

User instructions

Stereo zoom microscope

KERN

OZL-47

OZL 473, OZL 474

Version 1.0
01/2023





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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 lighting unit 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 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.

For devices with pillar stands, the microscope holder must not be rotated back too far. If you do this, there is a risk that the microscope could tip over.

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:

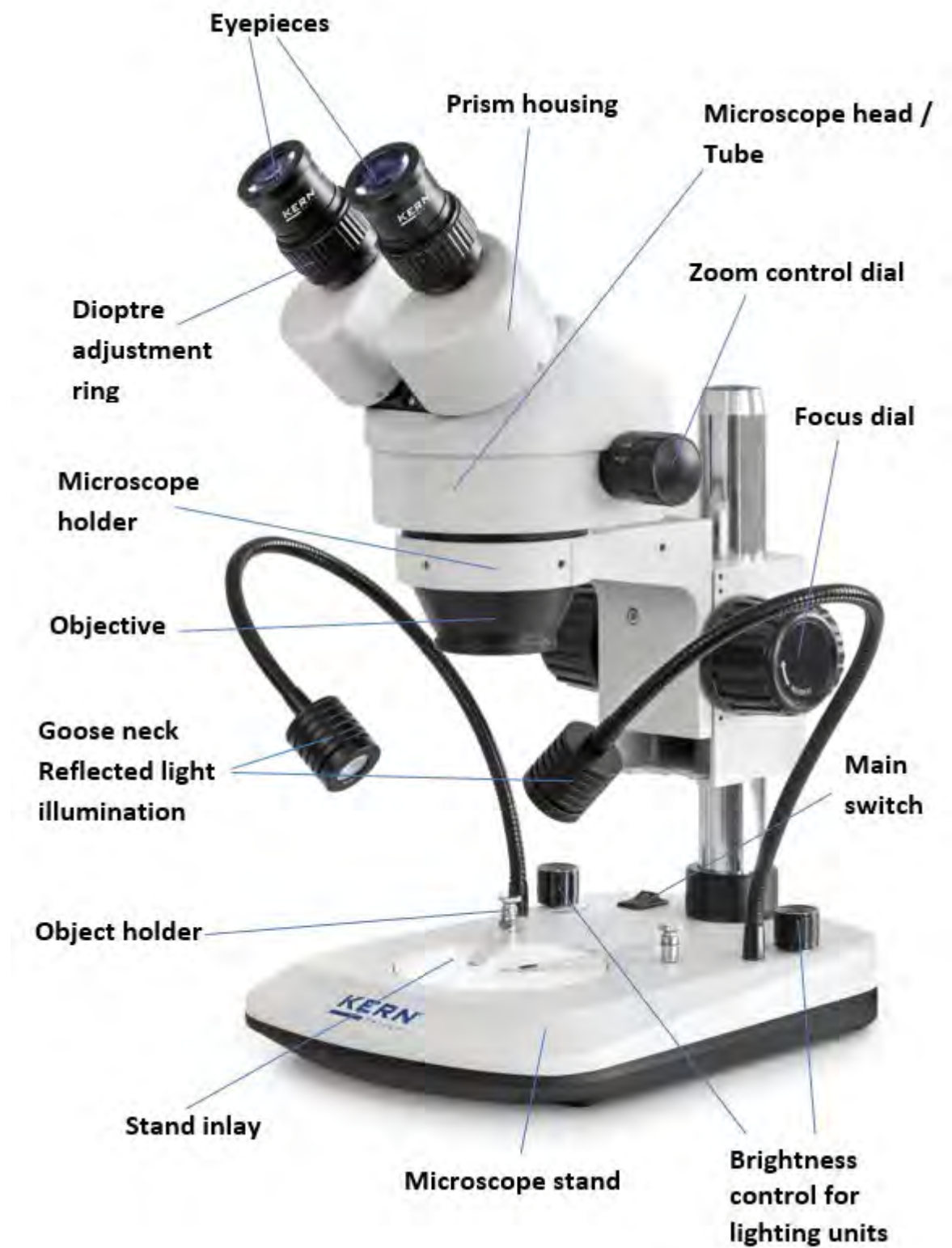
- Special cleaner for optical lenses
- Special optical cleaning cloths
- Bellows
- Brush

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

Using the OZL 473 as an example
(Binocular)



3 Basic data

Optical system	Greenough
Dimmable lighting	Yes
Magnification ratio	6,4:1
Tube	angled at 45°
Interpupillary distance	55 – 75 mm
Dioptr adjustment	On both sides
Gross weight	5,5 kg
Net weight	4 kg
Packing dimensions WxDxH	450x410x290 mm
Product dimensions WxDxH	300x240x420 mm

Standard configuration

Model	Tube	Eyepiece	Field of view	Objective	Stand	Illumination
KERN			mm	Zoom		
OZL 473	Binocular	HWF 10x Ø 20 mm	Ø 28,6 – 4,4	0,7x – 4,5x	Pillar	3W LED (Incident)
OZL 474	Trinocular	HWF 10x Ø 20 mm	Ø 28,6 – 4,4	0,7x – 4,5x	Pillar	3W LED (Incident)

4 Assembly

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

For devices with pillar stand the holder (OZL 473, OZL 474) is already on pillar of the stand, but you must always check whether it is **fixed** securely and that it is in the **correct position** (preferably centrally and facing to the front).

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

The next step is to place the **microscope head on the holder**, by passing the objective through the holder ring until the rest of the head is above the ring.

You must use the small silver adjusting screw on the front of the holder ring to **fix the head** in place.

The alignment of the microscope head is left to the user to do and can be adjusted to suit the individual application situations.

To make it easier to operate the focus wheels or lighting control for example, we recommend that you position the head with the tube connectors centrally to the front. Ideally, the holder and head are then parallel on the central axis of the stand base (see *nomenclature on page 6*).

Then 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**.

Additional optional attachments:

- The eye cups supplied with the microscopes can be fitted to the eyepieces. (see *section 5.6*)
- You can fit a C-mount adapter to the appropriate connection point on the top of the microscope head for trinocular devices (OZL 474). This enables you to fit and use digital cameras (see *section 5.9*).

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, including power adapter.

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

If the device has a camera connection (OZL 474), then for **binocular** use, you must let the **trinocular toggle rod** on the left side of the microscope head stay **slid-in**.

For trinocular use (camera connection) see section 5.9.

Do not forget to remove the cap from the bottom of the objective, so that you will then be able to see a reflection of the object being observed in the eyepiece.

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 KERN OZL-47 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.

Height adjustment

With a stereo microscope on a **pillar stand** (OZL 473, OZL 474), the microscope head can be height adjusted using the focus wheels and in addition, the microscope holder can be fixed at any point on the pillar, depending on the application requirements.

The way to fix the position is to use an adjusting screw, which is located directly on the back of the holder.

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

A main switch located in the rear area of the stand base ensures that the unit can be supplied with power when the mains plug is inserted.

Left and right incident light (goosenecks) can be controlled separately.

For this purpose, rotatable knobs are mounted on the right and left rear of the stand base. These are used to control the light intensity.

The goosenecks are flexible and therefore offer a wide range of positioning options to perfectly illuminate an observation object.

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.

Useful external illumination units to use with the OZL-47 series microscopes are:

- Ring illumination units (see figure below), usually LED.

These lighting units require an extra power connection and, depending on the model, may also have an on/off switch and various lighting controls.



Typical ring lighting

Mounting a ring illumination unit

As can be seen in the illustration, there are three screws on ring lightings, which must first be positioned so that they do not protrude into the ring. The ring is then fitted around the lens and the screws are each screwed in far enough to secure the illumination unit to the lens.

5.9 Fitting and adjusting a camera (OZL 474)

You can connect special microscope cameras to trinocular devices in the OZL-47 series, so that you can digitally record images or sequences of objects being observed.

The connection for this is on the top side of the microscope head.

When the **trinocular toggle rod is pulled out**, the beam path, which normally emits on the righthand eyepiece, is diverted in the tube, so that it can be used for the camera adapter connection.

This means that when the device is used in trinocular mode, you will see one image in the left eyepiece and one on the monitor of the microscope camera.

This means that the 3D effect is lost.



To fit a microscope camera properly, you must use an adapter with a C-mount thread, which needs to be attached to the camera connection point.

In total there are three focusable adapters to choose from (*see figure below*). The difference between these adapters is that they have different integrated magnification (0.3x, 0.5x, 1.0x).

The camera and adapter are then united using the C-mount thread.



C-mount adapter

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 when turning the attached black plastic ring.**

5.10 Using additional accessories

Auxiliary objectives



In order to make the magnification series of one of the stereo zoom microscopes described here even more flexible, there is the option of using appropriate auxiliary objectives.

You can choose from four different achromatic corrected objectives (0.5x, 0.75x, 1.5x, 2.0x), depending on what is required.

You can fit these objectives by simply screwing them onto the thread of the objective housing which is located at the bottom of the microscope head.

When you are doing this, you must avoid touching the objective lenses with your fingers or leaving any dust between the standard objective and the auxiliary objective.

5.11 Changing the bulb

LED

The devices in the OZL-47 range with lighting are all 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	Specifications - Objectives					
	Magnification	Standard	Auxiliary objectives			
			1,0×	0,5×	0,75×	1,5×
HSWF 10×	Total magnification	7× – 45×	3,5× – 22,5×	5,3× – 33,8×	10,5× – 67,5×	14× – 90×
	Field of view mm	∅ 28,6 – 4,4	∅ 57,1 – 8,9	∅ 38,1 – 5,9	∅ 19 – 3	∅ 14,3 – 2,2
HWF 15×	Total magnification	10,5× – 67,5×	5,3× – 33,8×	7,9× – 50,6×	15,5× – 101,3×	21× – 135×
	Field of view mm	∅ 21,4 – 3,3	∅ 42,9 – 6,7	∅ 28,5 – 4,4	∅ 14,3 – 2,2	∅ 10,7 – 1,7
HSWF 20×	Total magnification	14× – 90×	7× – 45×	10,5× – 67,5×	21× – 135×	28× – 180×
	Field of view mm	∅ 14,3 – 2,2	∅ 28,6 – 4,4	∅ 19,1 – 2,9	∅ 9,5 – 1,5	∅ 7,1 – 1,1
HWF 25×	Total magnification	17,5× – 122,5×	8,8× – 56,3×	13,1× – 91,9×	26,3× – 168,8×	35× – 225×
	Field of view mm	∅ 12,9 – 2	∅ 25,7 – 4	∅ 17,2 – 2,7	∅ 8,6 – 1,3	∅ 6,4 – 1
Working distance		105 mm	177 mm	120 mm	47 mm	26 mm
Maximum sample height		140 mm	35 mm	80 mm	165 mm	185 mm

7 Features

Model outfit		Model KERN		Order number
		OZL 473	OZL 474	
Eyepieces (30,0 mm)	HWF 10×/∅ 20 mm	✓✓	✓✓	OZB-A4631
	HSWF 15×/∅ 15 mm	○○	○○	OZB-A4632
	HWF 20×/∅ 10 mm	○○	○○	OZB-A4633
	HSWF 25×/∅ 9 mm	○○	○○	OZB-A4634
Auxiliary objectives	0,5×	○	○	OZB-A4641
	0,75×	○	○	OZB-A4644
	1,5×	○	○	OZB-A4642
	2,0×	○	○	OZB-A4643
	Soldering protection lens	○	○	OZB-A4645
C-Mount	1× (focus adjustable)		○	OZB-A4809
	0,3× (focus adjustable)		○	OZB-A4810
	0,5× (focus adjustable)		○	OZB-A4811
Eyepiece camera adapter	1,0×; for fitting an eyepiece camera to the trinocular connection of the microscope	○	○	OZB-A4863
Stand	Pillar style, with 3 W-LED illumination (incident)	✓	✓	
Stage plate	Black-white/∅ 95 mm	✓	✓	OZB-A4806
External illumination	Please find the information about external illumination units in the catalogue on page 83 and on our website www.kern-sohn.com			

✓ = Included with delivery

○ = 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 brightness control is set to the lowest level
The bulb has blown	The wrong bulb has been used
	The input voltage was too high
The bulb flickers	The bulb is not correctly fitted
	The lamp is worn out
The bulb brightness is not sufficient	The wrong bulb has been used
	The input voltage is too low

Optical unit

Problem	Possible causes
You can see two images	The gap between the eyes 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 diopetre 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.