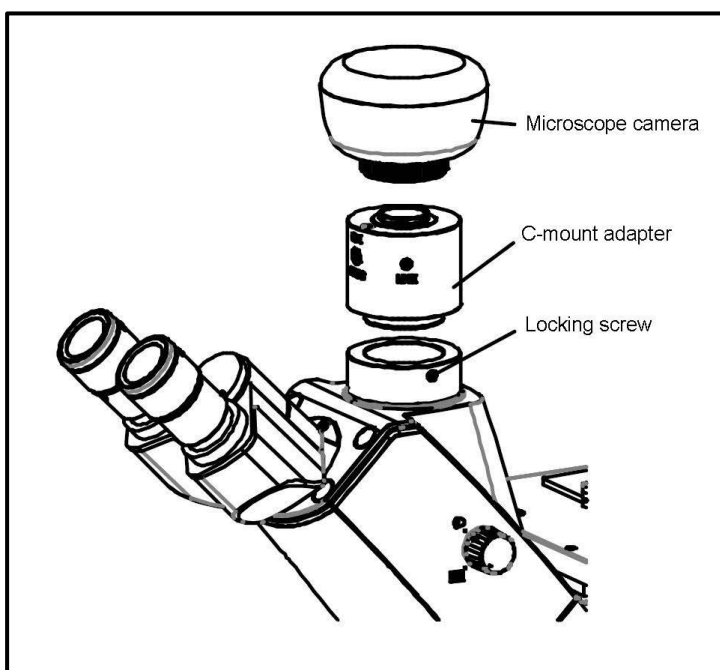
In general there are two C-mount adapters available for this (1x and 0.5x magnification, see *Chapter 3 Features*). After fitting one of these adapters it can be fixed with the locking screw. A camera which has a C-mount thread is then screwed on top of the adapter.

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 wheel on the righthand side of the microscope head must be set to the position "Camera". 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.



9 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 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
	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
	Diopre 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

Problem	Possible causes
Blurred details Bad image Bad contrast Vignetted field of view	The aperture diaphragm is not opened wide enough
	The objective does not belong to this microscope
	The front lens of the objective is dirty
	The condenser is not correctly centred
	Dirt / dust on the objective
	Dirt /dust on the front lens of the condenser
Dirt or dust in the field of view	Dirt / dust on the eyepieces
	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 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

10 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.

11 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.

12 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.

