

User instructions

Stereo zoom microscope

KERN

OZL-44

OZL 441, OZL 445

Version 1.0
01/2015





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Table of contents

1	Before use	3
1.1	General notes	3
1.2	Notes on the electrical system	3
1.3	Storage	4
1.4	Maintenance and cleaning	5
2	Nomenclature	6
3	Basic data	7
4	Assembly	8
5	Operation and functionality	10
5.1	Getting started.....	10
5.2	Adjusting the interpupillary distance	10
5.3	Adjusting the magnification	10
5.4	Dioptre adjustment and focussing	11
5.5	Adjusting the stand	12
5.6	Using eye cups / High Eye Point eyepieces	13
5.7	Lighting control.....	14
5.8	Using external illumination units.....	14
5.9	Fitting and adjusting a camera	15
5.10	Changing the bulb.....	16
6	Optical data	17
7	Features	18
8	Trouble shooting	19
9	Service	20
10	Disposal	20
11	Further information	20

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.

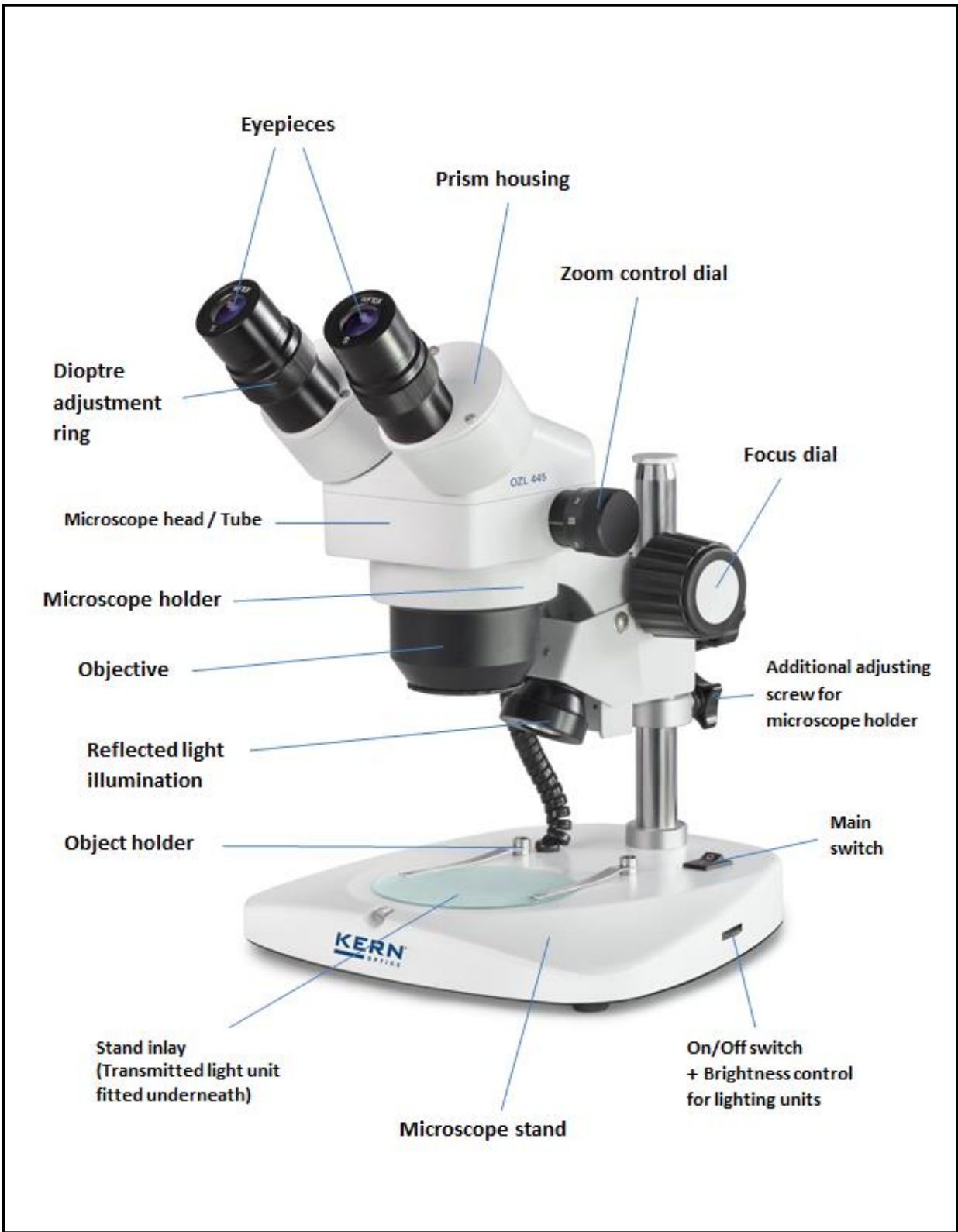
You could also use the following cleaning products to clean the optical components:

- 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



3 Basic data

OZL 441 / OZL 445

Optical system	Greenough
Dimmable lighting	Yes
Magnification ratio	4,8:1
Tube	angled at 45°
Interpupillary distance	55 – 75 mm
Dioptr adjustment	On both sides
Gross weight	5,5 kg
Net weight	4 kg

OZL 441

Magnification ratio	4:1
Packing dimensions WxDxH	370x300x475 mm
Product dimensions WxDxH	330x235x380 mm

OZL 445

Magnification ratio	4,8:1
Packing dimensions WxDxH	345x325x475 mm
Product dimensions WxDxH	300x235x360 mm

Standard configuration

Model	Tube	Eyepiece	Field of view	Objective	Stand	Illumination
KERN			mm	Zoom		
OZL 441	Trinocular	WF 10x Ø 22 mm	Ø 23 – 5,5	1x – 4x	Pillar	1W LED (reflected light) 0.35W LED (transmitted light)
OZL 445	Binocular	HSWF 10x Ø 21.5 mm	Ø 28 – 6	0.75x – 3.6x	Pillar	1W LED (reflected light) 0.35W LED (transmitted light)

4 Assembly

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

The holder 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 figure on page 9*).

Both eyepieces are already fitted in the tube. You just need to remove the protective film which covers them.

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.

In general you should avoid using two eyepieces with different magnifications.

When **changing the eyepieces**, you must also loosen the **small silver screw** under the eyepiece on the tube connectors and once the new eyepiece is fitted, then it must be re-tightened.

With regard to the use of **transmitted light illumination** you must make sure that the **frosted glass stand insert 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 inserts** using the **adjusting screw** on the front side of the stand base.

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 (OZM 543, OZM 544). This enables you to fit and use digital cameras (*see section 5.9*).



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.

If the device has a camera connection (OZL 441), 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-44 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

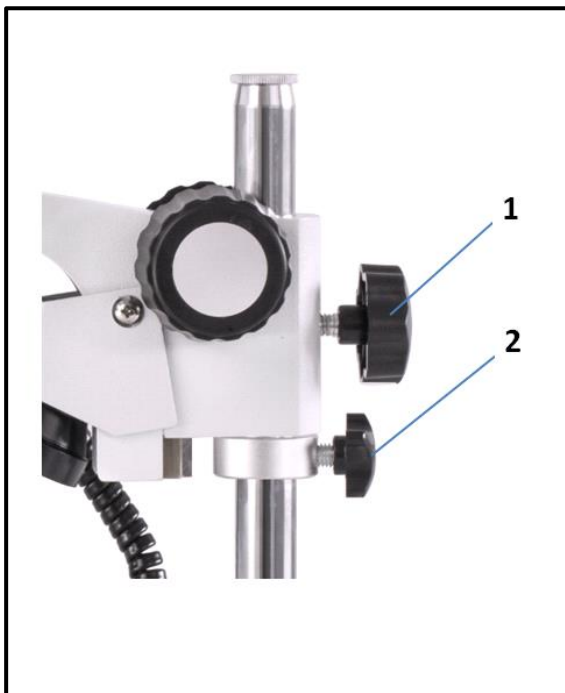
You can adjust the torque of the focus wheels by turning the ring which is fitted along the axis of the lefthand focus wheel.

To do this you need a special wrench which is included with delivery. The ring has holes which the wrench can hook into, so that you can then turn it in the desired direction.

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



Fixing the microscope holder

With a stereo microscope on a pillar stand, 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.

To primary way to fix the position is to use an adjusting screw (1) on the holder.

There is a metal ring which also ensures sufficient grip and which is fixed with a second screw (2) under the holder on the pillar. This metal ring proves to be particularly useful when the screw (1) on the holder is loosened, to swing the microscope head to the side.

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

The microscopes in the OZL-44 series have an adjustable **reflected and transmitted light illumination**.

The power supply is guaranteed by connecting the mains cable and pressing the **main switch on the right, rear corner**.

The **control wheel on the righthand side surface** of the stand base is responsible both for **on-/off-switching** and the adjustment of the **light intensity** of the **transmitted illumination**.

The same functions belong to the **control wheel on the lefthand side surface** of the stand base according to the **reflected illumination**.

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-44 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 Fitting and adjusting a camera (OZL 441)

You can connect special microscope cameras to trinocular devices in the OZL-44 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.



There is already an adapter fixed to the camera adapter connection (white varnishing), which is not suitable for C-Mount cameras. You firstly have to remove this adapter in order to attach an appropriate one.

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 Changing the bulb

LED

The devices in the OZL-44 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

OZL 441

OZL 441	Specifications - Objectives					
Eyepiece	Magnification	Standard 1,0x	Auxiliary objectives			
			0,5x	0,75x	1,5x	2,0x
WF 5x	Total magnification	5x - 20x	2,5x - 10x	3,75x - 15x	7,5x - 30x	10x - 40x
	Field of view mm	Ø 20 - 5	Ø 40 - 11	Ø 25 - 6,5	Ø 13 - 3,5	Ø 10 - 2,5
WF 10x	Total magnification	10x - 40x	5x - 20x	7,5x - 30x	15x - 60x	20x - 80x
	Field of view mm	Ø 23 - 5,5	Ø 52 - 12	Ø 30 - 7	Ø 15 - 4,8	Ø 11,5 - 3
WF 15x	Total magnification	15x - 60x	7,5x - 30x	11,25x - 45x	22,5x - 90x	30x - 120x
	Field of view mm	Ø 15,5 - 4	Ø 36 - 8,5	Ø 21 - 5	Ø 10,5 - 2,5	Ø 8 - 2
WF 20x	Total magnification	20x - 80x	10x - 40x	15x - 60x	30x - 120x	40x - 160x
	Field of view mm	Ø 10,5 - 3	Ø 25 - 5,8	Ø 14 - 3,5	Ø 7 - 1,8	Ø 5,5 - 1,5
Working distance		91 mm	170 mm	100 mm	42 mm	28 mm

OZL 445

OZL 445	Specifications - Objectives					
Eyepiece	Magnification	Standard 1,0x	Auxiliary objectives			
			0,5x	0,75x	1,5x	2,0x
WF 5x	Total magnification	3,75x - 18x	1,875x - 9x	2,81x - 13,5x	5,625x - 27x	7,5x - 36x
	Field of view mm	Ø 26 - 6	Ø 60 - 13	Ø 32 - 7	Ø 16 - 4	Ø 12,5 - 3
HWF 10x	Total magnification	7,5x - 36x	3,75x - 18x	5,625x - 27x	11,25x - 54x	15x - 72x
	Field of view mm	Ø 28 - 6	Ø 63 - 14	Ø 35 - 8	Ø 18 - 4	Ø 14 - 3
WF 15x	Total magnification	11,25x - 54x	5,625x - 27x	8,44x - 40,5x	16,875x - 81x	22,5x - 108x
	Field of view mm	Ø 19 - 4,5	Ø 43 - 9,5	Ø 24 - 5,5	Ø 12 - 3	Ø 9,5 - 2
WF 20x	Total magnification	15x - 72x	7,5x - 36x	56,25x - 54x	22,5x - 108x	30x - 144x
	Field of view mm	Ø 12,5 - 3	Ø 28 - 6	Ø 16 - 3,5	Ø 8 - 2	Ø 6 - 1,5
Working distance		86 mm	178 mm	96 mm	42,5 mm	25,5 mm

7 Features

Model outfit		Kern model		Order number
		OZL 441	OZL 445	
Eyepieces	WF 5x / \varnothing 16,2 mm	oo	oo	OZB-A4101
	WF 10x / \varnothing 22 mm	••		OZB-A4105
	WF 10x / \varnothing 21,5 mm		••	OZB-A4106
	WF 15x / \varnothing 15 mm	oo	oo	OZB-A4103
	WF 20x / \varnothing 10 mm	oo	oo	OZB-A4104
Auxiliary objectives	0,5x	o	o	OZB-A4201
	0,75x	o	o	OZB-A4202
	1,5x	o	o	OZB-A4204
	2,0x	o	o	OZB-A4205
C-Mount	1x	o		OZB-A4809
	0,3x	o		OZB-A4810
	0,5x	o		OZB-A4811
Stand	Pillar, with LED illumination (0,35W transmitted + 1W reflected light)	•	•	
Stand inlay	Frosted glass / \varnothing 95 mm	•	•	OZB-A4805
	black-white / \varnothing 95 mm	•	•	OZB-A4806
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-Konfiguration

o = 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 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 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.