

User instructions

Stereo zoom microscope

KERN

OZL-45R

OZL 456

Version 1.0
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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 in the 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 power supply is located on the device, on the rear of the stand base. 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.

When carrying out any procedures whereby you come into contact with the electrical system of the device, such as, for example, changing the bulb, 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 fit the objective cap and cover the microscope with the enclosed dust protective cover.

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



3 Basic data

Optical system	Greenough
Dimmable lighting	Yes (LED ring lighting only)
Magnification ratio	6.7:1
Tube	angled at 45°
Interpupillary distance	55 – 75 mm
Dioptr adjustment	On both sides
Packaging dimensions WxDxH	345x320x470 mm

Standard configuration

Model	Tube	Eyepiece	Field of view	Objective	Stand	Illumination
KERN			mm	Zoom		
OZL 456	Binocular	HSWF 10x Ø 23 mm	Ø 33 – 5	0.75x – 5.0x	mechanical	1W LED (reflected light) 0.21W LED (transmitted light)

4 Assembly

The first step is to position the **microscope stand on a firm, level surface**.

The holder is firmly attached to the pillar of the stand. You can then fit the **microscope head** to the holder, by passing the objective through the holder ring until the rest of the head is above the ring.

Please see section 5.5 for more details on adjusting the stand.

The head must then be fixed in a suitable position, using the small screw on the right of the holder ring.

Ideally it is then parallel on the central axis of the stand base (*see figure on page 9*).

Now you can **remove the protective caps from the tube connectors** so that you can then **fit the eyepieces**. When doing this, please be particularly careful that you do **not touch the optical lenses with your fingers** and that no dust enters the apertures.

You should also **never fit two eyepieces with different magnifications**.

With regard to the use of **transmitted light illumination** you must make sure that the **frosted glass stand inlay is fitted in the centre of the stand base**, so that the transmitted light can be used correctly.

It is always best to **fix** the different **stand inlays** using the **adjusting screw** on the front side of the stand base.

When using reflected light please make sure that the **connection cable between the holder and the objective is plugged in**.

Additional optional attachments:

- The eye cups supplied with the microscopes can be fitted to the eyepieces. (*see section 5.6*)



Assembled stereo zoom microscope

5 Operation and functionality

5.1 Getting started

After assembly, if the microscope is ready for use, then you must first establish a **power connection** using the cable which is connected to the device.

Please see section 5.7 for more details on adjusting the lighting.

All important functions which relate to the use of the devices in this document are described in the following sections.

5.2 Adjusting the interpupillary distance

Different users have different interpupillary distances. So each time a different person uses the microscope, the gap between the two eyepieces must be re-adjusted.

While you are looking through the eyepieces, use one hand to hold the righthand or lefthand prism housing firmly.

By rotating outwards or inwards, you can either increase or reduce the interpupillary distance.

As soon as the lefthand and righthand visual fields exactly overlap each other, this is the correct interpupillary distance.

5.3 Adjusting the magnification

As the devices in the KERN OZL-45R series are stereo zoom microscopes, then you adjust the magnification using the two zoom adjustment wheels on the lefthand and righthand side of the microscope head.

Chapter 6 “Optical data” gives information on the possible overall magnification which the microscope can produce. It will also include the optional use of different eyepieces and auxiliary objectives.

5.4 Dioptre adjustment and focussing

A special feature of stereo microscopes is that they are fitted with an optical unit which has a relatively high depth of field. In order to be able get the most benefit from this feature, each user must synchronise the focussing mechanisms for themselves.

The steps to do this are described in the following section.

1. Place the object to be observed on the working surface under the objective.
2. Put both dioptre adjustment rings into the starting position of 0.
3. Use the zoom control dials to set the smallest possible magnification.
4. Look through the right eyepiece with the right eye and bring the object into focus by using the focus control dials.
5. Now set the largest possible zoom factor.
6. Once again, still only looking through the right eyepiece, bring the object into focus
7. Then set the smallest possible zoom factor again.
8. If the object then does not appear to be in focus, adjust the focus on the dioptre adjustment ring of the right eyepiece.
9. In order to get the highest level of accuracy when adjusting the focus, you should repeat steps 5-8.
10. Afterwards set back to the smallest possible zoom factor.
11. Then look through the left eyepiece with the left eye and use the lefthand dioptre adjustment ring to also adjust the optimum focus of the object.
12. In this way, the object being observed will be in focus at any zoom setting.

5.5 Adjusting the stand

Torque of the focus wheels

You adjust the torque of the focus wheels by holding one of the two wheels in place and using the other hand to turn the other wheel.

Depending on the direction of the turn, the torque will be increased or decreased.

On one hand, this function can help to make it easier to adjust the focus and on the other hand it can prevent the microscope head from slipping down unintentionally. In this way you can avoid possible damage which could occur if the objective lens and the object being observed should collide.

5.6 Using eye cups / High Eye Point eyepieces

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 adjustment 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 Lighting control

Reflected light and transmitted light can be switched on separately.

The **switch for transmitted light** is at the **left rear corner** of the stand base. The switch for **reflected light** is on the **right** rear corner.

The **reflected light** is provided by an LED ring lighting unit, which is fitted directly under the objective and is connected to the objective.

Furthermore you can adjust the **intensity of the reflected light** by using the **control wheel on the front of the objective**.

Apart from the on/off switch, **the transmitted light unit** does not have **any other control options**.

5.8 Using external illumination units

If, when using a microscope in its standard version, the lighting is not suitable for the application, then it often makes sense to fit an external lighting unit to overcome this problem.

The lighting units which are suitable for devices of the OZL-45R series, are goose neck lighting units (*see figure*). These are available as LED as well as halogen versions and also have an on/off switch or different controller.



Typical goose neck lighting unit

Using goose neck lighting units

Depending on the requirements, a goose neck lighting unit is placed next to, in front of or behind the microscope. For halogen lighting units, the light source is in the housing of the unit and is emitted through one or several optical fibre cables. For LED units, on the other hand, it is usually at the end of the cable. These cables are flexible and therefore offer a large number of positioning options, so that the object being observed is perfectly illuminated.

5.9 Changing the bulb

LED

The devices in the OZL-45R series are fitted with LED bulbs.

Due to the long service life of an LED lighting system, for these microscopes it will not be necessary to simply change a bulb.

Problems with the lighting unit would therefore, in most cases, be caused by defects in the electrical system. If this is the case, then our Technical Service will be able to help.

6 Optical data

Eyepiece	Specification - Objectives				
	Magnification	Standard 1.0x	Auxiliary objectives		
			0.5x	1.5x	2.0x
HWF 5x	Total magnification	3.75x - 25x	1.875x – 12.5x	5.625x – 37.5x	7.5x – 50x
	Field of view mm	∅ 31 – 4.6	∅ 61.3 – 9.2	∅ 22 – 3.3	∅ 16 – 2.5
HSWF 10x	Total magnification	7.5x – 50x	3.75x – 25x	11.25x – 75x	15x – 100x
	Field of view mm	∅ 33 - 5	∅ 65 - 10	∅ 22 – 3.3	∅ 16 – 2.5
HWF 15x	Total magnification	11.25x – 75x	5.625x – 37.5x	16.875x – 112.5x	22.5x – 150x
	Field of view mm	∅ 24 – 4.2	∅ 48 – 8.5	∅ 16 – 2.8	∅ 12 - 2
HSWF 20x	Total magnification	15x – 100x	7.5x – 50x	22.5x – 150x	30x – 200x
	Field of view mm	∅ 20 – 3.5	∅ 40 - 7	∅ 13.3 – 2.3	∅ 10 – 1.8
HWF 25x	Total magnification	18.75x – 125x	9.375x – 62.5x	28.125x – 187.5x	37.5x – 255x
	Field of view mm	∅ 15.8 – 2.4	∅ 31.5 – 4.8	∅ 10.5 – 1.6	∅ 7.9 – 1.2
Working distance		113 mm	220 mm	50 mm	35 mm

7 Features

Model outfit		Kern model	Order number
		OZL 456	
Eyepieces	HWF 5x / ∅ 23.2 mm	∞∞	OZB-A4112
	HSWF 10x / ∅ 23 mm	●●	OZB-A4118
	HWF 15x / ∅ 15 mm	∞∞	OZB-A4119
	HSWF 20x / ∅ 14.5 mm	∞∞	OZB-A4120
	HWF 25x / ∅ 11.7 mm	∞∞	OZB-A4121
Auxiliary objectives	0.5x	○	OZB-A4201
	1.5x	○	OZB-A4204
	2.0x	○	OZB-A4205
Stand	mechanical, with LED lighting (0.21W transmitted light + 1W reflected light)	●	
Stand inlay	Frosted glass / ∅95 mm	●	OZB-A4805
	black-white / ∅95 mm	●	OZB-A4806
Table mechanical	Dimensions WxD 180x155 mm, Travel: 75x55 mm, for reflected light and transmitted light	○	OZB-A4605
External illumination	For information on external lighting units, please see the Kern Optics main catalogue, from page 68 and visit our website www.kern-sohn.com		

● = Standard configuration

○ = Option

8 Trouble shooting

Electrical system

Problem	Possible causes
The lighting unit (if fitted) cannot be switched on	The power cable is either not connected or not connected correctly
	The bulb is not fitted
	The bulb has blown
	The fuse has blown
The bulb has blown	The brightness control is set to the lowest level
	The wrong bulb has been used
The bulb flickers	The input voltage was too high
	The bulb is not correctly fitted
The bulb brightness is not sufficient	The lamp is worn out
	The wrong bulb has been used
	The input voltage is too low

Optical unit

Problem	Possible causes
You can see two images	The interpupillary distance is not set correctly
	The magnifications of the eyepieces do not match
There is dirt in the visual field	There is dirt on the object being observed
	There is dirt on the eyepiece surface
The image is unclear	There is dirt on the objective surface
The focus wheels are jammed	The torque of the focus wheels is set too high
The microscope head slips down while you are viewing the object	The torque of the focus wheels is set too low
Eyes get tired easily	The dioptre adjustment is not correct
	The brightness adjustment is not correct

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.