MAGUS STEREO D9T LCD
DIGITAL STEREOMICROSCOPE

USER MANUAL

MAGUS

Before using the microscope, please read this user manual carefully to study the instrument design, operation modes and procedures, operational limitations, and safety precautions.

Due to the continuous improvements in the microscope design, this manual may not reflect minor design changes that do not affect the microscope performance and operation procedures.

SAFETY PRECAUTIONS

MICROSCOPE

1. To avoid electric shock or fire, switch off and unplug the microscope before assembling the microscope, replacing the bulb or fuse.
2. Do not disassemble the microscope, except for the removable parts specified in this manual. This can seriously damage its performance. In case of malfunction, please contact a qualified service center.
3. Make sure that the input voltage of the microscope matches that of the local power supply. Using the power supply with the wrong input voltage may cause a short circuit or fire.
4. Using an incorrect bulb, fuse, or power cord may damage the microscope or cause a fire. The power cord must be grounded reliably.
5. In order to avoid a short circuit or any other malfunction, do not expose the microscope to high temperatures or humid or moist environments for a long period of time.
6. If water splashes on the microscope, immediately switch the power off, unplug the power cord, and wipe off the water with a dry cloth.
7. The microscope light bulb generates high temperatures during operation. To avoid burns, do not touch the collector lens or the bulb itself for 10 minutes after the lights have been switched off. To prevent fire, do not place paper or flammable or explosive materials near the air vents on the underside of the base.
8. The microscope employs a coaxial coarse/fine focusing mechanism. Do not turn the left/right coarse/fine focusing knobs in opposite directions. When the limit is reached, you should no longer rotate the coarse focusing knob.
9. Do not expose the microscope to direct sunlight or other light sources. Do not expose the microscope to high temperatures, humidity, or dust; otherwise, it may cause condensation, mold growth, or contamination of the optical parts.

10. Do not touch the lens surfaces with your fingers. Use a brush and special lens-cleaning solution to keep the lenses clean.
11. Bulb installation. This microscope employs LED bulbs as a light source. The bulbs should be replaced by the equipment vendor or in a qualified service center. If you replace the LED yourself, the illumination function may be impaired.

CAMERA

1. Never view the sun, another bright source of light or a laser through a camera – THIS IS DANGEROUS FOR YOUR EYESIGHT!
2. Do not disassemble the camera yourself.
3. Keep the camera away from moisture and do not use it in the rain.
4. Protect the camera from shocks, excessive stress from other objects.
5. Store the camera away from corrosive environments, household and car heaters, switched-on light bulbs and open flames.
6. If there is dirt on the optical surfaces, first blow off dust and small particles or brush them off with a soft brush, then clean the surface with a soft, clean cloth moistened with alcohol or ether.
7. If any instrument part or power component has been swallowed, seek medical attention immediately.

MONITOR

1. Make sure that the input voltage of the monitors matches that of the local power supply. Using the power supply with the wrong input voltage may cause a short circuit or fire.
2. Do not use the damaged power source.
3. Do not use the damaged power cord.
4. Do not insert foreign objects into the slot on the monitor body.
5. Do not expose the monitor to high temperatures or humidity for a long time.
6. If water splashes on the monitor, immediately switch the power off, unplug the power cord, and wipe off the water with a dry cloth.
7. Protect the monitor from shocks, excessive stress from other objects.
8. Store the monitor away from corrosive environments, household and car heaters, switched-on light bulbs and open flames.

CONTENTS

MAGUS Stereo D9T LCD Digital Stereomicroscope has been designed and tested in accordance with the international safety standards. If properly used, the microscope is safe for the customer's health, life, property, and the environment. Proper maintenance of the microscope is a prerequisite for its reliable and safe operation.

1 DESCRIPTION OF THE MICROSCOPE

PURPOSE

The microscope is used for observing three-dimensional transparent and opaque objects and performing various accurate operations with the specimen during the observations, such as dissection in biology, studying rock samples in mineralogy, various process operations in a semiconductor industry, as well as in other fields of science and technology.

The microscope is used in biomedical laboratories, biotechnology, material science, pharmaceutical research, agriculture, environmental studies, and forensics. The microscope can be used for scientific purposes, laboratory diagnosis, and education.

The microscope provides an upright three-dimensional image of the specimens being viewed. Observations can be made under both natural and artificial light in reflected and transmitted light.

The microscope's ZOOM system allows for smooth magnification changes by means of a rotary knob. The system is designed to ensure that there is no loss of image, which is characteristic of stepwise changes in magnification. The microscope maintains consistent focus and provides an upright (not inverted) specimen image. It features the Greenough optical design.

The microscope head design enables a camera to have images displayed on a computer screen and save them as files.

SPECIFICATIONS (TABLE 1)

Microscope	
Magnification, x	7–63 (3.5–315)*
Zoom objective lens, magnification, x	0.7–6.3
Zoom ratio	9:1
Working distance, mm	110 (188; 40.4)*
Field of view, mm	31.4–3.4 (62.85–1.745)*
Microscope head	Trinocular, 360° rotatable, can be locked in any desired position 45° inclined Interpupillary distance: 53–75mm Eyepiece diameter: 30mm
Eyepieces, x/field, mm	10x/22mm, eye relief *10x/22mm with a scale, *15x/15mm, *16x/15mm, *20x/12mm, *25x/9mm Diopter adjustment (each barrel): ±5 dp
Focusing mechanism	Coaxial coarse & fine focusing knobs on both sides Focusing range: 83mm Fine focusing scale value: 2µm. Coarse focusing tension adjusting knob
Transmitted light source	5W LED
Reflected light source	Oblique illumination – 3W LED
Stage plate	Black-and-white plate Ø90mm White plate Ø90mm Transparent plate Ø90mm
Auxiliary objective lens, x	0.5**; 2**
AC power supply, V/Hz	220/50
Operating temperature range	+5... +35°C
Operating humidity range	20...80%

Camera	
Number of megapixels	2
Sensor	SONY Starvis CMOS
Color/monochrome	color
Maximum resolution, pix	1920x1080
Sensor size	1/2.8" (5.57x3.13mm)
Pixel size, μm	2.9x2.9
Light sensitivity	1300mV with 1/30s
Exposure	0.04ms–1000ms
Video recording	+
Frame rate, fps at resolution, pix	60@1920x1080 (HDMI)
Image format	*.jpg
Video format	*.h264, *.mp4
Spectral range, nm	380–650 (IR-filtered)
Shutter type	ERS (electronic rolling shutter)
System requirements	Computer connection is not required
Software	HDMI: built-in
Mount type	C-mount
Illuminator body	metal
Power supply	12V/1A AC power adapter

Monitor	
Type of matrix	IPS
Screen diagonal, inch	13.3
Screen resolution, pix	1920x1080 (Full HD)
Aspect ratio	16:9
Brightness, cd/m2	400
Number of displayed colors	16.7m
Contrast ratio	1000:1
Horizontal/vertical viewing angle, °	178/178
Viewable screen size (WxH), mm	295x165
Pixel pitch (WxH), mm	0.154x0.154
Display refresh rate, Hz	60
Type of matrix backlight	LED
LED backlight lifetime, h	50000
Interface	HDMI
Power supply	AC 110–220V, DC 5–12V/1A (Type-C)
Power consumption, W	12 (maximum)
Dimensions without package (WxHxD)	280mm×463mm×335mm
Package dimensions (WxHxD)	447mm×422mm×675mm
Weight without package	9.8kg
Weight with package	12.3kg

*** The magnification of the microscope can be increased by using optional eyepieces and auxiliary objective lenses.**
**** Not included in the kit, available on request.**
The manufacturer reserves the right to make changes to the product range and specifications without prior notice.

MICROSCOPE KIT

The microscope kit includes the following main components:

— base with integrated transmitted light source and power supply unit

— stand with focusing mechanism

— microscope head – objective part and eyepiece tubes

— power cord

— digital camera

— monitor

— set of accessories.

See Section 7 of the User manual for a full kit contents.

Upon special request, the microscope may be supplied with various accessories that are not included in the standard delivery and expand the opportunities for microscopy-based research. Optional accessories include:

— 15x/15mm, 16x/15mm, 20x/12mm, 25x/9mm eyepieces, 10x/22mm eyepiece with a scale

— 0.5x and 2x auxiliary objective lenses

— reflected ring light illuminator

— epifluorescence ring light

— polarizer/analyzer set

— gooseneck LED light

— gem clip.

The general view of the microscope is given in Fig. 1.

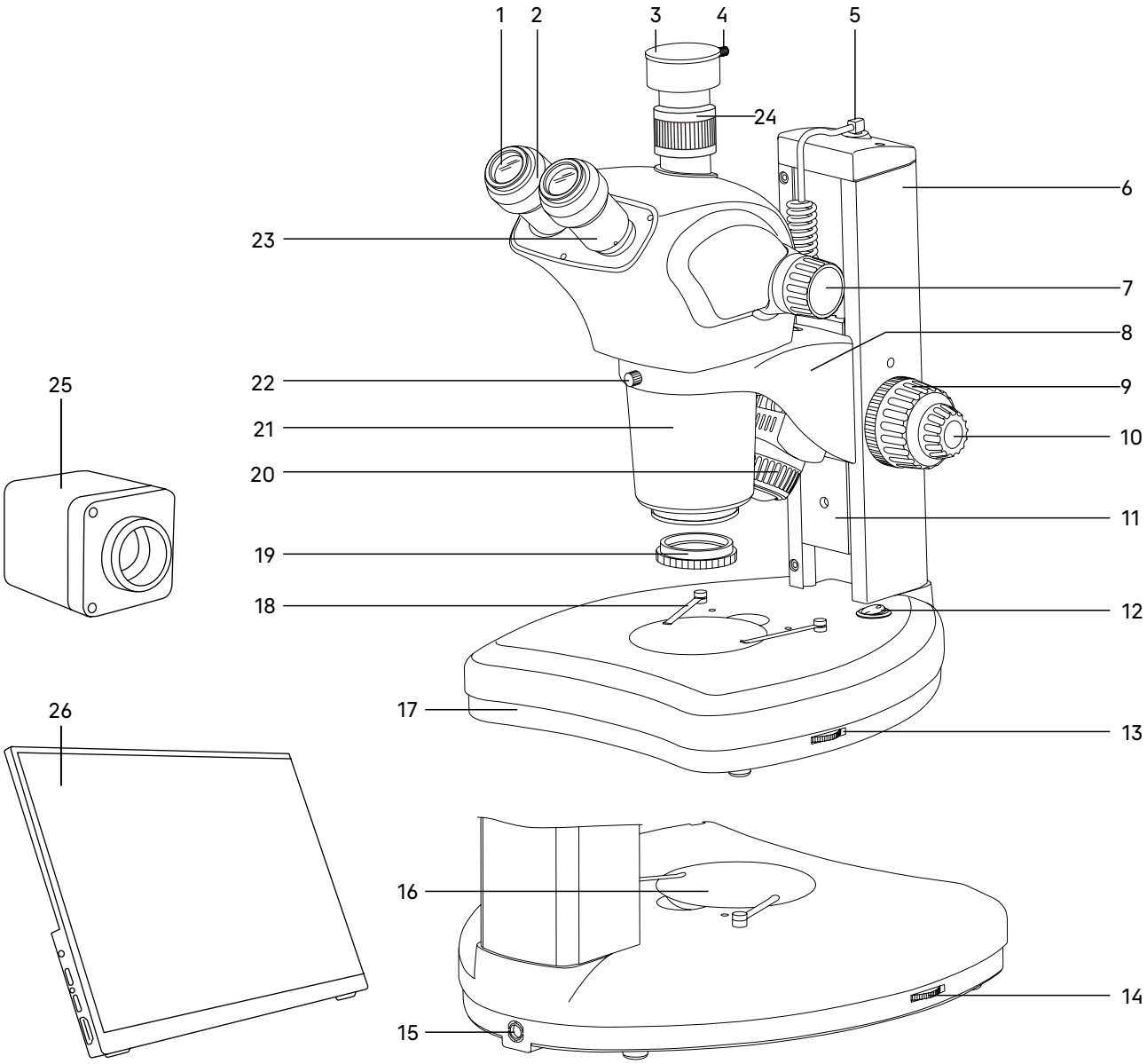


Fig. 1. MAGUS Stereo D9T LCD Microscope

1. Eyepieces
2. Diopter adjustment (each barrel)
3. Trinocular tube dust cap
4. Dust cap or C-mount adapter screw
5. Connector for reflected light illuminator
6. Stand
7. Zoom knob
8. Microscope head mount
9. Coarse focusing knob
10. Fine focusing knob
11. Focusing mechanism
12. ON/OFF switch
13. Transmitted light brightness adjustment ring
14. Reflected light brightness adjustment ring
15. Power cord connector
16. Stage plate
17. Base
18. Specimen holders
19. Auxiliary objective lens (optional)
20. Reflected light illuminator
21. Objective part
22. Microscope head fixing screw
23. Eyepiece tubes
24. Trinocular tube
25. Camera
26. Monitor

2 MICROSCOPE PARTS

STAND AND BASE WITH TRANSMITTED LIGHT ILLUMINATOR

The stand **6** (Fig.1) is mounted on the base **17** (Fig. 1). The stand is not removable.

Inside the stand is the focusing column **11** (Fig. 1), on which the microscope head mount **8** (Fig. 1) is fixed. On top of the stand is the reflected light illumination socket **5** (Fig. 1).

The base **17** (Fig. 1) houses a power supply unit and a transmitted light LED. The frosted glass plate **16** (Fig. 1) provides light scattering and uniform illumination of the entire surface of the specimen. The switch **12** (Fig. 1) is used to switch the light source on and off.

The brightness of the reflected light illuminator is adjusted using the ring **14** (Fig. 1), transmitted light brightness – using the ring **13** (Fig. 1).

The base also serves as a stage. The specimen is placed on the stage plate **16** (Fig. 1). The stage plate is inserted in the base opening. The diameter of the plate is 90mm.

The specimen can be fixed on the plate by two holders **18** (Fig. 1).

FOCUSING MECHANISM

The focusing mechanism **11** (Fig. 1) moves in the stand **6** (Fig. 1), bringing the specimen into focus in accordance with the specimen height and the working distance of the objective.

The microscope head mount **8** (Fig. 1) is secured on the focusing column. The total vertical travel range is 83mm.

The microscope head is inserted in the mount and secured by the fixing screw **22** (Fig. 1). The microscope head can be turned sideways in the mount and fixed in any desired position.

MICROSCOPE HEAD

The microscope head combines eyepiece tubes and a zoom objective lens into a single piece.

The eyepieces **1** (Fig. 1) are mounted in the eyepiece tubes **23** (Fig. 1) of the microscope head. The tubes are adjusted to the observer's interpupillary distance, ranging from 53 to 75 mm.

A C-mount 1x adapter is installed in the trinocular tube **24** (Fig. 1) of the microscope head to fix the camera. The camera **25** (Fig. 1) is used to transmit the image to a computer screen or monitor/TV.

OBJECTIVES AND EYEPIECES

The zoom objective lens **21** (Fig. 1) has 0.7-6.3x magnification and allows for smooth change of magnification up to 9 times with no loss of quality and maintaining a large working distance of 110mm.

The microscope magnification is changed by rotating the knob **7** (Fig. 1).

The 10x eyepieces have a linear field of view of 22mm (WF 10x/22). Each eyepiece has a diopter adjustment **2** (Fig. 1). The eyepiece tubes have a secure eyepiece mount design that prevents the eyepieces from accidentally falling out when the microscope is moved. The eyepieces are fixed in the tubes by screws.

Eyepieces with 15x, 20x, 25x magnification and a 10x eyepiece with a scale are optional. Different eyepieces change the total magnification and field of view. The working distance does not change when eyepieces are changed.

The microscope can also be fitted with 0.5x and 2.0x auxiliary objective lenses. The auxiliary objective lens changes the microscope's working distance, total magnification, and field of view.

The specifications of the microscope (magnification, field of view, working distance) equipped with various auxiliary objective lenses and 10x eyepiece are given in Table 2.

Table 2:

Objective	Objective magnification, x	Magnification, x	Field of view, mm	Working distance, mm
Basic configuration	0.7–6.3	7–63	31.43–3.49	110
0.5x auxiliary objective lens	0.35–3.15	3.5–31.5	62.85–6.98	188
2x auxiliary objective lens	1.4–12.6	14–126	15.71–1.745	40.4

REFLECTED LIGHT ILLUMINATOR

The microscope is designed to be fitted with one of two reflected light illuminators or both: a ring light for shadow-free lighting and an oblique illuminator.

The oblique illuminator **20** (Fig. 1) is fixed in the microscope head mount. The illuminator cord is plugged in the connector **5** (Fig. 1).

The ring light is secured to the objective part with three screws. It connects to the AC power supply through a separate power supply unit independent of the microscope. The ring light is not included in the standard scope of delivery and should be purchased separately. A daylight illuminator or epifluorescence LED lights (B, G, V, UV) are available for purchasing.

If necessary, additional reflected light devices can be used: fiber illuminator, gooseneck spot light (not included in the standard delivery).

CAMERA

The digital camera equipped with the SONY Starvis backlit color CMOS sensor delivers low noise performance and high light sensitivity even in low-light conditions. It is an autonomous camera that does not require connection to a computer or the installation of additional software.

The camera is mounted into the trinocular tube using the C-mount adapter from the microscope kit.

The camera is powered via a 12V/1A AC power adapter.

MONITOR

The monitor is designed to use a visualization system of the MAGUS microscope. It is connected to the camera mounted on the microscope to display the real-time images.

The monitor is installed on the table or shelf on a folding mount or attached directly to the camera or microscope stand.

The monitor is powered by AC, DC 5-12V/1A (Type-C).

3 UNPACKING AND ASSEMBLING THE MICROSCOPE

— Remove the microscope from the package.

— Check the scope of delivery using Section 7 of the User Manual.

— Place the microscope base on the flat surface.

— Insert the stage plate **16** (Fig. 1). To observe transparent objects, use a glass plate. To observe opaque objects, use a black-and-white plate. To increase contrast, the white side of the plate is used for dark-colored objects, while the black side is for light-colored objects.

— Install the specimen holders **18** (Fig. 1).

— Install the microscope head in the ring of the mount **8** (Fig. 1). Secure the microscope head by the fixing screw **22** (Fig. 1). Do not overtighten the screw.

— The eyepieces have a diopter adjustment. Rotate the diopter ring to adjust the "0" on its scale to the indicator "|" on the eyepiece body. Insert the eyepieces into the tubes until they are fully seated. Secure with the screws. When installing or removing the eyepiece, hold the cover instead of the diopter ring.

— Set the brightness adjustment rings **13** and **14** (Fig. 1) to the minimum position.

— Plug the power cord to the connector **15** (Fig. 1). Plug the power cord into an AC outlet.

— Make sure that all the components are securely and safely mounted.

— Check and sort the supplied accessories and tools in the correct order. Keep them in proper order to avoid confusion.

4 OPERATION

SWITCHING ON THE ILLUMINATION

Before switching on the ON/OFF switch, make sure that the input voltage of the microscope power supply matches the local mains voltage. If not, do not switch on the microscope. Improper input voltage may result in a short circuit or fire.

Make sure that the power cord is plugged into the connector on the back panel of the microscope stand.

Turn the ON/OFF switch **3** (Fig. 2) to "–" position (ON). Transmitted light and reflected light illuminators are switched on.

For the reflected light microscopy, the illuminator **2** (Fig. 2) is used, and its light intensity is adjusted by the ring **4** (Fig. 2). For the transmitted light microscopy, the illuminator brightness is adjusted by the ring **5** (Fig. 2).

Before switching off the microscope, rotate the rings **4** and **5** (Fig. 2) to reduce the light intensity to the minimum.

Use the ring light if you need shadow-free lighting to observe a specimen. The ring light is mounted on the groove **8** (Fig. 2).

PLACING THE SPECIMEN

Choose a frosted glass or opaque stage plate based on the object to be viewed and the intended research. The frosted glass stage plate is used for observing transparent and translucent objects in the transmitted and reflected light. Opaque objects are studied in reflected light. When observing light-colored objects, you should use the black side of the stage plate. When observing dark-colored objects, use the white side.

Insert the stage plate into the opening in the base.

Place the specimen on the stage plate. Secure it with the specimen holders as necessary. Position the specimen so that the examined part is in the center of the stage plate, i.e. in the optical path.

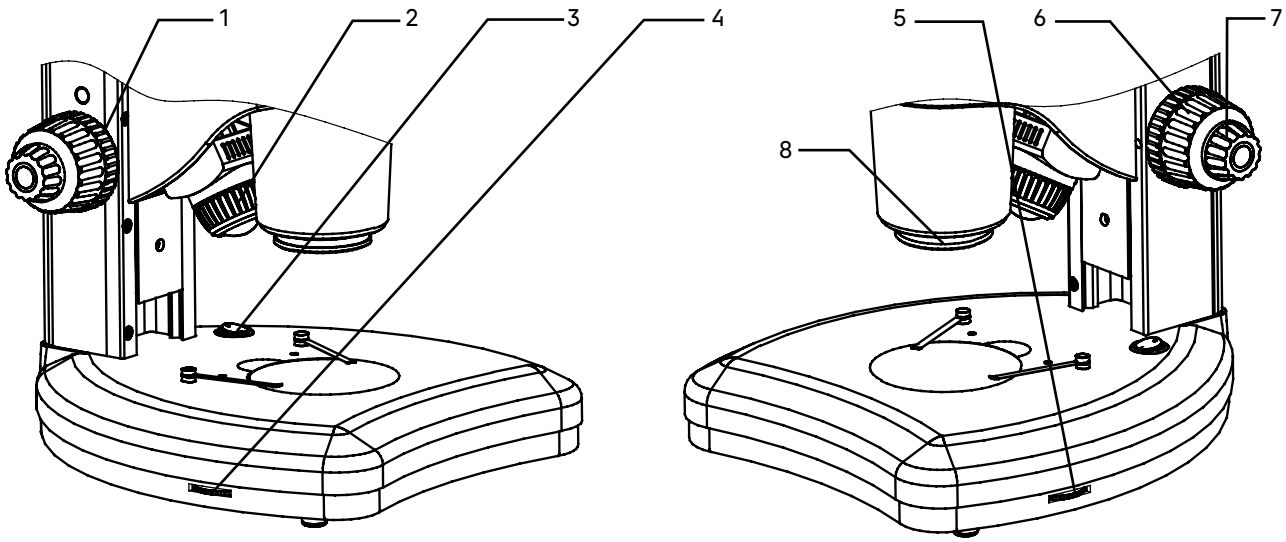


Fig. 2. Placing the specimen

FOCUSING ON THE SPECIMEN

Set the minimum magnification of the 0.75x objective by rotating the zoom knob **7** (Fig. 1). The zoom knobs are on both sides of the microscope head.

Rotate the knobs **6** (Fig. 2) to move the focusing mechanism so that the distance between the specimen and the objective approximately corresponds to the working distance of the objective according to the specifications given in Table 2.

While looking through the right eyepiece (with your left eye closed), rotate the focusing knobs slowly to bring the specimen into focus.

When using high magnification, use a fine focusing knob **7** (Fig. 2) for accurate adjustment.

The tension of the focusing knob is adjustable and is preset by the manufacturer. With properly adjusted tension, the microscope head does not lower under its own weight. If you need to adjust the tension of the focusing knob, use the ring **1** (Fig. 2). By rotating it counter-clockwise, you loosen the tension, and by rotating it clockwise, you tighten it. Too high a tension can cause inconvenience in the operation.

ADJUSTING THE EYEPIECE TUBES

Use the eyepiece diopter adjustment to compensate for the observer's ametropia. Start by setting the diopter adjustment on both eyepieces to the zero. To do this, rotate the ring **2** (Fig. 1) to adjust "0" to the indicator "|".

While looking through the right eyepiece (with your left eye closed), bring the specimen into focus. While looking through the left eyepiece (with your right eye closed) and not touching the focusing knobs, bring the specimen into sharp focus in the left eyepiece by rotating the diopter adjustment ring **2** (Fig. 1).

The adjustment range is ±5 diopters. The number on the ring corresponds to the diopter adjustment of the eyes. The indicator on the side is used for marking.

We recommend memorizing your diopter adjustment value for future reference.

Adjust the distance between the eyepieces to your interpupillary distance by moving the eyepiece tubes closer or further apart until you see a single circular image when looking through the eyepieces with both eyes.

Set the zoom knob **2** (Fig. 3) to the maximum magnification: 6.3. Bring the specimen into focus and adjust the diopter settings on both eyepieces. Set the zoom knob to the minimum magnification: 0.7. Re-focus and re-adjust the eyepiece diopter settings. Return to the high magnification. With proper diopter adjustment, there will be little or no loss of focus when the lens magnification is changed.

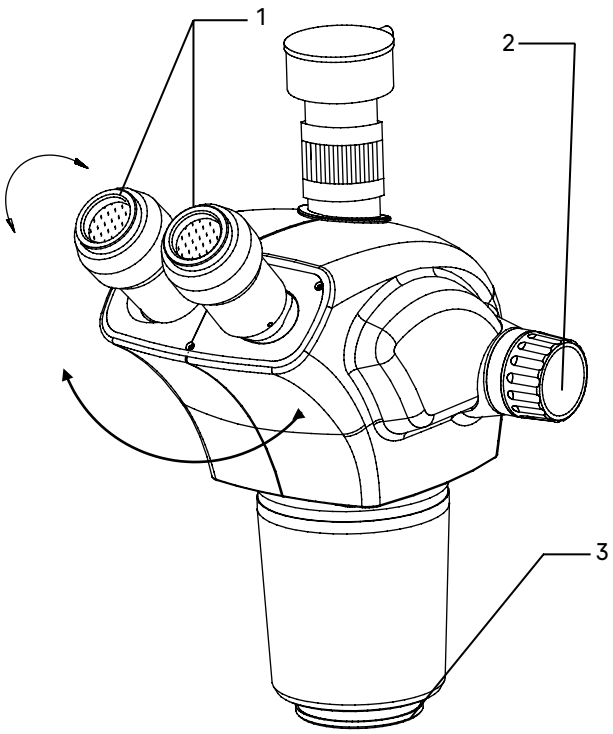


Fig. 3. Adjusting the eyepiece tubes

CALCULATING THE TOTAL MAGNIFICATION

The total magnification is the eyepiece power multiplied by the objective power. The objective magnification corresponds to the number on the knob **2** (Fig. 3) located opposite the line. You should also consider the magnification of the auxiliary objective lens, if you use it.

The microscope magnifications in the objective end positions using the 10x/22mm eyepiece and various auxiliary objective lenses are given in Table 2.

CALCULATING THE FIELD OF VIEW

The field of view is calculated by dividing the eyepiece field number by the objective magnification. You should also consider the magnification of the auxiliary objective lens, if you use it.

The microscope field of view in the objective end positions using the 10x/22mm eyepiece and various auxiliary objective lenses is given in Table 2.

A stage micrometer (calibration slide) is used to accurately determine the field of view of the microscope.

USING THE CAMERA

The digital camera is equipped with a 2MP sensor producing a realistic image in Full HD resolution (1920x1080 pixels).

The microscope is designed to observe a specimen through the eyepieces and to photograph the specimen. The trinocular tube **2** is located at the top of the microscope head. When not in operation, it is covered with the dust cap **4**.

It is important that you choose a proper camera to solve specific tasks with the microscope – displaying the image viewed through the microscope on a computer screen or monitor in real time, taking pictures or shooting a video, saving data to create a database, demonstrating visual content or live streaming. You should pay attention to the camera's pixel size and sensor size, resolution, and data rate. The wrong camera will not allow taking good quality pictures, which will distort the results of the observation.

To mount a camera:

— Loosen the screw **1**. Remove the dust cap **4** from the trinocular tube.

— The microscope kit includes a C-mount adapter. Connect the camera to the adapter.

— Fit the camera **6** into the tube **2** and secure it with the screw **1**.

— Pull out the beam splitter lever **3** as far as it will go. The knob is in the pulled-out position when the trinocular tube is not used.

— Switch on the camera according to the manual, adjust the image.

— If the image is blurred, adjust the focus using the ring on the trinocular tube to ensure an accurate and sharp image.

1. Dust cap screw
2. Trinocular tube
3. Beam splitter lever
4. Dust cap
5. Centering screws

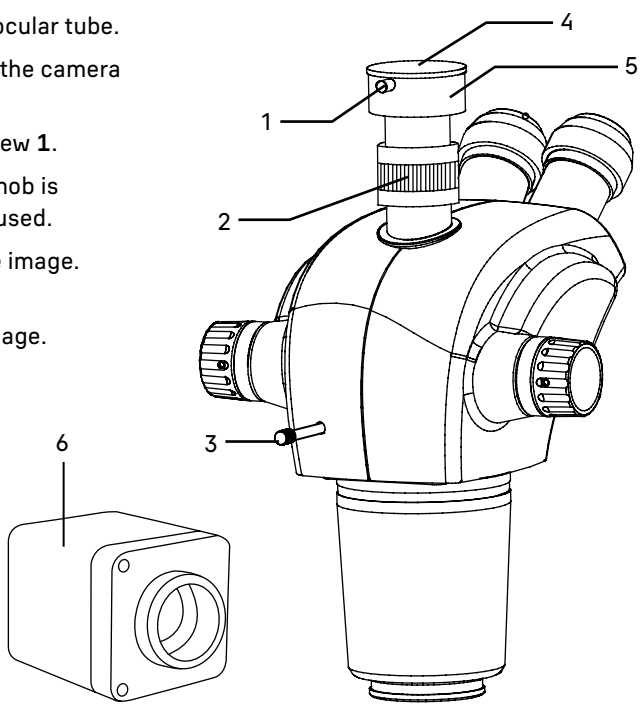


Fig. 4. Mounting a camera

If there is a strict requirement to synchronize the image in the eyepieces and camera (coincidence between the image center and direction), you should adjust the camera image using three centering screws **5**. Do it as follows:

— Set the beam splitter lever **3** to the eyepiece position. While observing the specimen through the eyepieces, find a distinctive point in the field of view (an easily identifiable target, such as point S in Fig. 5a), move the object on the stage so that the point is in the center of the field of view, as shown in Fig. 5b. To do this, you should use a special calibration slide instead of a specimen slide and an eyepiece with a reticle in place of an ordinary one.

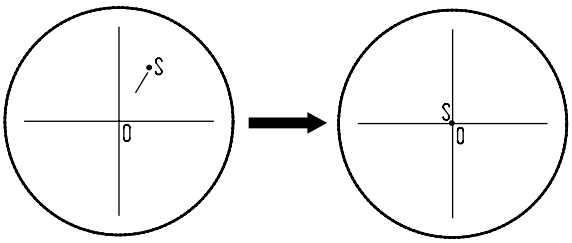


Fig. 5. Adjusting the camera image

— Pull out the beam splitter lever **3** to the camera position. Look at the specimen on a monitor or display screen and make sure that the image of the target is in the center of the field of view. If the image deviates from the center of the field of view, adjust three centering screws **5** on the trinocular tube to move the target towards the center.

— Move the specimen and check whether the image of the specimen on the monitor or display screen moves in the same direction as the specimen does. If the image moves in another direction, you should adjust the camera position. Loosen the lock screw **1** (Fig. 5), rotate the camera so as to make the displayed image direction in line with the direction of stage movement, then secure the screw.

USING THE MONITOR

The IPS matrix delivers a bright image with large viewing angles, which allows you to look at the display even at an angle with no color distortion.

To display the image on the screen:

— Attach the monitor **4** to the camera **1** using the fasteners from the kit.

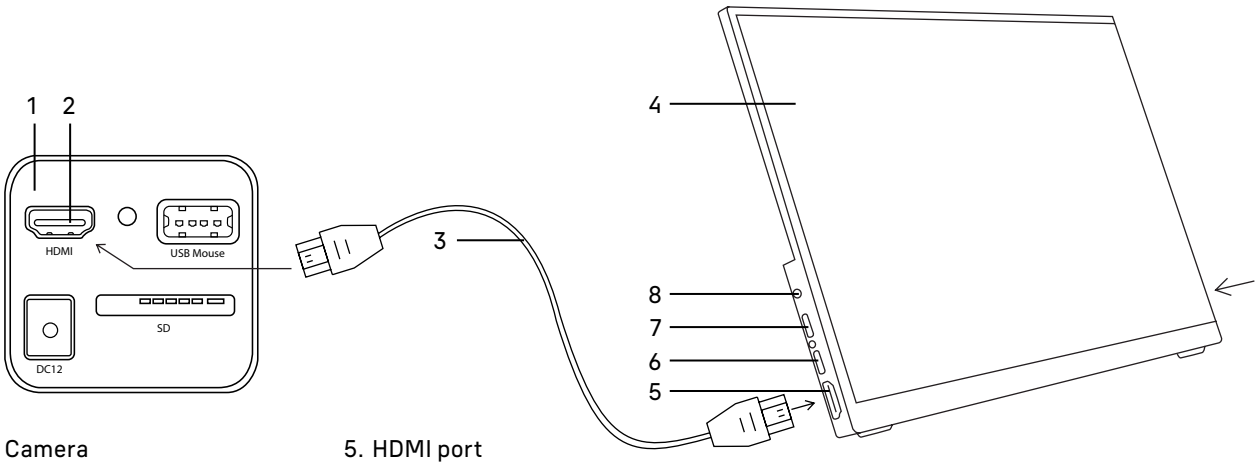
— Connect the monitor to the camera using the HDMI cable **3**.

— Connect the monitor and camera to AC power using the DC/DC Type-C adapter and power adapter (supplied). If the camera and monitor are remote from each other, each device is powered separately using the power adapter supplied with both the camera and monitor.

— Switch on and adjust the camera as per the user manual and the above steps in the previous section.

— Switch on the monitor by pressing the lower button on the side panel as indicated by the arrow (not shown in Figure 6).

If the image on the screen is blurred, rotate the fine focusing knob to get an accurate image.



1. Camera
2. HDMI port
3. HDMI cable
4. Monitor
5. HDMI port
6. USB Type-C power connector
7. USB Type-C power connector
8. Audio output

Fig. 6. Using the monitor

5 USING OPTIONAL EQUIPMENT

AUXILIARY OBJECTIVE LENSES

Screw the required objective lens **19** (Fig. 1) into the thread of the objective part **21** (Fig. 1). The 0.5x reducing objective lens increases the working distance and field of view.

The 2x magnifying objective lens reduces the working distance and field of view.

USING THE EYEPIECE WITH A SCALE

The eyepiece with a scale can be used to make comparative analysis of the linear dimensions of the individual components of an object. The scale is installed in the plane of the field diaphragm of the 10x eyepiece. The eyepiece with a scale is installed in the tube in place of the eyepiece of your microscope.

You should use a special stage micrometer (calibration slide) to determine the linear dimensions (in millimeters or microns).

The calibration slide is a transparent glass with a micrometer scale etched on the surface. Stereo microscopes use special scales with a scale value of 0.05mm, 0.1mm, and 0.5mm.

Place the calibration slide on the stage instead of the specimen with the scaled side facing up. Using the scale of the calibration slide, calibrate the eyepiece scale for each magnification that will be used for measurements.

To do this, bring the image focus of the calibration slide scale into sharp focus in the plane of the eyepiece scale and rotate the eyepiece in the tube, setting the strokes of both scales in parallel. Determine how many divisions of the calibration slide fit in the eyepiece scale (with the high magnification objective) or how many divisions of the eyepiece scale are covered by the entire calibration slide (with the low magnification objective).

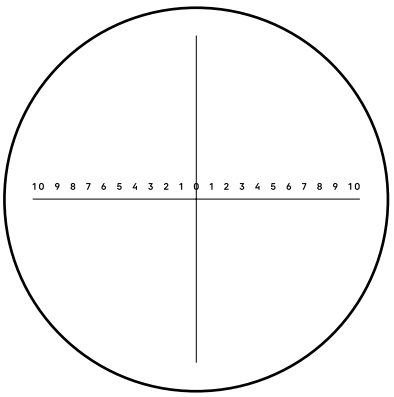


Fig. 7. Calibration slide

Work out the value for one eyepiece division using each objective by formula **E = TL/A**, where:

E – eyepiece division value
T – stage division value specified on the stage micrometer
L – number of stage micrometer divisions
A – number of eyepiece divisions.

We recommend entering the obtained data in a size chart

Objective magnification	Eyepiece division value
0.7	
1	
2	
3	
4	
5	
6	

Using these data to determine the actual linear size of the specimen, you just need to count the number of divisions of the eyepiece scale aligned with the area of the specimen being measured, and multiply this number by the scale division value specified in this table.

USING A CALIBRATION SLIDE WITH A CAMERA

The calibration slide (stage micrometer) with a scale value of 0.1mm or 0.05mm is used to calibrate the image analysis software for measurements in actual units. In the calibration mode, you should capture an image of the micrometer scale with every objective magnification and indicate the known distance. That lets you establish a scale of the image in actual units (micrometer, millimeter, etc.). Calibration:

1. Place the calibration slide on the microscope stage.
2. Select the desired objective and set the maximum camera resolution.
3. Get a contrast image of the scale on the monitor screen and capture the image.
4. Select the "Calibrate" function in the software you are using.
5. Double-click on the maximum visible distance and enter the value in actual units.
6. Enter the calibration setting and check the result. The program will save the calibration factor.
7. You can select any measurement unit later, and all the results will be re-calculated in accordance with this selection.

6 TROUBLESHOOTING

Potential problems and remedies (Table 3)

Problem	Cause	Remedy
	ELECTRICAL COMPONENTS	
No illumination in the field of view	The ON/OFF switch is off	Switch on the ON/OFF switch
	The fuse has blown	Replace the fuse
	The LED is burned out	Switch off the power supply. Remove the LED from the illuminator holder. Replace the LED with a new one
	The circuit board connector has poor contact	Have the connector repaired by a qualified electronics technician

OPTICS AND IMAGE REPRODUCTION		
Vignetting or sharp drop in illumination at the edges of the field of view; uneven illumination	There is dirt on the eyepiece	Remove dirt
Dirt and dust are visible in the field of view	There is dirt on the eyepiece	Remove dirt
	There is dirt on the frosted glass plate	Remove dirt
The specimen image in two eyepieces does not coincide which leads to eye strain	The eyepiece tubes are not properly adjusted to the observer's interpupillary distance; no diopter adjustment has been performed during focusing	Adjust the microscope head
MECHANICAL COMPONENTS		
The image does not remain sharp during observation	The focusing mechanism is loosened which causes the microscope head to lower spontaneously under its own weight	Adjust the coarse focusing tension adjusting knob

7 SCOPE OF DELIVERY

The scope of delivery (Table 4)

Component	Pcs	Note
Microscope		
Base with light source and power supply, stand with focusing mechanism	1	
Microscope head – objective part and eyepiece tubes	1	
10x eyepiece	2	
10x eyepiece with a scale	1	Optional
15x eyepiece	2	Optional
16x eyepiece	2	Optional
20x eyepiece	2	Optional
25x eyepiece	2	Optional
0.5x auxiliary objective lens	1	Optional
2x auxiliary objective lens	1	Optional
Black-and-white plate	1	
White plate	1	
Transparent plate	1	
Reflected light oblique illuminator	1	
Transmitted light LED illuminator	1	Built into the base
Reflected ring light illuminator	1	Optional
Epifluorescence light	1	Optional
Ring light with sector control	1	Optional
Ring light polarizer	1	Optional
Polarizer/analyzer set	1	Optional
Gooseneck LED light	1	Optional
Calibration slide	1	Optional

C-mount camera adapter	1
Power cord	1
Fuse	1
Dust cover	1
User manual	1
Digital camera	
Digital camera	1
HDMI cable (1.5m)	1
USB mouse	1
32GB SD memory card	1
EU-plug 12V/1A AC power adapter	1
Fasteners (mounting plate and screws)	1
User manual	1
Monitor	
Monitor	1
HDMI cable	1
AC power adapter	1
DC/DC Type-C adapter	1
Fasteners (Allen wrench and screws)	1

8 CARE AND MAINTENANCE

REPLACING THE FUSE

The fuse is located in the socket of the microscope base. Before replacing the fuse, switch off the power supply, and unplug the power cord from the power outlet. Loosen the locking screw of the objective part with the microscope head and the main objective and remove them from the bracket. Lay the microscope on its side to reach the fuse socket. Using a flathead screwdriver, remove the fuse socket, replace the fuse, and re-install the socket. Plug the power cord and turn on the ON/OFF switch to check that the fuse is working.

REPLACING THE BULB

This microscope employs LED bulbs as a light source.

The bulbs should be replaced by the equipment vendor or in a qualified service center. If you replace it yourself, the illumination function may be impaired.

MAINTENANCE

1. Once you have finished using the microscope, switch off the power supply. When not using the microscope for a long time, switch off the power supply.
2. The microscope should be kept clean. Do not install the dust cover unless the microscope is completely cooled down and dry.

3. Cleaning lenses:
   Remove dust from the lenses with a soft brush. Significant contamination can be removed using a soft cloth moistened with a small amount of a mixture of alcohol and ethyl ether (mixture proportion: 20-30% alcohol and 70-80% ethyl ether) or special O-xylene solution. Wipe the lenses from the center outward.

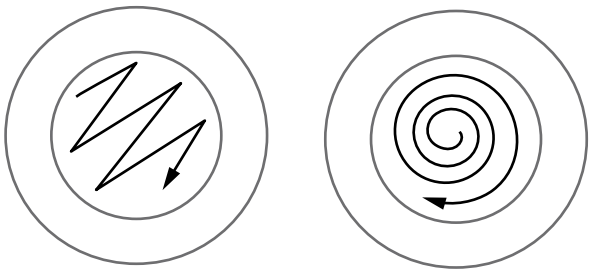


Fig. 8. Cleaning lenses

4. Cleaning the surfaces: wipe with a clean soft cloth; significant contamination can be wiped off with a neutral detergent.

   Do not wipe the microscope stand with any organic solvent (e.g., alcohol, ethyl ether or its diluted solution). This may cause damage to the coating of the microscope stand surface.

5. Cleaning the camera: blow off dust and small particles or brush them off with a soft brush, then clean the surface with a soft, clean cloth moistened with alcohol or ether.
6. Monitor cleaning: brush the dust and small particles with a soft brush. If there are liquid drops on the screen, remove them with a dry cloth or soft tissue. Use special alcohol wipes to remove heavy soiling.

   Always switch off the monitor before cleaning. Do not use aggressive agents to clean difficult stains, as this may cause damage to the device.

7. Storage: when not using the microscope for a long time, switch off the power, wait for the lamp to cool down, cover the microscope with a dust cover. Store the microscope in a dry, ventilated and clean place, with no exposure to acids, alkalis, or steam, otherwise mold may form on the lenses.

   It is recommended to apply a layer of rust-preventive coating to the moving parts of the microscope.

8. Periodic inspection: the microscope should be regularly inspected and serviced to maintain its performance.

9 MAGUS WARRANTY

MAGUS provides a **5-year international warranty** from date of purchase (valid for the entire life of the instrument). The Levenhuk company warrants the product to be free from defects in materials and workmanship. The Seller warrants that the MAGUS product you have purchased meets specification requirements, provided that the Buyer complies with terms and conditions of transport, storage, and operation of the product. The warranty period for accessories is **6 (six) months** from the date of purchase.

For more information on warranty terms and conditions, see www.magusmicro.com

For warranty service, please contact your nearest Levenhuk representative office.

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