

User instructions

Stereo microscope set

KERN

OZM-9

OZM 912(UK), OZM 913(UK), OZM 932(UK),
OZM 933(UK), OZM 952(UK), OZM 953(UK)

Version 1.0
01/2016





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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 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 each 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.

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 (if lighting unit is fitted).

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:

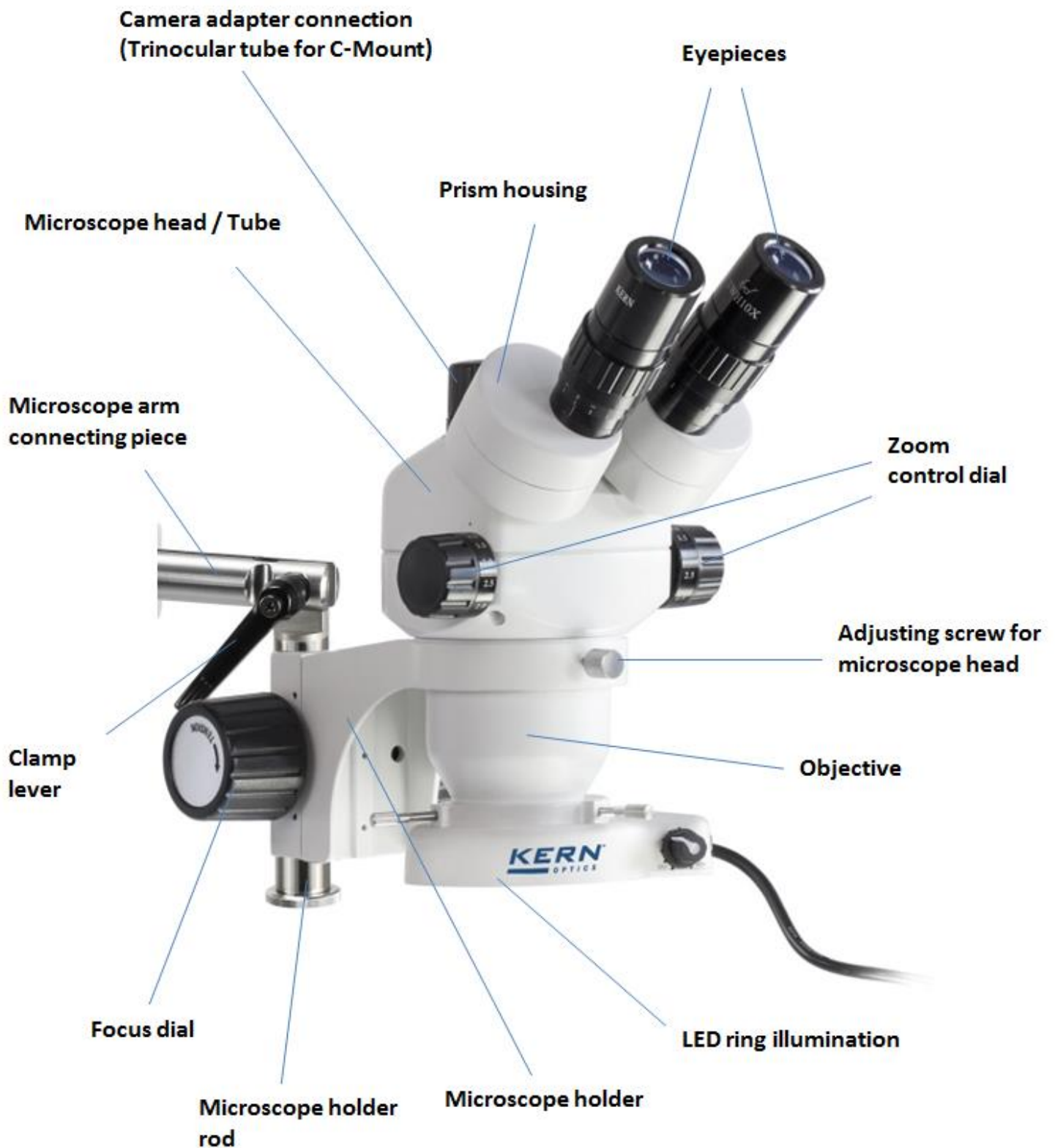
- Special cleaner for optical lenses
- Special optical cleaning cloths
- Bellows
- Brush

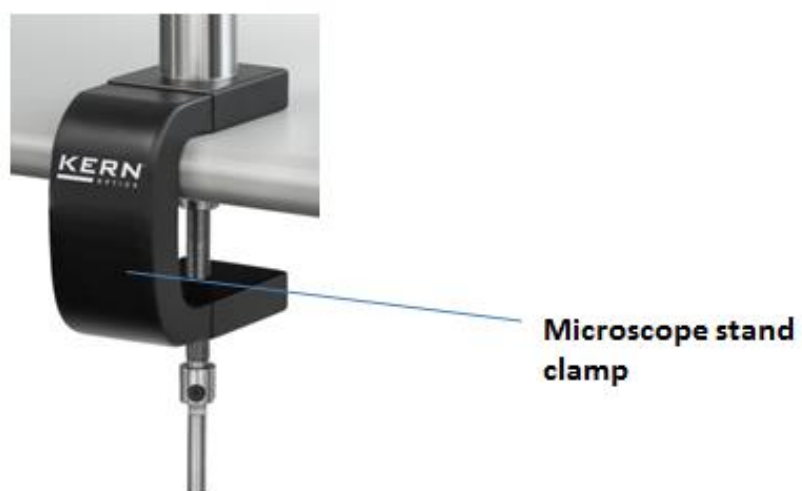
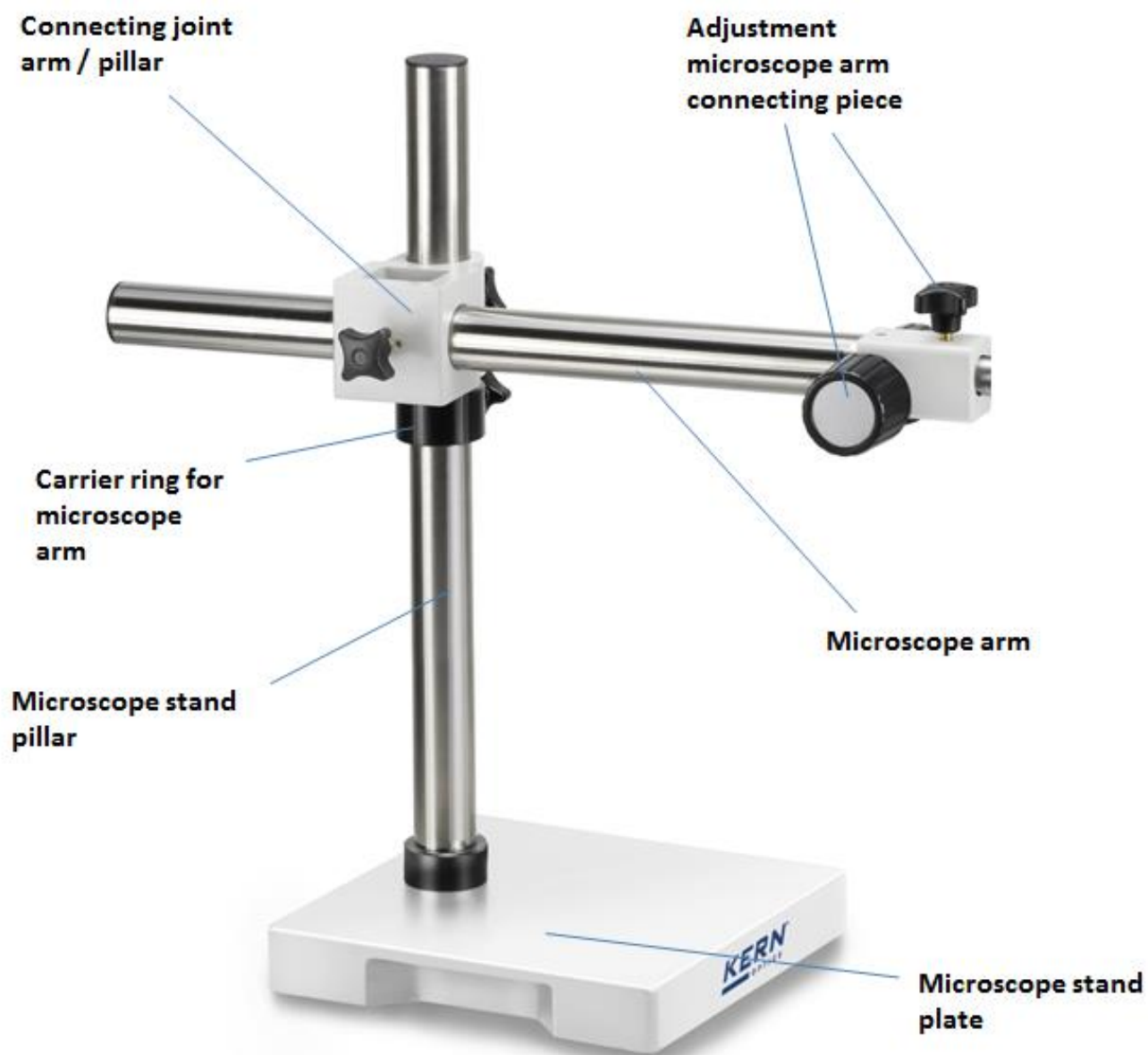
When handled correctly and checked regularly, the microscope should give many years of efficient service.

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

2 Nomenclature

Using the OZM-91 as an example
(Trinocular)





3 Basic data

Optical system	Greenough
Dimmable lighting	Yes
Magnification ratio	6,4:1
Tube	angled at 45°
Interpupillary distance	52 – 76 mm
Dioptr adjustment	On both sides
Eyepiece	HSWF 10x / Ø 23mm
Field of view (mm)	Ø 32,8 – 5,1

Standard configuration

Model	Microscope head		Stand	Holder	Illumination
	Tube	Objective Zoom			
KERN					
OZM 912	Binocular (OZM 546)	0,7× – 4,5×	Telescopic arm with plate (OZB-A5201)	With coarse focusing knob Adjustable torque of the hand wheels (OZB-A5301)	4,5 W LED ring light (OBB-A6102)
OZM 913	Trinocular (OZM 547)	0,7× – 4,5×	Telescopic arm with plate (OZB-A5201)	With coarse focusing knob Adjustable torque of the hand wheels (OZB-A5301)	4,5 W LED ring light (OBB-A6102)
OZM 932	Binocular (OZM 546)	0,7× – 4,5×	ball-beared double telescopic arm with plate (OZB-A5203)	With coarse focusing knob Adjustable torque of the hand wheels (OZB-A5301)	4,5 W LED ring light (OBB-A6102)
OZM 933	Trinocular (OZM 547)	0,7× – 4,5×	ball-beared double telescopic arm with plate (OZB-A5203)	With coarse focusing knob Adjustable torque of the hand wheels (OZB-A5301)	4,5 W LED ring light (OBB-A6102)
OZM 952	Binocular (OZM 546)	0,7× – 4,5×	Jointed arm with clamp (OZB-A5212)	With coarse focusing knob Adjustable torque of the hand wheels (OZB-A5301)	4,5 W LED ring light (OBB-A6102)
OZM 953	Trinocular (OZM 547)	0,7× – 4,5×	Jointed arm with clamp (OZB-A5212)	With coarse focusing knob Adjustable torque of the hand wheels (OZB-A5301)	4,5 W LED ring light (OBB-A6102)

4 Assembly

The assembly of the microscope stand together with the holder has to be carried out as follows:

1. Microscope stand base

a. Stand clamp:

Clamp and pillar are firmly connected to each other.

Attach the clamp with help of the fastening screw onto a stable edge of a table.

b. Stand plate:

Attach the stand pillar with help of the three screws onto the stand plate.

Afterwards place the plate on an even and stable table surface.

2. Microscope arm

Attach the arm to the pillar with help of the joint, which is already fitted to the arm. Fasten the appropriate screws for arm, joint and carrier ring.

3. Connecting joint arm - holder

Attach the microscope arm connecting piece onto the appropriate microscope arm end (in case they are not already connected to each other).

If necessary, fasten by Allen screw.

Attach the microscope holder rod to the microscope arm connecting piece by using the clamp lever. Please apply the washer when doing this.

4. Microscope holder

Remove the screw cap from the lower end of the microscope holder rod.

Attach the microscope holder to the rod and refit the screw cap.

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.

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**.

In order to ensure the incident illumination, the LED ring light needs to be attached to the bottom of the objective housing of the microscope head. The three fastening screws on the holder of the ring light are used for the mounting.

Therefor it is important to pay attention to the groove around the objective housing, which is intended to be the socket for the screws.

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 913, OZM 933, OZM 953). This enables you to fit and use digital cameras (remove protective cap first) (see *section 5.8*).

5 Operation and functionality

5.1 Getting started

After assembly, if the microscope is ready for use, then for devices with lighting you must first establish a **power connection** using the cable supplied.

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

If the device has a camera connection (OZM 913, OZM 933, OZM 953), then for **binocular** use, you must let the **trinocular toggle rod** on the back of the microscope head stay **slid-in**.

For trinocular use (camera connection) see section 5.8.

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 Adjust 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 OZM-9 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

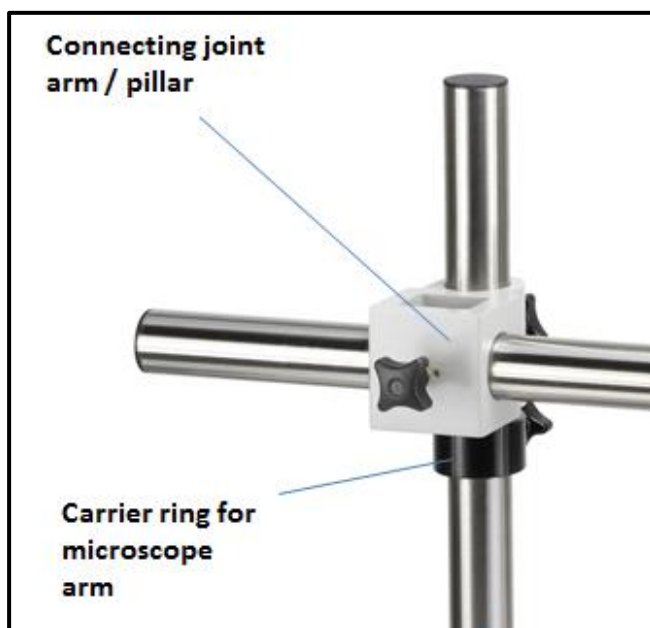
Torque of the focus wheels

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.

Adjustment of height and arm distance



Fixing the microscope holder

In order to set the required height of the microscope head, at first the carrier ring for the microscope arm needs to be located at the appropriate position on the stand pillar. Afterwards you put the connecting joint between arm and pillar onto the carrier ring, so that the ring holds the joint.

The arm is now rotatable around the pillar and fixable in the preferred position.

Furthermore the arm can be moved back and forth, so that the optimum distance between stand pillar and microscope head can be set.

In order to effect an inclined position of the microscope head, you need to vary the alignment of the joint between microscope holder rod and microscope arm connecting piece and fasten it with help of the clamp lever.

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



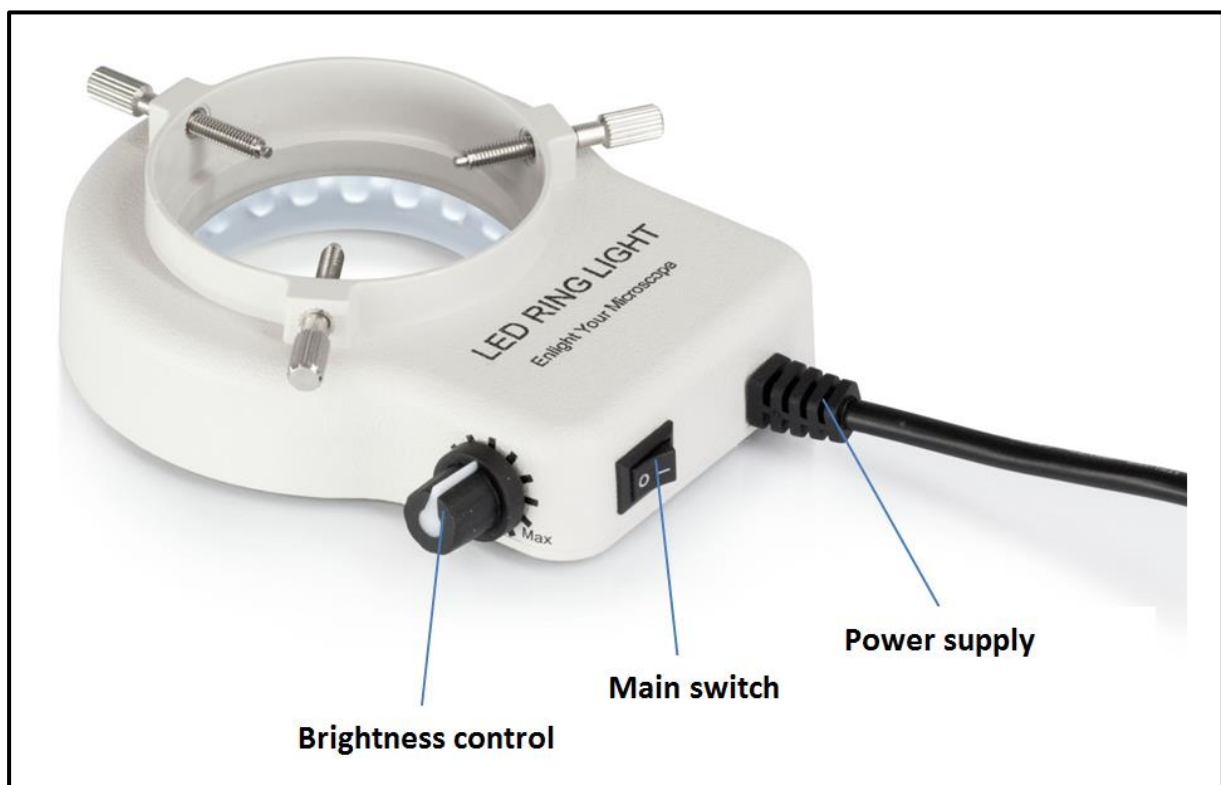
High Eye Point eyepiece
(identified by the glasses symbol)

5.7 Brightness adjustment

There is only the usage of incident illumination available when working with KERN stereo microscope sets. Therefore a LED ring light (see *picture below*) is required, that can be mounted to the bottom of the microscope head (see *chapter 4 Assembly*).

Provided that the power connection is established, the illumination can be switched on by using the main switch, which is located at the housing rear of the illumination unit.

Furthermore it is possible to adjust the light intensity. Therefore you have to use the control knob on the side of the housing. Depending on which way you turn the knob, the light will become lighter or darker.



Control elements for the lighting unit

5.8 Fitting and adjusting a camera (OZM 913, OZM 933, OZM 953)



You can connect special microscope cameras and reflex cameras to trinocular devices in the OZM-9 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 (see figure above).

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 reflex camera or 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 is put in the adapter connection once the cap is removed.

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.

For special measuring applications in conjunction with a microscope camera, when using the 1.0x C-mount, there is the option of screwing in a second adapter with an integrated micrometre in front of the camera.



C-mount adapter

You also need an adapter to connect a reflex camera. But in contrast to the microscope camera this does not have a C-mount thread, but has a bayonet connection which fits directly on the camera objective.

There are also three different adapters to choose from. They all have a 3,5x magnification and differ in the fact that they come from different camera manufacturers. **Canon, Nikon and Olympus** cameras can be used for this.

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, when **adapters with integrated magnification (0,3x, 0,5x)** are used. In order to be able to bring both images into focus, **the focus can be adjusted by those adapters.**

5.9 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.

As you can see in Chapter 7 “Features”, you can choose from five different achromatic corrected objectives (0.37x, 0.5x, 0.7x, 1.5x, 2.0x), depending on what is required.

You can fit these objectives by simply screwing them onto the bottom side 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.

6 Optical data

Eyepiece	Specifications - Objectives						
	Magnification	Standard 1,0x	Auxiliary objectives				
			0,37x	0,5x	0,7x	1,5x	2x
HSWF 10x	Total magnification	7x – 45x	2,59x – 16,65x	3,5x – 22,5x	4,9x – 31,5x	10,5x – 67,5x	14x – 90x
	Field of view mm	Ø 32,8 – 5,1	Ø 88,8 – 13,8	Ø 65,7 – 10,2	Ø 46,9 – 7,3	Ø 21,9 – 3,4	Ø 16,4 – 2,6
SWF 15x	Total magnification	10,5x – 67,5x	3,89x – 25x	5,3x – 33,8x	7,4x – 47,2x	15,8x – 101,3x	21x – 135x
	Field of view mm	Ø 24,3 – 3,8	Ø 65,6 – 10,2	Ø 48,6 – 7,6	Ø 34,7 – 5,4	Ø 16,2 – 2,5	Ø 12,1 – 1,9
SWF 20x	Total magnification	14x – 90x	5,18x – 33,3x	7x – 45x	9,8x – 63x	21x – 135x	28x – 180x
	Field of view mm	Ø 20 – 3,1	Ø 54,1 – 8,4	Ø 40 – 6,2	Ø 28,6 – 4,4	Ø 13,3 – 2,1	Ø 10 – 1,6
SWF 30x	Total magnification	21x – 135x	7,77x – 50x	10,5x – 67,5x	14,7x – 94,5x	31,5x – 202,5x	42x – 270x
	Field of view mm	Ø 12,9 – 2	Ø 34,7 – 5,4	Ø 25,7 – 4	Ø 18,4 – 2,9	Ø 8,6 – 1,6	Ø 6,4 – 1
Working distance		110 mm	275 mm	195 mm	145 mm	50 mm	35 mm

7 Trouble shooting

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 dioptr adjustment is not correct
	The brightness adjustment is not correct

8 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.

9 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.

10 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.