

# GSX-500



**Manual**

**Version 1.0.0**





# Table of contents

1 Safety Instructions.....	4
1.1 Characteristics and Application.....	5
1.2 Assembly and Operation.....	5
2 Starting Operations.....	7
2.1 Assembly.....	7
2.2 Adjusting the sharpness.....	8
2.3 Incident light illumination.....	8
2.4 General Operating Instructions.....	9
2.4.1.....	9
2.4.2.....	9
2.4.3.....	9
.....	9
2.4.4.....	9
2.4.5.....	10
3 Maintenance and Service.....	11
3.1 Care of components.....	11
3.1.1.....	11
3.1.2.....	11
3.1.3.....	11
3.1.4.....	12
3.1.5.....	12
4 Technical Data.....	13

# 1 Safety Instructions

**CAUTION!** Please read the following information carefully before using the unit and its supplementary equipment!

This unit was constructed and checked according to the safety regulations for electronic measuring devices, and was delivered securely. This User Manual contains information and warning notices that should be heeded by the user.

The unit is a light microscope, drafted according to the newest scientific and technical knowledge for the visual, micro photographic and videotechnical investigation of microscopic objects. The unit should only be used for the designed purpose. All other uses (also the insertion of single components which were not designed by the manufacturer) constitute a misuse of the product. We are not liable for any damages caused by this misuse.

This unit is not meant for unattended continuous operation.

The microscope does not have any special safeguards against samples with caustic toxic, radioactive or other hazardous materials. The allowed sample amount may not be exceeded.

The unit may only be operated on the voltages indicated on the unit. Please heed the instructions in the user manual! We are not liable for any damages caused by the disregard of these instructions.

If the unit is connected to voltage, contact clamps can lead to dangerous voltages and opening the coverings or removing parts can uncover a piece under a dangerous voltage. The unit must be disconnected from power before it can be opened for adjustments, replacements, servicing or repairs.

## 1.1 Characteristics and Application

The microscope is equipped with high quality optics, and excels due to its high optical performance.

The following additional devices are available: evaluation of investigations over Photo-/TV adapter and digital cameras, Polarization equipment, measuring software...

Different interchangeable objectives and eyepieces, which can be changed easily by a revolver (quadruple), make an extension area in an interval of 50x ... 640x possible (standard configuration).

## 1.2 Assembly and Operation

The polarization microscope GSX500 comes with a fixed stand. All further components of the microscope are mounted on this stand. There is a pol.-suited binocular straight tube with wide field eyepieces (spectacles) for a research of objects.

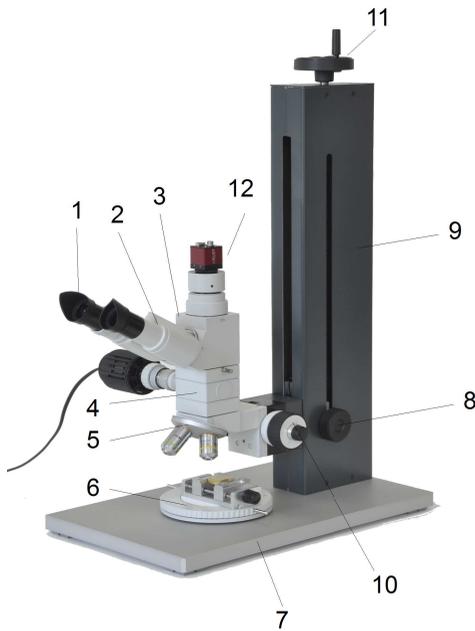
The microscope GSX-500 is assembled with a revolving nosepiece (quadruple) and four M-Plan  $\infty$  objectives.. The ball bearing revolver has click stops for the positions of each objective.

There are three stages for fixing the objects under the microscope (gliding stage, stage carrier with object guide and stage carrier with rotary stage). The objects will be illuminated by a 3W-LED incident light or transmitted light illumination (Koebler principle).

All electronic parts for the illumination are integrated into the microscope base. There is a control for adjusting the illumination in front and on the side of the microscope base. It is also possible to add other kind of illuminations to the microscope (transmitted light illumination, striped incident light).

Further information, how polarization microscopy is working, you can find in special literature.

We will describe only necessary features of the microscope GSX-500 at the following pages.



- 1 *Eyecup with eyepiece*
- 2 *Binocular straight tube*
- 3 *Angle tube*
- 4 *Incident light polarization tube*
- 5 *Revolving nosepiece with objectives*
- 6 *sliding stage*
- 7 *base plate*
- 8 *Locking knob*
- 9 *Microscope stand*
- 10 *Coaxial coarse and fine drive adjustment*
- 11 *shaft knob*
- 12 *photo tube*

**picture 1: overview GSX-500**

## 2 Starting Operations

### 2.1 Assembly

Please open carefully the packaging of the microscope.

At first the microscope stand (9) has to be taken out of the packaging, screw it from the bottom side on the base plate and has to be put on a plan subsoil.

After that put the unit, consist of revolving nosepiece (5) and the coaxial coarse and fine drive adjustment (10), out of the packaging and screw it from the bottom side on the microscope stand (9).

After that the incident light tube (4) has to be set on the quick-change equipment of the microscope stand. Clamp it with the screw.

The binocular straight tube (2), the angled tube (3) and the photo tube (12) has to be taken from the packaging. Assemble the binocular straight tube and the photo tube into the quick-change equipment of the angled tube and clamp it with a screw.

Take this pre-assembled parts and set them to the quick-change equipment of the incident light tube and clamp it with the screw.

Now the objectives will be taken out of their protective packaging and the objectives has to be placed into the revolving nosepiece (5) in this way, that if the revolver will be rotated clockwise, the magnification will be increase.

The adjustment of the objectives will be done by the combined coaxial coarse and fine drive adjustment (10).

At last the eyepieces GF – Pw 10x/20 (1) will be assembled into the binocular straight tube. The eyepiece can be used with or without eyecups. The eyepiece is usable as eyepiece for spectacles. To avoid dirt within the tube, the eyepieces should be stay the whole time in the tube.

The intensity of the incident light illumination can be set by the adjustment in front power supply of the microscope.

Further it is possible to use different filter in the filter holder of the incident light tube.

## 2.2 Adjusting the sharpness

The adjustment of the sharpness is only necessary if the binocular straight tube is in use.

The microscope can be adjusted in that kind that a sharp image is the result at all levels of magnifications.

You can achieve this in the following way:

- The distance of the eyepieces has to be adjusted by screwing up the eyepiece cone to the individual interpupillary distance.
- The left dioptre ring has to be adjusted to -0- .
- Adjust a sharp picture with help of the drive mechanism (you have to look with the right eye through the right eyepiece).
- You have to adjust the sharpness on the left eye by adjusting the dioptre ring.

## 2.3 Incident light illumination

The incident light illumination tube consists a intermediate tube with a tube factor of 1x or 1,6x, an illuminating adapter and a 3W-LED illumination.

The objects will be illuminated by a 3W-LED incident light illumination (Koebler principle). The aperture diaphragm and the field diaphragm are integrated in the illuminating adapter.

The field diaphragm is necessary to improve the contrast (by reducing the scattered light on the object layer). The biggest effect is visible at the border of the field diaphragm. In case the illumination aperture is to high, there is too much scattered light in the object field and the pictures have a low contrast. The field diaphragm is also necessary for focusing at incident light illumination.

The resolution capability, the contrast and the depth of field can be also optimised by the aperture diaphragm.



- 1 3W-LED illumination
- 2 Filter holder (opened)
- 3 Adjusting ring for the aperture stop (aperture diaphragm)
- 4 Adjusting ring for the illuminated field aperture (field diaphragm)
- 5 Intermediate tube

## 2.4 General Operating Instructions

2.4.1 The adjustment of the microscope in the *High positioning* can be done with the drive mechanism.

2.4.2 *The illumination level* can be changed by changing the adjustment in front of the microscope base or by using of different kind of filters. With help of the aperture diaphragm it is possible to change the contrast.

2.4.3 All tubes can be changed at the same kind. The screw under the tube has to be dissolve so that you can remove the tube. The tube has to be set into the tube mount for assembling the tube.

Don't forget to clamp the screw again. If necessary the tubes can be mount also by rotating in 180°. It isn't possible to use more than one intermediate tube at the same time.

2.4.4 *A change of the objectives* is for all existing objectives the same. The nosepiece has a uniform, centred and adjusted W0,8" (RMS) fine thread. Please handle all objectives with care so that it can't come off. Do not touch the objective directly with your hands. A removed objective should be placed again into the protective packaging of the objective.

2.4.5 All *fixed or adjustable eyepieces* from laboratory or technical microscopes can be used in the microscope GSX-500.

### 3 Maintenance and Service

The Technical Microscope GSX-500 and its supplemental equipment are service-free over a long period of time, assuming normal use. In the case of continual use (shift operation) and especially in the case of unfavourable environment conditions (dust, etc.), the unit should be serviced when needed in the following ways.

Before any servicing of the equipment, the power supply should be disconnected.

Please be carefully with all optical parts. A damage of these part will cause aberrations or not sharpen images.

All loose parts, e.g. preparations, filter or so on have to be removed from the microscope.

#### 3.1 Care of components

3.1.1 The dioptre rings are unscrewed, those threads easily greased and by repeated and movement of the dioptre rings it is all greased evenly. When mounting the rings, ensure that their marks agree with the index lines on the eyepiece connecting piece.

3.1.2 *Eyepieces, tube and interchangeable objectives* should be cleaned regularly with a soft hair brush. In addition these parts should be removed from the equipment and all accessible optical parts should be carefully cleaned. Each attempt to disassemble the objective will cause a complete adjustment error of the objective. Optics and lenses can be cleaned by a cleaning tissue for optics. Medical alcohol is recommend as cleaner.

3.1.3 In case the *microscope* isn't in use you should cover the microscope with the delivered protective cover.

3.1.4 We recommend to use antifriction bearing grease of middle consistency for lubricating the slide faces of the sliding stage. Lightly lubricate both faces in regular time intervals with this grease. Before doing this, carefully remove the old grease with a grease dissolver.

3.1.5 If the operating characteristics going worse, put a thin fluid drop of solid free synthetic oil on the shaft of the stand. Therefore open one side of the stand (9) and rub some oil on it with a fluffless cloth.

## 4 Technical Data

Objective (M-Plan)	5x; 10x; 20x; 50x
Eyepiece	GF-Pw 10x/20
Tubus factor	Visuell 1x photo 0,8x
Illumination	Koehler principle with filter holder, field diaphragm and aperture diaphragm
Adjustable range of Microscope stand	400 mm
Adjustable range of coarse drive	15 mm
free length (optical axis - housing of the microscope stand)	160 mm
Interpupillary adjustment	55...80 mm
Adjustment ametropia	+/- 6dpt
Adjustment Gliding stage	Ø40 mm
Coaxial coarse and fine drive	
Resolution	12 (or 2) µm

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