



**Leica M50
Leica M60
Leica M80
User Manual**

General Instructions

Safety concept

Before using your microscope for the first time, please read the "Safety concept" brochure included with your instrument. It contains additional information about handling and care.



Use in clean rooms

The Leica M series can be used in clean rooms without any problems.

Cleaning

- ★ Do not use any unsuitable cleaning agents, chemicals or techniques for cleaning.
- ★ Never use chemicals to clean colored surfaces or accessories with rubberized parts. This may damage surfaces and abraded particles may contaminate preparations.
- ★ In most cases, we can provide special solutions on request. Some products can be modified, and we can offer other accessories for use in clean rooms.

Servicing

- ★ Repairs may only be carried out by Leica Microsystems-trained service technicians. Only original Leica Microsystems spare parts may be used.

Responsibilities of person in charge of instrument

- ★ Ensure that the Leica stereomicroscope is operated, maintained and repaired by authorized and trained personnel only.

Important Safety Notes

User Manual

The individual modules of the Leica M stereomicroscopy series include an interactive CD-ROM with all relevant user manuals in 20 other languages. Keep it in a safe place, and readily accessible to the user. User manuals and updates are also available for you to download and print from our web site at www.stereomicroscopy.com.

This operating manual describes the special functions of the individual modules of the Leica M stereomicroscopy series and contains important instructions for their operational safety, maintenance, and accessories.

The "Safety concept" booklet contains additional safety information regarding the service work, requirements and the handling of the stereomicroscope, accessories and electrical accessories as well as general safety instructions.

You can combine individual system articles with articles from external suppliers (e.g. cold light sources, etc.). Please read the user manual and the safety requirements of the supplier.

Before installing, operating or using the instruments, read the user manuals listed above. In particular, please observe all safety regulations.

To maintain the unit in its original condition and to ensure safe operation, the user must follow the instructions and warnings contained in these user manuals.

Symbols Used

Warning of a danger



This symbol indicates especially important information that must be read and complied with.

Failure to comply can cause the following:

- ★ Hazards to personnel
- ★ Functional disturbances or damaged instruments

Warning of hazardous electrical voltage



This symbol indicates especially important information that is mandatory to read and observe.

Failure to comply can cause the following:

- ★ Hazards to personnel
- ★ Functional disturbances or damaged instruments

Danger due to hot surface.



This symbol warns against touching hot surfaces, e.g. those of light bulbs.

Important information



This symbol indicates additional information or explanations that are intended to provide clarity.

Explanatory notes

- ★ This symbol within the text stands for additional information and explanations.

Figures

- (1) Numbers in parentheses within the descriptions relate to the figures and the items within those figures.

Safety Regulations

Description

- ★ The individual modules fulfill the highest requirements for observation and documentation of Leica stereomicroscopes of the M series.

Designated use

- ★ Refer to "Safety Concept" booklet

Non-intended use

- ★ Refer to "Safety Concept" booklet

Never use M series microscopes or their components for surgical procedures (e.g. on the eye) unless they are specifically intended for that purpose.

The instruments and accessories described in this operating manual have been tested for safety and potential hazards. The responsible Leica affiliate must be consulted whenever the instrument is altered, modified or used in conjunction with non-Leica components that are outside of the scope of this manual.

Unauthorized alterations to the instrument or noncompliant use shall void all rights to any warranty claims!

Place of use

- ★ Refer to "Safety Concept" booklet
- ★ Set up the electrical components at least 10 cm from walls and combustible objects.
- ★ Avoid large temperature fluctuations, direct sunlight and vibrations. These conditions can distort measurements and micrographic images.
- ★ In warm and warm-damp climatic zones, the individual components require special care in order to prevent the buildup of fungus.

Responsibilities of person in charge of instrument

- ★ Refer to "Safety Concept" booklet

Ensure that:

- ★ The M series stereomicroscopes and accessories are operated, maintained and repaired by authorized and trained personnel only.
- ★ All operators have read, understood and observe this User Manual, and particularly the safety regulations.

Safety Regulations (cont'd.)

Repairs, service work

- ★ Refer to "Safety Concept" booklet
- ★ Only original Leica Microsystems spare parts may be used.
- ★ Before opening the instruments, switch off the power and unplug the power cable.
- ★ Touching the live circuit can cause injury.

Transport

- ★ Use the original packaging for shipping or transporting the individual modules of the Leica M stereomicroscopy series and the accessory components.
- ★ In order to prevent damage from vibrations, disassemble all moving parts that (according to the user manual) can be assembled and disassembled by the customer and pack them separately.

Installation in third-party products

- ★ Refer to "Safety Concept" booklet

Disposal

- ★ Refer to "Safety Concept" booklet

Legal requirements

- ★ Refer to "Safety Concept" booklet

EC Declaration of Conformity

- ★ Refer to "Safety Concept" booklet

Health risks

Workplaces equipped with stereomicroscopes facilitate and improve the viewing task, but they also impose high demands on the eyes and holding muscles of the user. Depending on the duration of uninterrupted work, asthenopia and musculoskeletal problems may occur. For this reason, appropriate measures for reduction of the workload must be taken: optimal arrangement of workplace, work

assignments and work flow (changing tasks frequently), thorough training of the personnel, giving consideration to ergonomic and organizational aspects.

The ergonomic design and construction of the Leica M stereomicroscopy series are intended to reduce the exertion of the user to a minimum.

Direct contact with eyepieces can be a potential transmission path for bacterial and viral infections of the eye.

The risk can be kept to a minimum by using personal eyepieces for each individual or detachable eyecups.

Safety Regulations (cont'd.)

Light sources: safety regulations

Protective measures of the manufacturer:

- ★ UV protection screen in front of the specimen plane prevents the user from looking directly into the UV rays.
- ★ Dummy filter carriers in the free positions of the rapid filter changer prevent direct UV radiation from reaching the eyes.
- ★ UV filters are installed in the observation beam paths to protect the eyes.
- ★ The stray-light protection on the lamp housing prevents irradiation of the hands.

Warning

- ★ UV radiation could damage the eyes. Therefore:
 - ★ Never look into the light spot on the specimen plane without a UV protection screen.
 - ★ Never look into the eyepieces if no excitation filter is in the beam path.
- ★ Fill empty filter positions with dummy filter carriers (e.g. M165 FC).
- ★ Do not select a white, strongly reflective background for the specimen.

Supply unit

Always unplug the supply unit from the power supply:

- ★ When installing and disassembling the lamp housing
 - ★ Before opening the lamp housing
- ★ When replacing the high-pressure mercury lamp and other parts, such as the heat-absorbing filter or the collector
- ★ During maintenance work on the supply unit

Safety Regulations (cont'd.)

Lamp housing

- ★ Never open the lamp housing while the lamp is switched on. Risk of explosion, UV exposure, blinding!
- ★ Before opening the lamp housing, allow it to cool off for at least 15 minutes. Danger of explosion!
- ★ Never cover the air duct on the lamp housing. Danger of fire!

Mercury lamp

- ★ Follow the user manual and safety regulations provided by the lamp manufacturer, and, in particular, the section on how to proceed if a lamp breaks and releases mercury.
- ★ For transport, remove the mercury lamp, transport it in its original packaging and protect moving parts in the lamp housing using the transport anchors.
- ★ When it has reached the end of its rated life (follow the manufacturer's specifications and the minute meter on the supply unit).
- ★ To minimize the risk of explosion, replace a discolored mercury lamp promptly.
- ★ Leica Microsystems assumes no liability for damage caused by exploding, incorrectly installed or improperly used mercury lamps.

Table of Contents

Inhaltsverzeichnis

General Instructions	2
Important Safety Notes	3
Symbols Used	4
Safety Regulations	5
Safety Regulations (cont'd.)	6
Safety Regulations (cont'd.)	7
Safety Regulations (cont'd.)	8

M series

Congratulations!	12
The Modular Design: Everything is Relative	13
Maximum Compatibility	14
On We Go	15

Assembly

Base and Focusing Column	17
Microscope Carrier	18
Optics Carrier	19
Tube	20
Eyepieces	21
Objective	22
Leica LED5000 CXI (Coax Illumination)	23

Leica LED5000 CXI (cont'd.)	24
Leica LED3000 NVI™ (Near Vertical Illumination)	25
Leica LED3000 NVI™ (cont'd.)	26

Quick Start Guide

The Reliable Route to Success	28
Overview of an M Series Microscope	29
The Correct Interpupillary Distance	30
Using the Eyepieces	31
Focusing	32
Adjusting the Resistance of the Focus Drive	33
Changing the Magnification (Zoom)	34
Ratchet Steps and Magnification Levels	35

Eyepieces & Tubes

Magnification Factor of the Eyepieces	37
Health Notes	38
Dioptic Correction	39
Dioptic Correction and Parfocality	40
Graticules	41
ErgoTube 10° to 50°	42

Photography & Video

Photography & Video	44
Photo Tubes and C-mounts	45
Video/Phototubes HD F & HD V	46

Optical Accessories

The Different Types of Objectives	48
-----------------------------------	----

System Illumination

Leica LED3000 NVI™ (Near Vertical Illumination)	50
Leica LED5000 CXI (Coax Illumination)	51

Dimensional Drawings

Leica M50	53
Leica M50	54
Leica M50	55
Leica M60	56
Leica M80	57
Leica M80	58
Leica M80	59
Leica M80	60
Leica M80	61

Appendix

Calculating the Total Magnification and Field of View Diameter	63
Care, Maintenance, Contact Persons	64
Care, Maintenance, Contact Persons (cont'd.)	65



The Leica M series

Congratulations!

The New Leica M Series

The introduction of the Leica M50, M60 and M80 adds three new high-quality routine stereomicroscopes to the proven M-Series range from Leica Microsystems. The optical brilliance and the wide range of accessories make them the ideal microscope for quality assurance and similar industrial applications.

Magnification in stages or zoom

The Leica M50 stereomicroscope includes precisely reproducible magnification levels for repeated examinations, measurements, drawing or photography of objects under absolutely identical conditions. The five easily selectable positions can be set without removing the eyes from the eyepieces. This ensures that your results remain comparable at all times without great efforts.

The Leica M60 and M80 stereomicroscopes can be used for a wide range of routine applications with the 6:1 / 8:1 zoom and switchable ratchet steps. The large working distance and the brilliant imaging power shows you the finest details of your specimens without losing your overview of large workpieces.

Common to all microscopes is the Leica range of accessories. Whether you need a variety of illumination types, a wide selection of objectives or the Leica swinging-arm system – there is a solution for everything there!

Do you already own stereomicroscopic equipment and are thinking of switching to Leica? No problem! Leica M50, M60 and M80 fit into microscope carrier with a diameter of 76 mm and are therefore compatible with many suppliers. You can simply continue to use your components and add the proven Leica stereomicroscopes.

The Modular Design: Everything is Relative

The Leica M series provides maximum flexibility in choosing equipment, thanks primarily to the modular configuration and the compatibility that Leica has painstakingly maintained for decades. The optics carriers, eyepieces, bases and more can be combined in any way you choose, allowing you to create the microscope that best suits your needs.

Despite this, you will notice that the controls and individual components do not differ significantly. Whichever configuration you choose, you will quickly feel right at home.

Have a special request? Let us know!

Leica Microsystems enjoys an exceptional reputation when it comes to devising customer-

specific solutions. If you have a special request that cannot be met with standard parts, contact your Leica consultant. We have a solution for every problem.



Maximum Compatibility

Leica engineers were careful to ensure that the new Leica M series—like its predecessors—remains compatible with existing series. This means that objectives, bases, tubes and so on can be reused.

Objectives

All objectives of this new generation have the same reference focal length as the objectives of the MZ generation. If you prefer, you can therefore continue to use the previous Leica objective series.

Tubes

The interface between the optics carrier and the tube has remained the same, so existing tubes fit the new M series. The new tubes are designed for eyepieces with field number 23, while the predecessor models were only designed for field number 21, resulting in a smaller object field.

Eyepieces

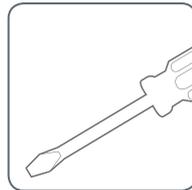
The new M-series eyepieces have an audible and tangible click to provide immediate feedback in case of accidental adjustment.

On We Go

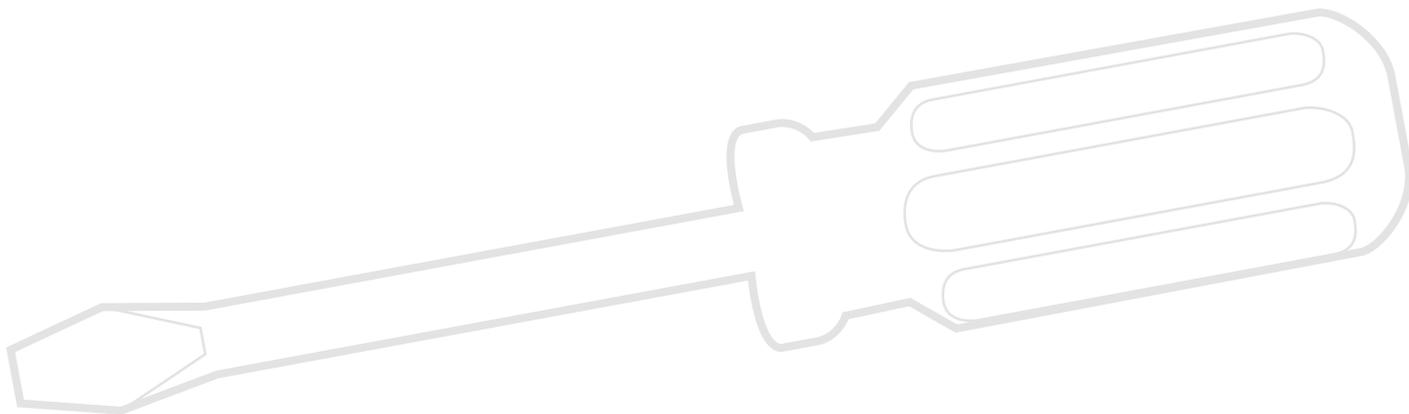
If your new Leica microscope has already been assembled and commissioned by your Leica consultant, click [here](#) to skip through the installation instructions and go directly to the Quick Start Guide on [Page 29](#).



If, on the other hand, you are assembling the microscope yourself, continue with the "Assembly" chapter, which begins on [Page 16](#).



Assembly



Base and Focusing Column

The first step is to connect the focusing column of the M series to the corresponding base.

Tools used

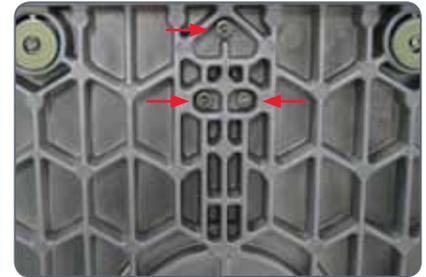
- ★ Hex socket screwdriver, 3 mm

Assembling the column adapter

1. Remove the three screws provided from the column.



2. Install the base on the column using the three screws.



Tip: Place the column on the edge of a table to attach the base and have another person help you.

Microscope Carrier

Tools

- ★ Allen screwdriver provided

Assembly

The microscope carrier is fastened to the column using the screw provided.



Alternative installation options

Depending on the desired working distance, the microscope carrier can be installed in the standard way or upside down (see figure below).



Optics Carrier

Tools used

- ★ None

Assembling the optics carrier

1. Unscrew the clamping screw on the holder for the optics carrier.



2. Place the optics carrier into the holder and align it in such a way that the notch in the optics carrier and the bottom clamping screw are on top of each other.



2. Tighten the clamping screw below the optics carrier.



Tube

All intermediate tubes that fit between the optics carrier and the binocular tube are fitted in the same manner.

Tools used

★ No tools required.

Preparation

1. Unscrew the positioning screw and remove the protective cover.



Assembling the tube

2. Push the tube (for example, the inclined binocular tube) into the dovetail ring and rotate it slightly in both directions until the positioning screw meshes with the guide groove.
3. While holding the tube only slightly, carefully tighten the positioning screw. It is automatically brought to the correct position.



Eyepieces

Tools used

- ★ No tools required.

Magnification range

You can extend the overall magnification range using available 10×, 16×, 25× and 40× wide-field eyepieces for persons wearing glasses.

Preparation

1. If you want to use an optional graticule, insert it now ([Page 43](#)).
2. Remove the plastic tube guard.



Inserting the eyepieces

3. Push the eyepieces into the tubes as far as they will go and check to ensure that they fit tightly and accurately.



4. Securely tighten the clamping screws.



Objective

Tools used

- ★ No tools required.

Preparation

1. Remove the protective cap on the optics carrier by turning it.



Attaching the objective



Hold the objective firmly during assembly and disassembly so that it does not fall onto the stage plate. This applies particularly to the 2x planapochromatic objective, which is very heavy. Remove all specimens from the stage plate first.

2. Screw the objective clockwise into the optics carrier.



Leica LED5000 CXI (Coax Illumination)

Required tools

- ★ None

Installing the Leica LED5000 CXI

1. Connect the Leica LED5000 CXI to the focusing column via the CTL2 connection if the focusing column is equipped with integrated electronics.



Alternative installation for manual columns

1. Connect the external power supply unit (10 450 266) to the Leica LED5000 CXI.

2. Unscrew the positioning screw and remove the protective cover.



Leica LED5000 CXI (cont'd.)

3. Place the Leica LED5000 CXI on the optics carrier and tighten the positioning screw.



4. Push the tube (for example, the inclined binocular tube) into the dovetail ring and rotate it slightly in both directions until the positioning screw meshes with the guide groove.



5. While holding the tube only slightly, carefully tighten the positioning screw. It is automatically brought to the correct position.



Leica LED3000 NVI™ (Near Vertical Illumination)

Required tools

★ None

 The Leica LED 3000 NVI™ can be used with any objectives that have an outer diameter of 58 mm.

 The supported working distance is between 50 mm and 150 mm.

Installing the Leica LED3000 NVI™

1. Connect the Leica LED3000 NVI™ to the focusing column via the CTL2 connection if the focusing column is equipped with integrated electronics.



Alternative installation for manual columns

1. Connect the external power supply unit (10 450 266) to the Leica LED3000 NVI™.
2. Place the Leica LED3000 NVI™ on the optics carrier from below and tighten the locking screw.



Leica LED3000 NVI™ (cont'd.)



Ensure that the locking screw of the illuminator and the locking screw of the optics carrier are on a straight line, as otherwise image shading may occur.



Quick Start Guide

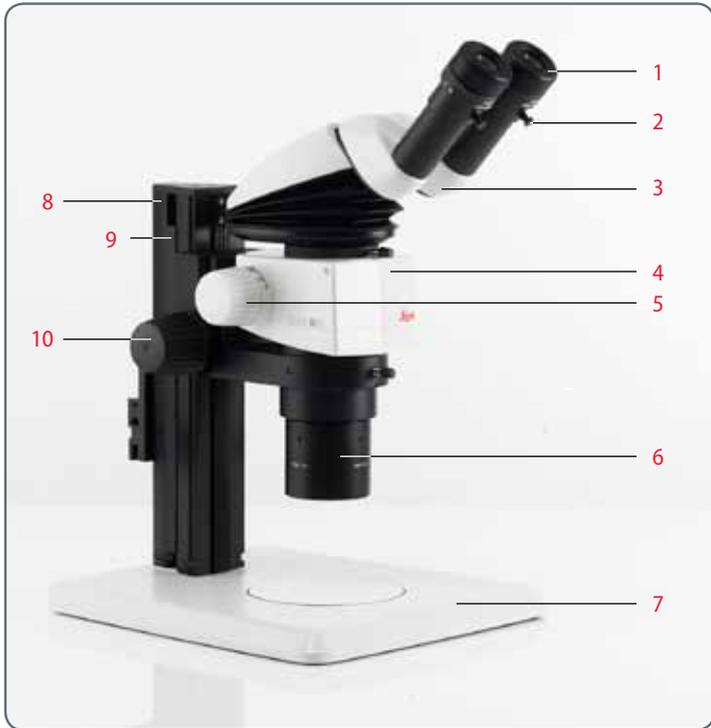


The Reliable Route to Success

Your Leica stereomicroscope has been delivered in completely assembled condition by your Leica partner, and naturally you want to get right to work. This manual will familiarize you with the finer details of your microscope. The following pages contain important, practical information that makes using it every day easier.

Take time to read it – it's worth it!

Overview of an M Series Microscope



- 1 *Eyepieces for spectacle wearers with dioptic correction and eyecups*
- 2 *Fastening screws for the eyepieces*
- 3 *Ergo tube*
- 4 *Optics carrier*
- 5 *Magnification changer (zoom)*
- 6 *Interchangeable objective*
- 7 *Incident-light base*
- 8 *Column*
- 9 *Cable duct with cover*
- 10 *Coarse/fine focusing*

The Correct Interpupillary Distance

The interpupillary distance is correctly set if you see a single circular image field when looking at a specimen.

If you are still a novice microscope user, you may need a short time to become accustomed to this. Not to worry—after a little while, it will become automatic.

Reference value

The distance between eye and eyepiece measures approx. 22 mm for 10/23B wide-field eyepieces for persons wearing glasses.

Adjusting the interpupillary distance

1. Look into the eyepieces.
2. Hold the eyepieces with both hands. Push the eyepieces together or separate them until you see a circular image.



3. Slowly approach the eyepieces with your eyes until you can see the complete image field without corner cutting.



Using the Eyepieces

The eyepieces form the connection between the tube and the eye of the observer. Simply push them into the tube and they are ready to use.

Each eyepiece offers a certain magnification factor that has a determinative effect on the total magnification. Furthermore, all Leica eyepieces can be equipped with practical graticules that enable measuring and quantifying of specimens.

Dioptric correction

A built-in dioptric correction is available for eyeglass wearers. For more information, refer to [page 39](#).

If you do not wear glasses:

1. Hold the eyepiece firmly and rotate the eyecups forwards counterclockwise.



2. If an eyepiece is equipped with the integrated dioptric correction, turn the value to the "0" mark.

If you wear glasses:

1. Hold the eyepiece firmly and rotate the eyecups counterclockwise towards the rear, as otherwise the viewing distance is too great.



2. If an eyepiece is equipped with the integrated dioptric correction, turn the value to the "0" mark.

By the way, one benefit of viewing with eyeglasses is a drastically lower risk of bacterial transmission (see [page 38](#)). The soft material of the eyecup also ensures that your glasses will not be scratched, even if they contact the eyepiece.

Focusing

Focusing raises or lowers the stereomicroscope using the focusing drive. The specimen detail is brought into sharp focus as soon as it is in the focal point of the objective.

- ★ The focusing drive can be operated either left- or right-handed.



The coarse/fine adjustment carries a load of up to 15 kg.



The resolution of the coarse/fine adjustment is 1 μm .



Adjusting the Resistance of the Focus Drive

Adjusting the resistance

Is the focus movement too loose or too tight? Does the outfit tend to slide downwards? The resistance can be adjusted individually depending on the equipment weight and personal preferences as follows:

1. Grip the outer drive knobs with both hands and turn them towards each other until the desired resistance is reached during focusing.



Changing the Magnification (Zoom)

All M series microscopes have an integrated zoom. The name indicates the zoom range covered:

- ★ Leica M50 = 5 increments
- ★ Leica M60 = 6:1 zoom
- ★ Leica M80 = 8:1 zoom

The rotary knob for the zoom can be used either left or right-handed.

Zooming

1. Look into the eyepieces.
2. Focus on the specimen.
3. Rotate the magnification changer until the desired magnification is configured.



Ratchet Steps and Magnification Levels

The zoom button can optionally be operated either with or without ratchet steps. Continuous zoom is possible when the ratchet steps are disabled, which many users find convenient. On the other hand, when the ratchet steps are enabled, photographs, measurement results etc. can be reproduced more accurately.

Enabling and disabling ratchet steps

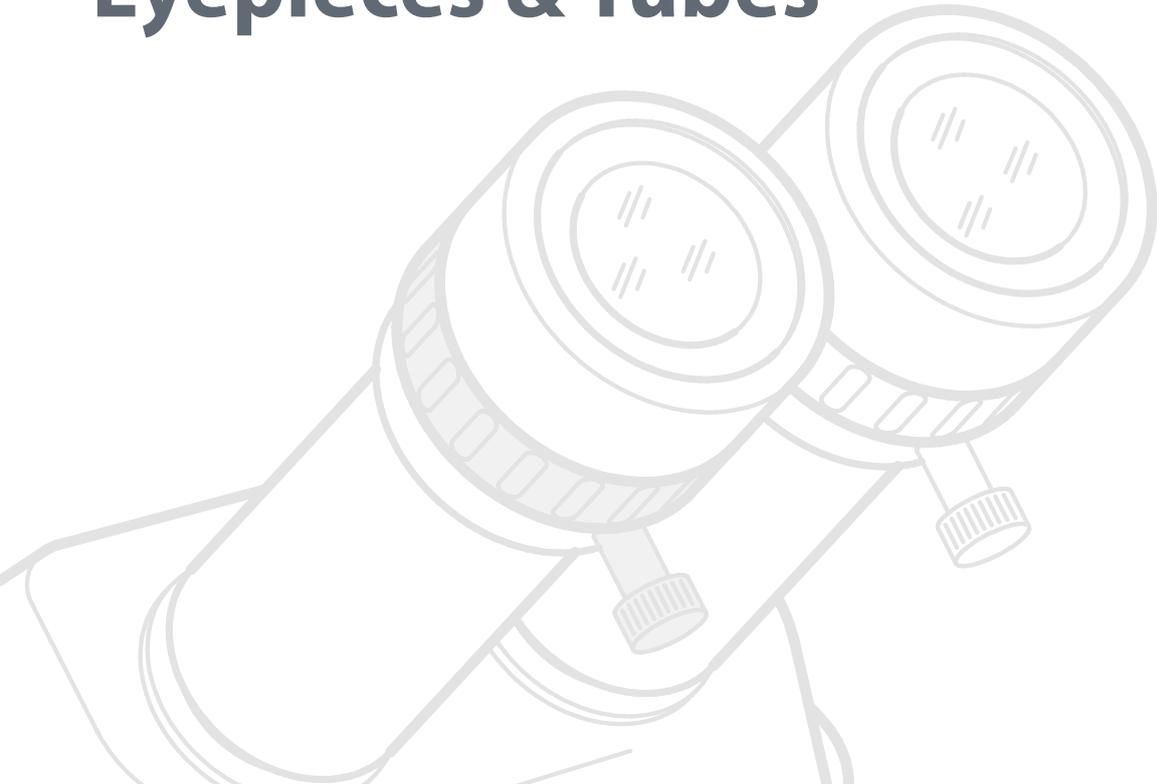
1. Push the button towards the knob to enable the ratchet steps.
2. Push the button away from the knob to disable the ratchet steps.



Magnifications and fields of view

The formula on [page 62](#) provide additional information about the magnifications and field of view diameters, with consideration given to the position of the magnification changer and the eyepiece and objective combination used.

Eyepieces & Tubes



Magnification Factor of the Eyepieces

An eyepiece not only makes it possible to look passively into the microscope, but also has a critical effect on the maximum magnification. The magnification factor is between 10x and 40x.

The following eyepieces are available for the M series:

Magnification	Dioptric correction	Order number
10×	± 5 diopter settings	10 450 023
16×	± 5 diopter settings	10 450 024
25×	± 5 diopter settings	10 450 025
40×	± 5 diopter settings	10 450 026

Health Notes

Potential sources of infection



Direct contact with eyepieces is a potential transmission method for bacterial and viral infections of the eye. The risk can be kept to a minimum by using individual eyepieces or detachable eyecups. Eyecups can be ordered separately. Please contact your Leica partner.



Separate eyecups are an effective way of preventing infections.

Dioptric Correction

All Leica eyepieces are also available with built-in dioptric correction, allowing the microscope to be used without glasses even by those with vision problems. The correction comprises ± 5 diopter settings.



Using the Dioptric Correction

1. Set the dioptric correction of both eyepieces to the mid position ("0" diopter settings).
2. While wearing your glasses, look through the eyepieces and focus on the specimen.
3. Rotate both eyepieces to the maximum value of "+5".
4. Hold one eye closed and rotate the other eyepiece in "-" direction until the specimen appears sharp.
5. Then, open the other eye and correct the diopter settings until the image is uniformly sharp.

Dioptric Correction and Parfocality

Leica stereomicroscopes are parfocally matched. The prerequisite for this is the correct setting of the diopters and the parfocality. The following adjustments only have to be carried out once by each user.

Preparation

- ★ Move the lever of the video/phototube to the "observation" position and open the diaphragm.

Adjusting

1. Set the dioptric correction for both eyepieces to "0".
2. Select the lowest magnification and focus on a flat specimen.
3. Select the highest magnification and readjust the sharpness.
4. Select the lowest magnification again, but do not look into the eyepieces.
6. Rotate the eyepieces counterclockwise in the "+" direction as far as they will go (+5 diopter settings).

7. Look into the eyepieces.
8. Slowly rotate each eyepiece individually in the "-" direction until each eye sees the object sharply imaged.
9. Select the highest magnification and refocus if necessary.

Now, if you adjust the magnification from the lowest to the highest level, the specimen is always brought into sharp focus. If not, repeat the process.

Graticules

Use

Leica graticules make length measurements and counting easier, particularly for workstations that are not equipped with a digital camera and LAS software.

The Leica graticules for length measurements and numbering are fitted in mounts and are inserted into the eyepieces.

1. Screw the insert off of the eyepiece.



2. Clamp the graticule on the insert, applying moderate pressure. Ensure that the graticule fits tightly.



3. Screw the insert and graticule firmly into place and replace the eyepiece in the tube.



4. You can now align the graticule by rotating the eyepiece in the tube and then tightening it using the clamping screw.



ErgoTube 10° to 50°

ErgoTube™ 10° to 50°

The ErgoTube™ with continuously adjustable viewing angle from 10° to 50° allows for optimum sitting posture. Users who work with the same stereomicroscope can adjust the viewing height to their height with a simple hand movement. If the head posture is changed, the viewing height can also be readjusted without having to adjust the height of the chair. Special long tubes enable the user to maintain an upright posture. In order to safeguard against ESD, the ErgoTube™ has been constructed from anti-static materials.

Assembly

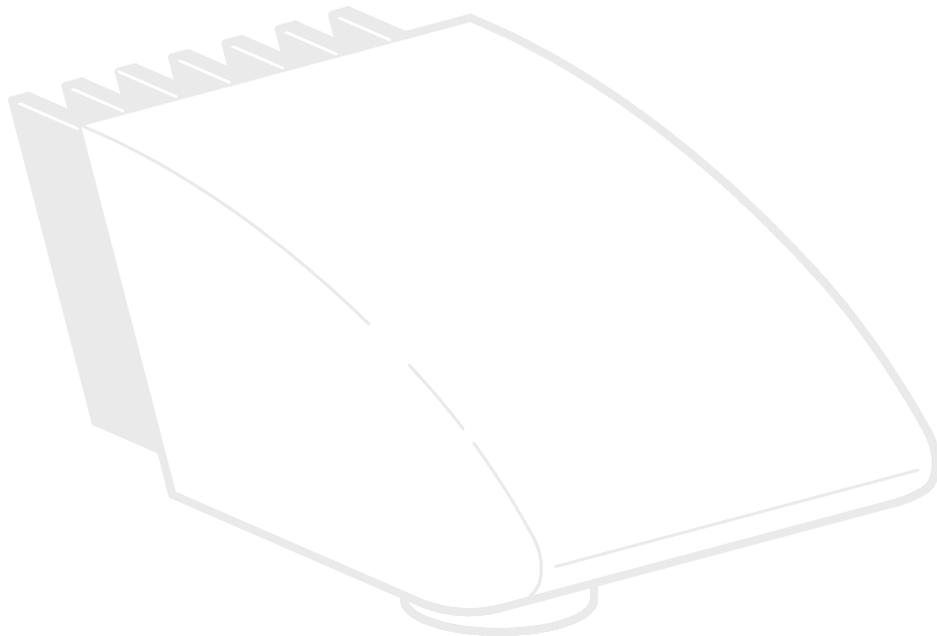
Assembly of the ErgoTube 10° to 50° is exactly the same as that of any other tube (see [Page 20](#)).

Handling

1. Then grasp the tubes with both hands and adjust the desired tilt.



Photography & Video



Photography & Video

For most microscope users, digital documentation has become an invaluable part of their work. Research results can be presented in an attractive manner; measurements on the digital image provide clarity and, in conjunction with the motorized IsoPro™ cross-stage, even images of large specimens can be captured step by step and automatically joined to create a new complete image.

Adapter

If camera control using the Leica Application Suite is not required, conventional mirror reflex and rangefinder cameras from third-party manufacturers can be used. For this purpose, Leica Microsystems offers a variety of adapters that can be used together with the 50% and 100% trinocular tubes.

Leica DFC cameras

However, if you require absolute control over the camera and need the capability for measurement, evaluation and more in addition to photography, the digital Leica DFC cameras are exactly right for you. Together with the Leica Application Suite, they provide virtually limitless freedom of use. For additional information about Leica cameras, refer to the camera's documentation.



Leica Application Suite

The "Leica Application Suite", or "LAS" for short, is, as it were, the digital extension of the Leica M series microscopes. In addition to capturing images, it lets you control the microscope, illuminator, stages, cameras and more. For additional information, refer to the LAS online help.



Photo Tubes and C-mounts

Application

All Leica DFC cameras are equipped with a standardized C-mount interface. In turn, the C-mount adapter for the respective trinocular tube is connected to this interface. This adapter creates a solid mechanical connection between the microscope and camera and ensures optimum rendering of the microscopic image on the image sensor of the camera.

Usually, the ideal is for the digital camera to capture as much of the field of vision as possible, while excluding as much of the black edge of the field of vision as possible. To do so, the magnification factor of the C-mount adapter must match the image format of the sensor as closely as possible (see table).

If there is unwanted shading at the corners even with a compatible C-mount adapter installed, it can be corrected using the "Shading function" of the camera software.

Alternatively, you can also use a C-mount adapter with higher magnification. This primarily avoids the critical border area of the field of vision and concentrates on the center of the field of vision.

Camera	optimal (large image field)	suitable (smaller image field)
DFC295 DFC290 HD	0.5×	0.63×
DFC425 DFC425 C	0.5×	0.63×
DFC495	0.63×	0.8×
DFC500	0.63×	0.8×

Cameras from third-party suppliers

In addition to Leica DFC cameras with the standardized C-mount interfaces, you can connect third-party cameras to the microscope using a T2 bayonet adapter. To do so, instead of the C-mount adapter, simply use the corresponding SLR adapter with T2 connection. However, these third-party cameras are not integrated into the Leica Application Suite and have to be operated using the corresponding software from the camera manufacturer.

The Leica digital cameras are detailed in a separate user manual along with instructions for their assembly and use.

Video/Phototubes HD F & HD V

The video/phototubes HD F and HD V are optimized for adapting state-of-the-art digital cameras to obtain perfect results for image acquisition. The video/phototubes can be combined with the binocular tubes and the ErgoModules™ from the Leica ergonomics line. A range of high-quality video objectives with different self-magnifications and C-mount allows for the selection of different cameras.

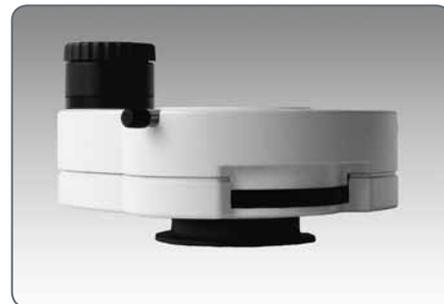
Separation ratios

The HD V allows for selecting three different separation ratios:

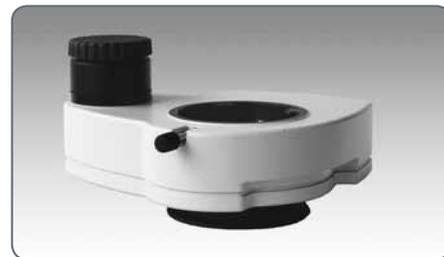
- ★ 50% light at all outputs, i.e. 50% light for stereoscopic observation and recording at 50% light.
- ★ 100% light in the right eyepiece for monitoring the object and 100% light in the camera to have the maximum light for the recording under extremely poor light conditions.

- ★ Three-dimensional observation with 100% light in the binocular tube.

The HD F features a fixed separation ratio of 50% in the binocular tube and 50% in the photo beam path. This allows the user to conduct three-dimensional observations of the samples in the binocular tube, manipulate and edit them and simultaneously project the image live on the monitor. Since the sensors of state-of-the-art cameras are highly sensitive, the exposure time for most applications is short in spite of lower light intensity.



Videotube HD V



Phototube HD F

Objectives and Optical Accessories



The Different Types of Objectives

To meet the various requirements regarding imaging properties, there is a choice of high-quality interchangeable planachromatic and planapochromatic objectives and also lower-priced interchangeable achromatic objectives.

- ★ Achromatic objectives are particularly suited for specimens with high-contrast structures.
- ★ Flat-field (planachromatic) objectives are particularly well suited for studying flat objects such as wafers and thin sections.
- ★ With planapochromatic objectives, the finest structures are visible with high contrast. The sophisticated apochromatic correction allows these objectives to attain the highest color brilliance and fidelity.

Achromatic objectives

The 0.32×, 0.5×, 0.63×, 0.8×, 1×, 1.5×, 2× achromatic objectives offer countless variants for selecting the object field diameter, magnification ranges and working distances (see [page 63](#)).

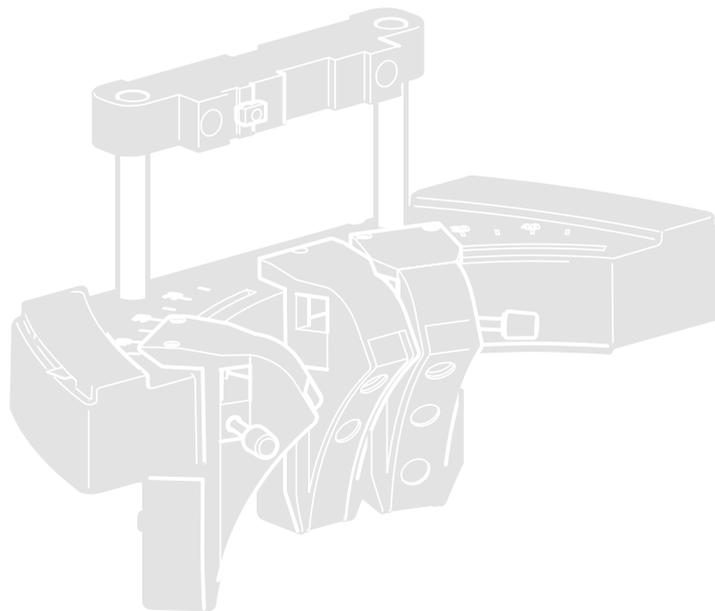
Planachromatic objective 1×

For the highest requirements for overall image quality, we recommend equipping the microscope with the 1× plan (flat-field) objective, which returns sharp, contrast-rich object fields.

Achromatic objectives with a long focal length:

For special applications achromatic objectives with long working distances and focal lengths of $f=100$ mm to 400 mm are available.

System Illumination



Leica LED3000 NVI™ (Near Vertical Illumination)

 The intensity of the illuminator can be adjusted in 10 increments.

 The Leica LED3000 NVI™ can also be controlled via the Leica Application Suite (LAS) or the Leica SmartTouch.

 The supported working distance is between 50 mm and 150 mm.

Use



The light of the Leica LED3000 NVI™ can be very bright. Therefore, always switch on the illuminator *before* you look through the eyepieces!

1. Switch on the illuminator by briefly pressing the  (ON/OFF) button.



The green LED on the upper left corner now lights up.

2. Adjust the brightness by briefly pressing the  or  buttons.



3. Switch off the illuminator by briefly pressing the  button.

Leica LED5000 CXI (Coax Illumination)

 The intensity of the illuminator can be adjusted in 10 increments.

 The Leica LED3000 NVI™ can also be controlled via the Leica Application Suite (LAS) or the Leica SmartTouch.

 Using the Leica LED5000 CXI results in an increased magnification level of 1.5×.

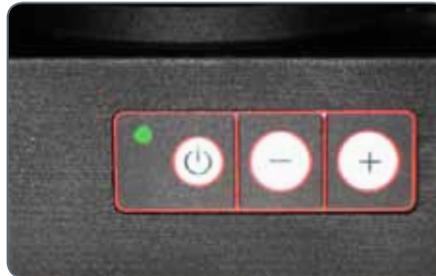
 Depending on the components used, different intensities of vignetting may occur at low magnification. Vignetting is normal and not a malfunction.

Use



The light of the Leica LED5000 CXI can be very bright. Therefore, always switch on the illuminator *before* you look through the eyepieces!

1. Switch on the illuminator by briefly pressing the  (ON/OFF) button.



The green LED on the upper left corner now lights up.

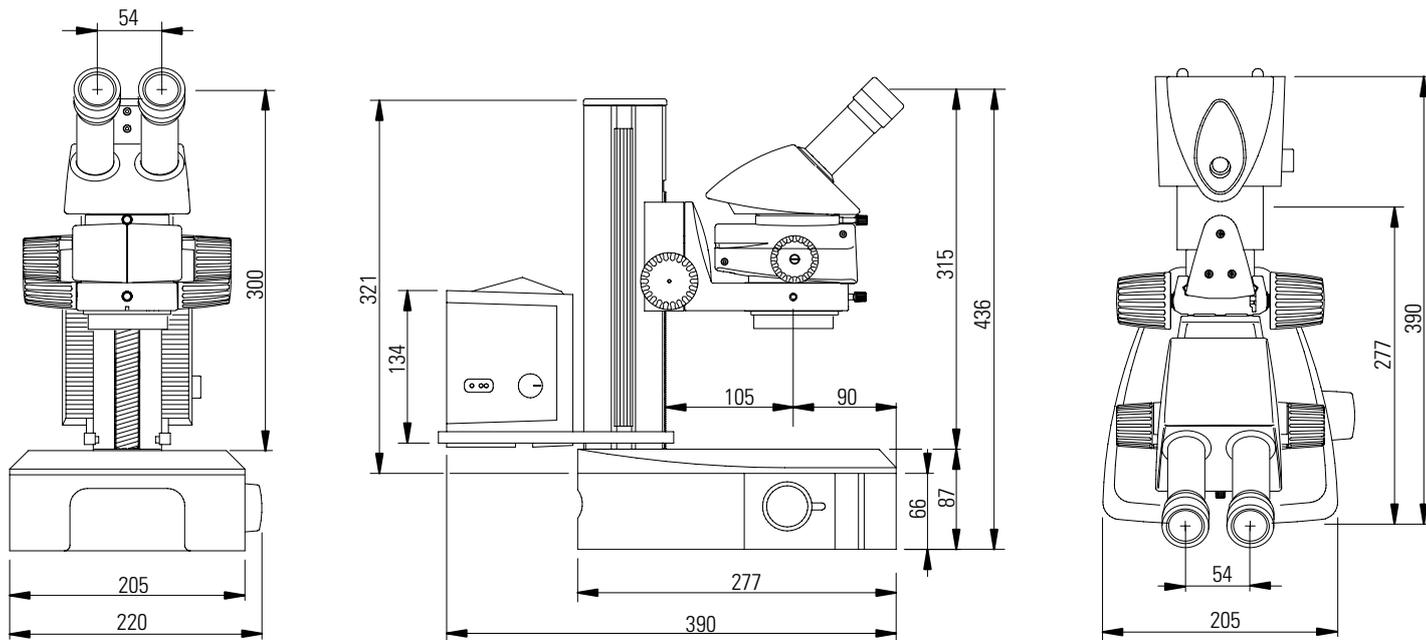
2. Adjust the brightness by briefly pressing the  or  buttons.
3. Switch off the illuminator by briefly pressing the  button.



Dimensional Drawings

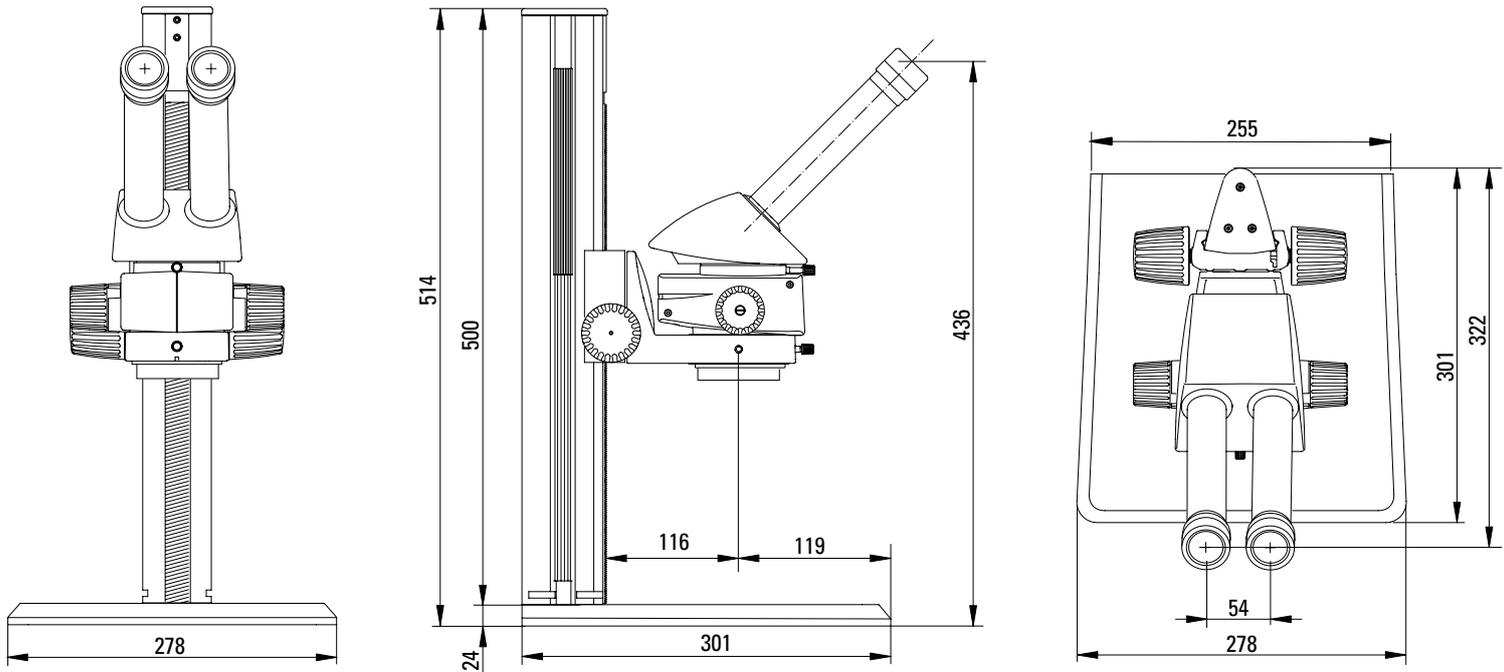
Leica M50

Leica M50 with small incident-light base, transmitted-light base, Leica L2 illumination and 45° binocular tube



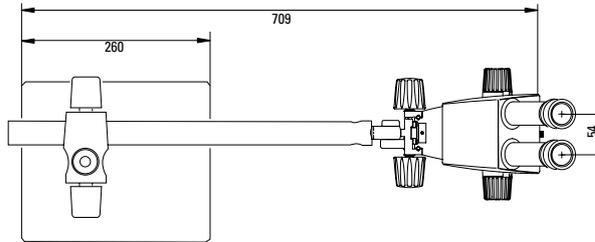
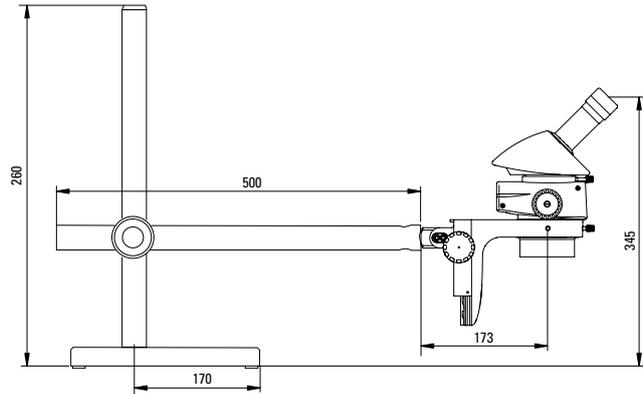
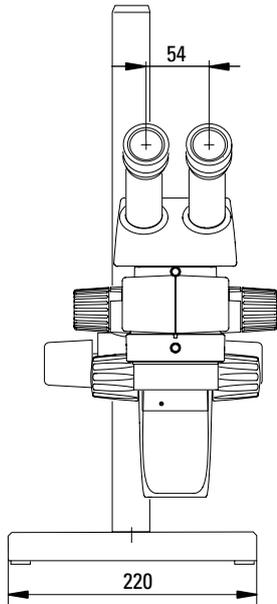
Leica M50

Leica M50 with large incident-light base and ErgoTube® 45°



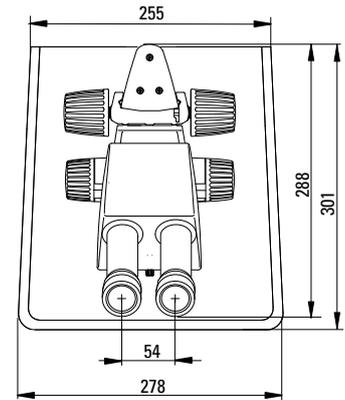
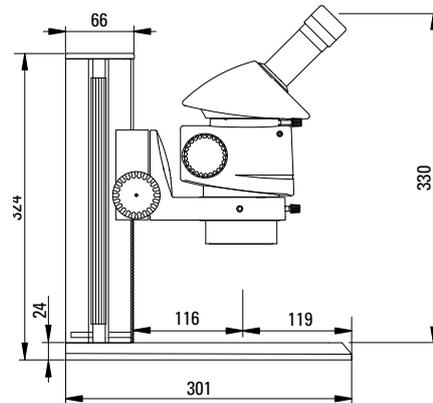
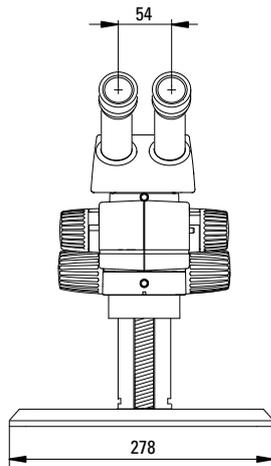
Leica M50

Leica M50 with small swinging-arm stand and 45° binocular tube



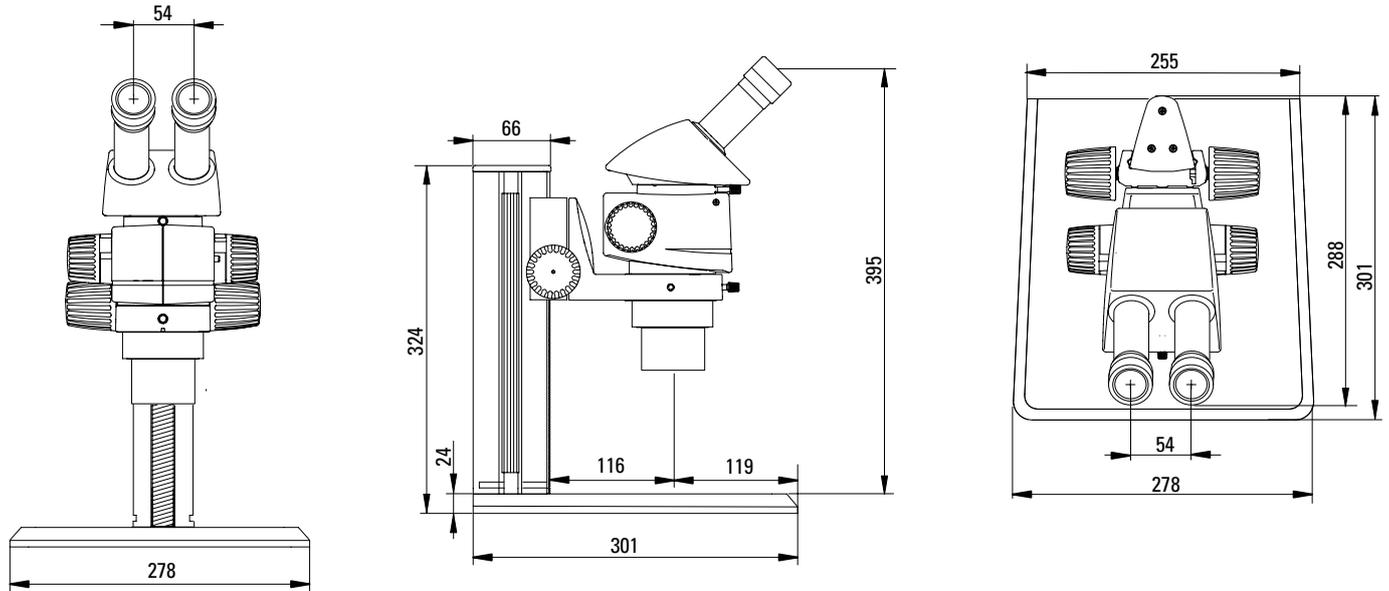
Leica M60

Leica M60 with large incident light base and 45° binocular tube



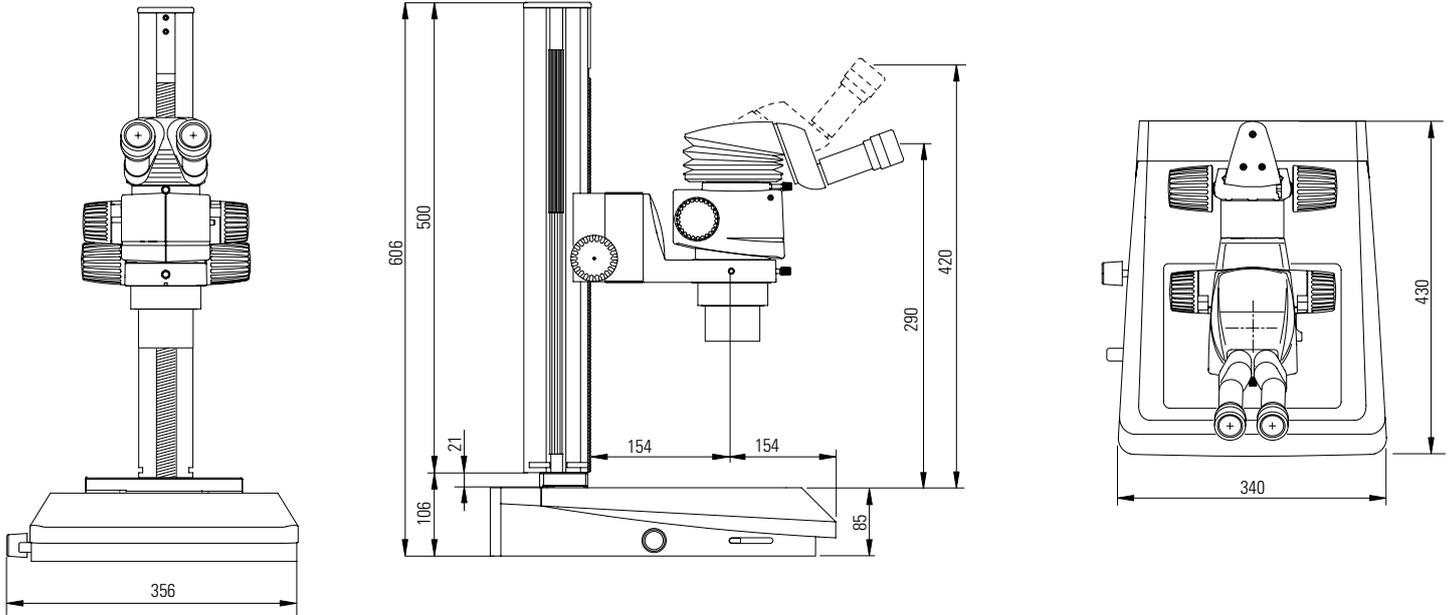
Leica M80

Leica M80 with large incident-light base and 45° binocular tube



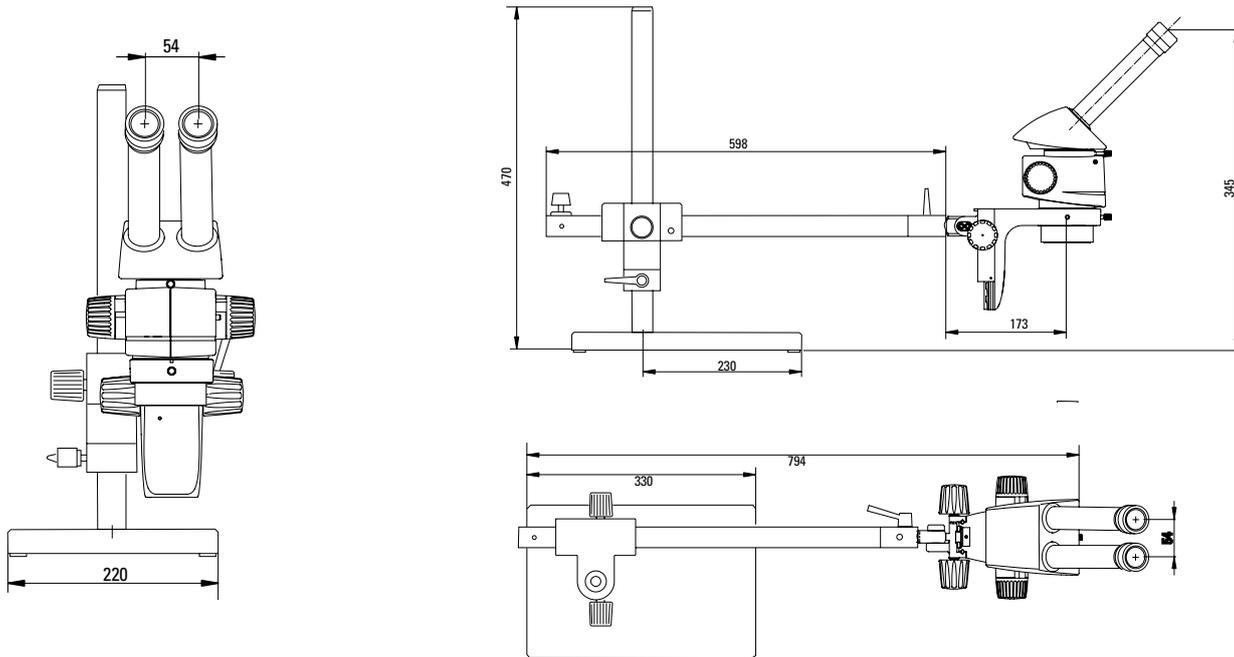
Leica M80

Leica M80 with transmitted-light base TL ST and binocular ErgoTube®



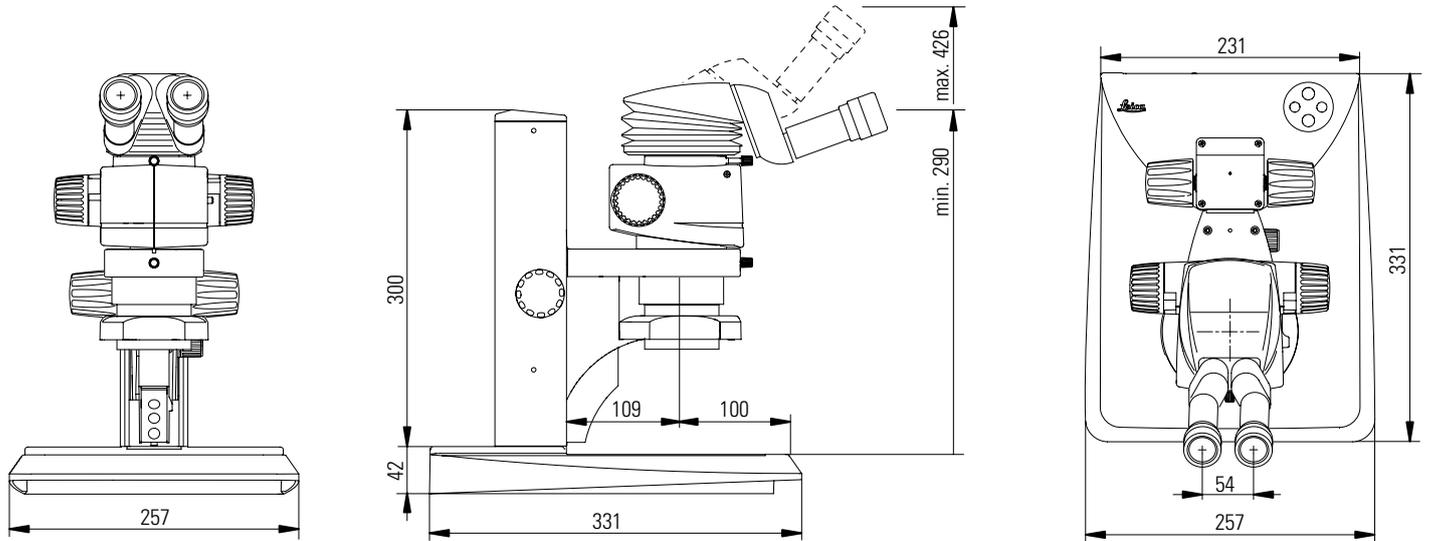
Leica M80

Leica M80 with standard swinging-arm stand and 45° binocular tube



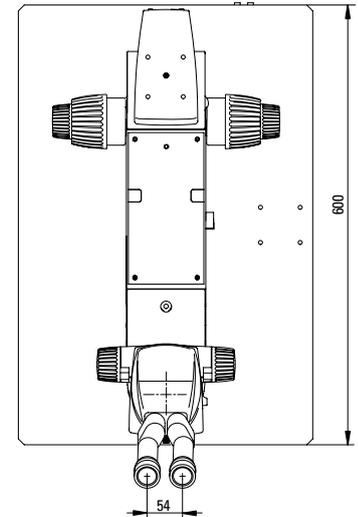
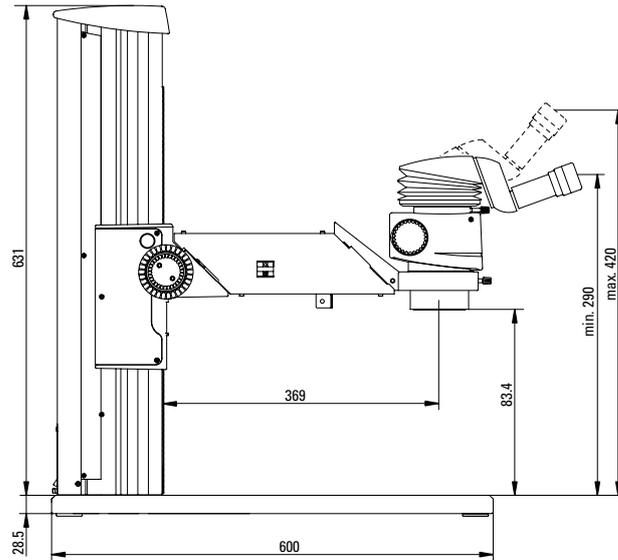
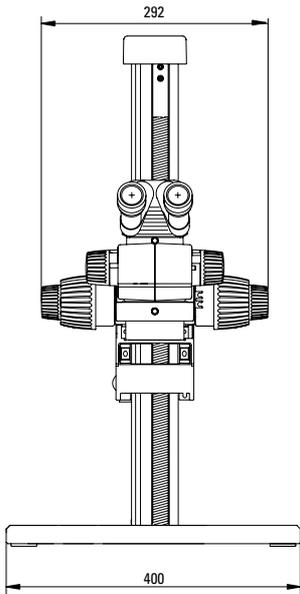
Leica M80

Leica M80 with Leica LED2500 and binocular ErgoTube®



Leica M80

Leica M80 with universal stand, XL extension and binocular ErgoTube®



Appendix

Calculating the Total Magnification and Field of View Diameter

Parameter

MO	Magnification of objective
ME	Magnification of eyepiece
z	Magnification changer position
q	Tube factor, e.g. 1.5× for coaxial incident light, 1.6× for 45° ErgoTube™
r	Factor 1.25× if the planachromatic and planapochromatic objectives of the MZ125/MZ16 are used on the MS5, MZ6, MZ75 or MZ95
NFOV	Field number of the eyepiece. Field numbers are printed on the eyepieces: 10× = 21, 16× = 14, 25× = 9.5, 40× = 6.

Example

MO	1× objective
ME	25×/9.5 eyepiece
z	Zoom position 4
q	Coaxial reflected light 1.5×, tube factor
r	Factor 1.25×

Calculation example: magnification in binocular tube

$$\begin{aligned}
 \text{MTOT VIS} &= \text{MO} \times \text{ME} \times z \times q \times r \\
 &\text{or} \\
 &1 \times 25 \times 4 \times 1.5 \times 1.25 = 187.5\times
 \end{aligned}$$

Calculation example: field of view diameter in the specimen

$$\text{Ø OF: } \frac{N_{\text{FOV}}}{\text{MO} \times z \times q \times r}$$

Care, Maintenance, Contact Persons

We hope you enjoy using your high-performance microscope. Leica microscopes are renowned for their robustness and long service life. Observing the following care and cleaning tips will ensure that even after years and decades, your Leica microscope will continue to work as well as it did on the very first day.

Warranty benefits

The guarantee covers all faults in materials and manufacture. It does not, however, cover damage resulting from careless or improper handling.

Contact address

However, if your instrument should no longer function properly, contact your technician, your Leica representative or Leica Microsystems (Schweiz) AG, CH-9435 Heerbrugg.

E-mail contact:

stereo.service@leica-microsystems.com

Care

- ★ Protect your microscope from moisture, fumes and acids and from alkaline, caustic and corrosive materials and keep chemicals away from the instruments.
- ★ Plugs, optical systems and mechanical parts must not be disassembled or replaced, unless doing so is specifically permitted and described in this manual.
- ★ Protect your microscope from oil and grease.
- ★ Do not grease guide surfaces or mechanical parts.

Care, Maintenance, Contact Persons (cont'd.)

Protection from dirt

Dust and dirt will affect the quality of your results.

- ★ Put a dust cover over the microscope when it will not be used for a long time.
- ★ Use dust caps to protect tube openings, tubes without eyepieces, and eyepieces.
- ★ Keep accessories in a dust-free place when not in use.

Cleaning polymer components

Some components are made of polymer or are polymer-coated. They are, therefore, pleasant and convenient to handle. The use of unsuitable cleaning agents and techniques can damage polymers,

Permitted measures

- ★ Clean the microscope (or parts of it) using warm soapy water, then wipe using distilled water.
- ★ For stubborn dirt, you can also use ethanol (industrial alcohol) or isopropanol. When doing so, follow the corresponding safety regulations.
- ★ Remove dust with a pneumatic rubber bulb or with a soft brush.
- ★ Clean objectives and eyepieces with special optic cleaning cloths and with pure alcohol.