

Living up to Life

Leica
MICROSYSTEMS

User Manual

Leica M125 B
Leica M165 C B



CE

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The instructions contained in the following documentation reflect state-of-the-art technology. We have compiled the texts and illustrations as accurately as possible. Still, we are always grateful for comments and suggestions regarding potential mistakes within this documentation.

The information included in this manual may be changed without prior notice.

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Function of the Microscopes

The Leica M125 B and Leica M165 C B microscopes, for which this User Manual has been written, are designed for routine examinations of cell and tissue cultures, liquids, and sediments. This includes examining specimens taken from the human body for the purpose of gaining information about physiological or pathological conditions or inborn anomalies, or testing for safety and compatibility for potential recipients, or for monitoring therapeutic measures.

IVD

The above-named microscopes comply with the Council Directive 98/79/EC concerning in vitro diagnostics.

 The manufacturer assumes no liability for damage caused by, or any risks arising from, using the microscope for

other purposes than those for which they are intended or not using them within the specifications of Leica Microsystems CMS GmbH. In such cases, the Declaration of Conformity shall be invalid.

 These (IVD) instruments are not intended for use in the patient environment defined by DIN VDE 0100-710. Nor are they designed to be combined with medical

instruments in accordance with EN 60601-1. If a microscope is electrically connected to a medical instrument in accordance with 60601-1, the requirements listed in EN 60601-1-1 shall apply. Not suitable for examining potentially infectious specimens. This type of instrument may be operated by trained laboratory personnel only.

Leica M125 B nameplate



Leica M165 C B nameplate



General Notes

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 could damage the surfaces, and products could be contaminated by abraded particles.
 - ★ 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.
- ★ The cleaning of glass surfaces and objectives in particular should be carried out exclusively as outlined in the brochure "Cleaning of Microscope Optics". The information can be downloaded at:
<http://www.leica-microsystems.com/products/>
. Select your product and go to the "Download" page.
 - ★ For additional information, refer to [page 56](#).

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

This User 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.

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 instructions from the supplier.

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

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.

We guarantee the quality of our products. Our guarantee covers all faults in materials and manufacture. It does not, however, cover damage resulting from careless or improper handling.

Symbols Used

Warning! Safety hazard!



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

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.

Disposal



Notes on how to dispose on the microscope, its components and expendables.



China RoHS 50 year EFUP (Environmentally friendly use period)

IVD labeling



Instrument for in vitro diagnostics.



IVD manufacturing date, for example 11 / 2011 for November 2011.

MM/YYYY

Safety Instructions

Description

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

Intended use of instrument

- ★ Leica Microsystems microscopes are optical instruments for improving the visibility of objects or specimens through magnification. Accessories such as optical accessories, stands, illumination, cameras etc. supplement the equipment configuration.

Non-intended use

- ★ Using the instrument in any way contrary to the specifications in the User Manual can lead to bodily harm and damage to objects. Never use microscopes for in vivo examinations or eye surgery if they are not expressly intended for such use. Never install any other plug or unscrew optical systems

and mechanical parts unless expressly instructed to do so in the instructions.

The instruments and accessories described in this User 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 as well as product liability and the Declaration of Conformity.

Place of use

- ★ Only use the instruments in closed, dust free rooms and between +10°C and +40°C. Protect the devices from oil, chemicals and extreme humidity. If using the devices outdoors, protect them from dust and moisture. Never use electrical devices outdoors.
- ★ Electrical components must be placed at least 10 cm away from the wall and away from flammable substances.
- ★ Avoid large temperature fluctuations, direct sunlight and vibrations. These conditions can distort micrographic images, for example.
- ★ In warm and warm-damp climatic zones, the individual components require special care in order to prevent the build-up of fungus.

Safety Instructions (continued)

Responsibilities of person in charge of instrument

- ★ These Safety Instructions must be available at the workplace.

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.

Repairs, service work

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

- ★ Before opening the instruments, switch off the power and unplug the power cable.
- ★ Avoid contact with powered electrical circuits, which can lead to 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.

Integration in third-party products

- ★ When installing Leica products into third-party products, the manufacturer of the complete system or its dealer is responsible for following all applicable safety instructions, laws and guidelines.

Disposal

- ★ Once the product has reached the end of its service life, please contact Leica Service or Sales about disposal.
- ★ Please observe and comply with the national and federal laws and regulations that are equivalent to EC directives such as WEEE.



Like all electronic devices, the microscope, its accessory components and consumables must never be disposed of with general household waste.

Safety Instructions (continued)

Legal regulations

- ★ Observe the generally applicable statutory and country-specific regulations for accident prevention and environmental protection.

EC Declaration of Conformity

- ★ Electrically operated accessories are constructed based on the state of the art of technology and are provided with an EC Declaration of Conformity. See [page 55](#)

Health risks

Workplaces 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.

Careful handling

- ★ Exercise particular care when setting up the instruments. If it is specified that two or more people are required for setup, compliance with this is mandatory.
- ★ Never spill any liquids on electrical instruments. This could cause the stereomicroscope and other equipment to become electrically live and damage people and instruments.
- ★ Never clean instruments using corrosive cleaning agents or those containing acetone. For detailed information about care, refer to the User Manual for the instrument.
- ★ Check the power cables regularly. Defective power cables can cause injuries.
- ★ Wait for bulbs to cool off before changing them. Touching hot bulbs can cause burns.

Safety Instructions (continued)

Light sources: safety regulations

- ★ Light sources pose a potential risk from glare. Therefore, lamps have to be operated in closed housings and in installed condition.
- ★ Never look directly into the beam path (blinding hazard).
- ★ Do not select a white, strongly reflective background for the specimen.

External power supply for the focusing column

(Leica M165 C B)

Permitted power supply:
SINPRO SPU46-110

Specifications:

Input: 100-240 V AC
47-63 Hz
1.2 A
Output: 33 V DC
1.51 A

For indoor use only.

External power supply for TL5000 Ergo

Permitted power supply:
SINPRO SPU130-110

Specifications:

Input: 100-240 V AC
47-63 Hz
3.2 A
Output: 33 V DC
3.93 A
max. 130 W

For indoor use only.



Use only the power supply specified above. Other power supplies must not be used. If the original power supply fails or is damaged, it must be replaced. Repair is not permitted. Original power supplies are available from your Leica branch office or Leica dealer.

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The Leica M Series



Congratulations!

Congratulations on obtaining your new Leica M series stereomicroscope. We are convinced it will exceed your expectations, as never before have we applied our decades of experience in the areas of optics, mechanical engineering and ergonomics in such an uncompromising manner.

The Leica M series embodies all the qualities you associate with the name Leica Microsystems: excellent objectives, high-quality engineering, and reliability. Furthermore, the modular design ensures that the M series adapts perfectly to your needs—no matter which accessories you require for your tasks.

Though the reliability and robustness of Leica stereomicroscopes is legendary, like any high-tech product, the Leica M series requires a certain degree of care and attention. Therefore, we recommend that you read this manual. It contains all the information you need regarding operation, safety and maintenance. Simply observing a few guidelines will ensure that even after years of intensive use, your stereomicroscope will continue to work as smoothly and reliably as on the very first day.

We wish you the best of success in your work— after all, you are now equipped with the best tool!

A Step Towards Infinity

Ever since their introduction by Horatio S. Greenough, stereomicroscopes have worked according to the optical principles based primarily on Ernst Abbe's research. For over a century, ingenious optics designers and engineers have worked to push magnification, resolution and image fidelity to the limit permitted by optics.

In doing so, they have always been constrained by the interrelation between three factors: the higher a microscope's resolution, the lower the available working distance. If one increases the distance of the optical axes, the three-dimensional image seen by the observer becomes distorted— a sphere becomes an ellipse, a flat surface curves towards the observer.

The Electronics: Comfort, Convenience and Safety for your Experiments

Never before have electronics been used as extensively in a Leica series as in the new M series lineup. Optics carrier, tripod, base and illuminator are all connected using electrical contacts—which provides a number of advantages.



Contacts not only transmit data, but also supply the power.

Fewer cables

A large part of the cables have been routed in the interior of the column. Data are also transferred via the interface between the column, the optics carrier and the carrier. The direct result is that you need fewer cables—this not only makes your workstation neater and more comfortable, it even makes it appear larger.

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 new objectives of the Leica M series are parfocal.

If you prefer, you can continue to use the previous Leica objective series. In this case, parfocality is no longer guaranteed.

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

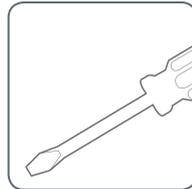
The new M series eyepieces have an audible and tangible click to provide immediate feedback in case of accidental adjustment.

On We Go

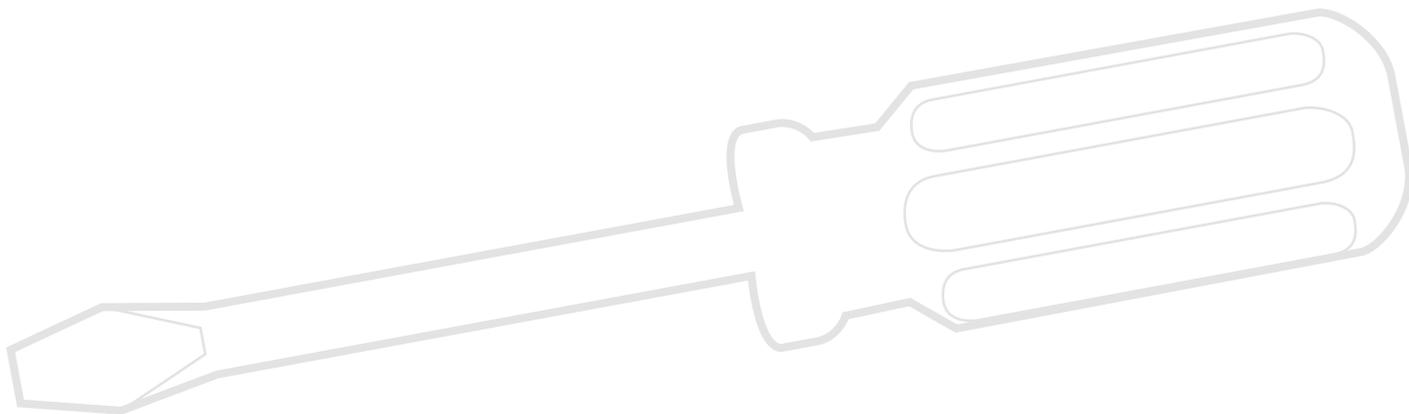
If your new Leica microscope has already been assembled and commissioned by your Leica consultant, click here to skip through the installation instructions and go directly to the Quick Start Guide on [page 28](#).



If, on the other hand, you are assembling the microscope yourself, continue with the "Assembly" chapter, which begins on [page 19](#).



Assembly



Base and Focusing Column

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

Tools used

- ★ Allen key, 3 mm

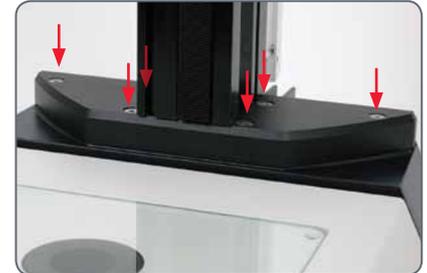
Assembling the column adapter

1. Securely install the column adapter on the column using the four included screws.



Assembling the focusing drive

2. Securely screw the focusing column to the base using the six included screws.



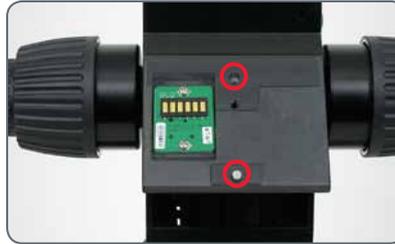
Optics carrier

Tools used

- ★ Allen key, 4 mm

Assembling the Optics Carrier

1. Place the optics carrier on the focusing column so that the screw fits into the thread provided and the lug fits into the groove.



2. Press the optics carrier backwards to the focusing column and screw it in place using your other hand.



Tube

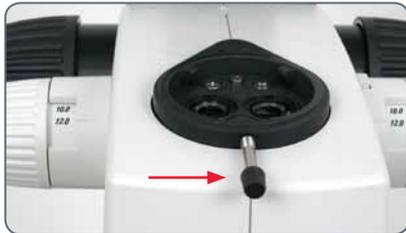
All intermediate tubes that fit between the optics carrier and the binocular tube are fitted in the same manner.

Tools used

★ No tools required.

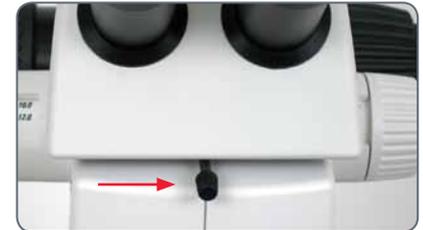
Preparations

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 44](#)).
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.



TL5000 Ergo transmitted light base

Unpacking the base

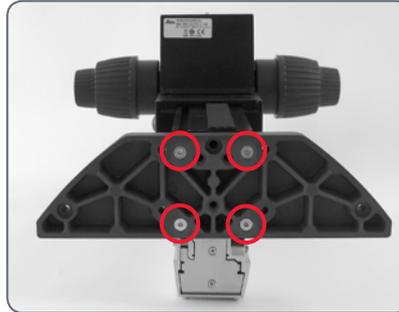
The base is delivered with the adapter plate installed. Make sure the instruments are unpacked on a flat, sufficiently dimensioned, and non-slip surface.



Refer also to the separately provided User Manual for the TL5000 Ergo transmitted light base.

Focusing drive and column

1. Unscrew the extension plate from the base using the Allen key provided.



2. Attach your focusing drive column to the bottom using the 4 Allen screws.
3. Reattach the adapter plate to its original position using the 6 Allen screws.



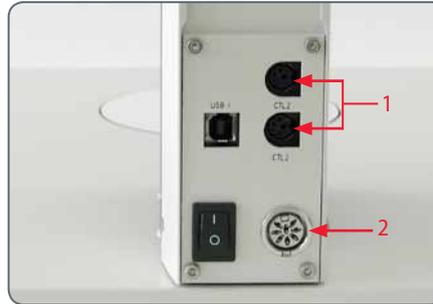
Wiring: Connections (Leica M165 C B)

The new Leica M series features extensive encoding with which various microscope data and settings can be read out and reproduced later.

- ★ The interface to the optics carrier is on the column.



The terminals



The connection to other instruments is made using the terminals on the rear side of the column:

1. 2×CTL2 terminals for auxiliary equipment such as the ring illuminator, the base and other accessories from the Leica product range.
2. Terminal for the 50-watt power supply provided.

Cables: Cable Duct

The integrated cable duct in the column enables a neat cable layout around the microscope. For example, the USB or FireWire cables of the camera can be stowed in the cable duct.

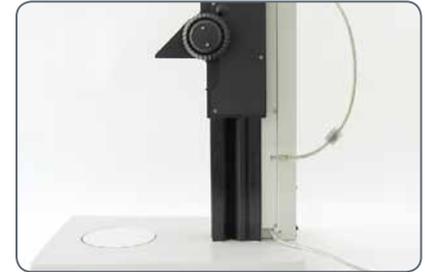
Feeding the cables

1. Unscrew the three screws on the cable duct.



2. Remove the cover of the cable duct.

3. Place the cables in the cable duct and screw the cover on tightly.



Tip: Estimate the length of the cable ends you will need before screwing on the cover. For thick cables, it is difficult to change the length retroactively.

Quick Start Guide

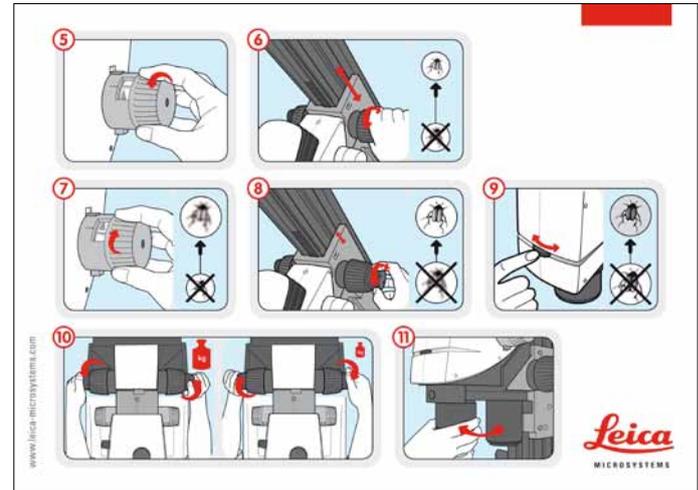


The Fastest Route to Success

Your Leica stereomicroscope has been delivered in completely assembled condition by your Leica partner, and naturally you want to get right to work. Therefore, your next step should be to study the Quick Start Guide, which outlines the most important steps at a glance.

This manual will then familiarize you with the finer details of your microscope. The following pages contain important, practical information that makes using it every day easier.

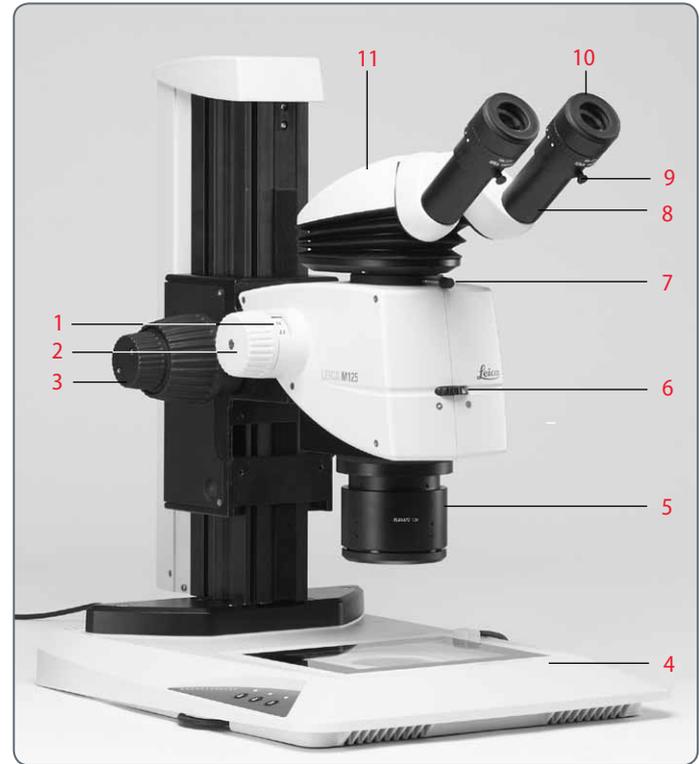
Take time to read it – it's worth it!



The M series Quick Start Guide (included with instrument).

Overview of an M Series Microscope

- 1 Switch click stops on/off
- 2 Magnification changer (zoom)
- 3 Coarse/fine focusing
- 4 Transmitted light base
- 5 Interchangeable objective
- 6 Built-in iris diaphragm
- 7 Fastening screw for the binocular tube (or accessories)
- 8 Adjustable eyepiece tubes
- 9 Fastening screws for the eyepieces
- 10 Eyepieces for spectacle wearers with diopteric correction and eyecups
- 11 Trinocular tube



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 values

The distance between eye and eyepiece measures approx. 22 mm for 10/23B widefield 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.

Dioptic Correction

A built-in dioptic correction is available for eyeglass wearers. For more information, refer to [page 42](#)

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 inte-



grated dioptic 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 inte-



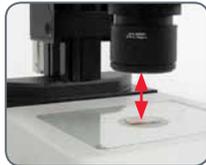
2. If an eyepiece is equipped with the integrated dioptic correction, turn the value to the "0" mark.

By the way, one benefit of viewing with eyeglasses is a drastically lower risk of bacterial transmission (see [page 41](#)). 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.



Focusing

- ★ The inner, coarse adjustment is used for covering great distances.
- ★ The outer, fine adjustment is used for fine focusing.



Coarse/fine adjustment

The sharpness is adjusted using the coarse/fine adjustment.



2. 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 focusing drive too loose or too tight?
Does the equipment 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 M125 B = 12.5:1
- ★ Leica M165 C B = 16.5:1

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.



Click Stops and Magnifications

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

Enabling and disabling click stops

1. Push the top button downwards to disable the ratchet steps.
2. Push the bottom button upwards to enable the ratchet steps.



Magnifications and fields of view

The formula on [page 54](#) provides 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.

Parfocality: More Comfort and Convenience for Your Work

All Leica stereomicroscopes are parfocally matched, meaning that you can view a focused specimen from the lowest to the highest magnification without having to refocus. The focus needs to be readjusted only if you want to view a specimen detail that is located higher or lower.

Requirements for parfocal work

- ★ If you are using an eyepiece with dioptic correction, the procedure differs from this description. For more information, refer to [page 43](#)

Parfocality

1. Enlarge the view to the maximum level.
2. Focus on the specimen.

You are done! Even if you select a smaller working distance, the specimen remains pin-sharp.

The parfocality is maintained until you focus on another level of the specimen.

Iris Diaphragm

The iris diaphragm in the optics carrier of your M series microscope has the same purpose as those in a camera shutter: it regulates the available light, which changes the depth of field. The "depth of field" (or "depth of focus") is the area of a specimen that is brought into sharp focus.

Closing the iris diaphragm

- ★ Close the iris diaphragm by turning the knob to the left. The subject appears darker and the depth of field increases.

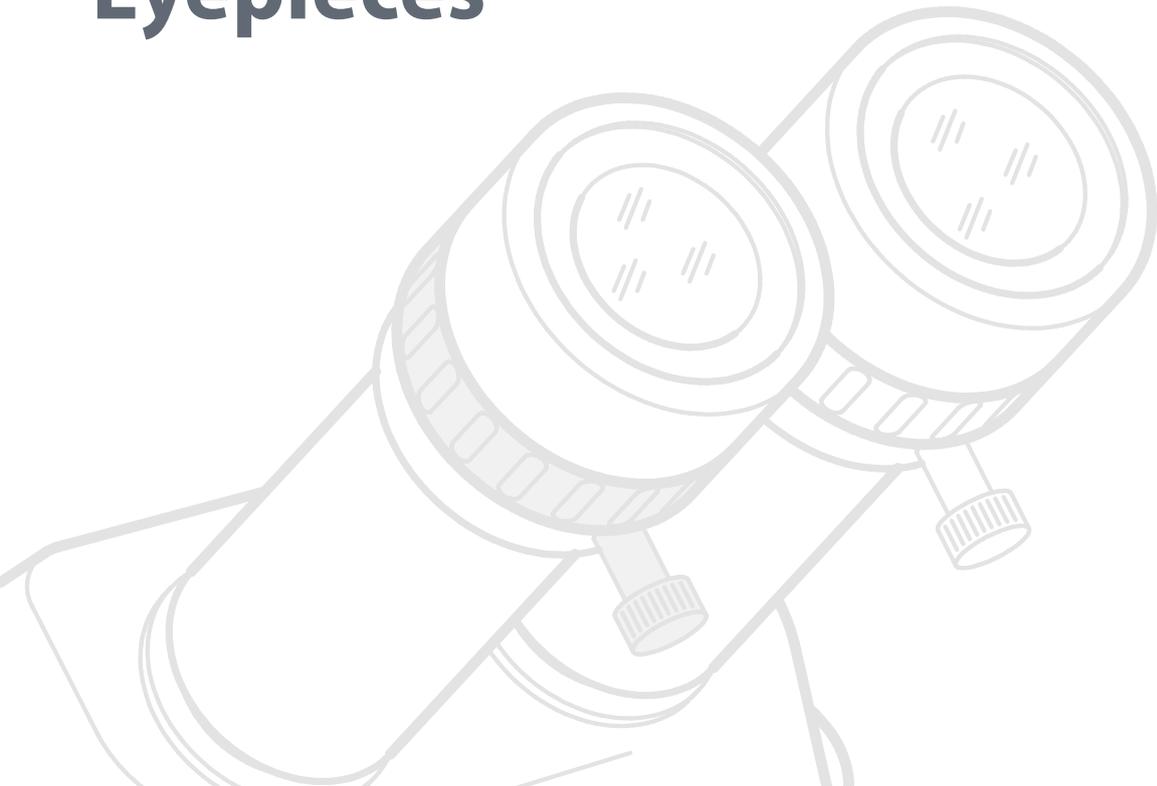


Opening the Iris Diaphragm

- ★ Open the iris diaphragm by turning the knob to the right. The subject now appears brighter, but the depth of field decreases.



Eyepieces



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 the "-" direction until the specimen appears sharp.
5. Then, open the other eye and correct the diopter settings until the image is uniformly sharp.

 Note that when using dioptric correction, the advantage of parfocality is lost - thus you have to manually refocus each time you change the zoom level. To also use parfocality with dioptric correction, refer to the instructions on [page 43](#)

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 have to be carried out only once by each user.

Preparations

- ★ 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 counting easier, particularly for workstations that are not equipped with a digital camera.

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.



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 54](#)).

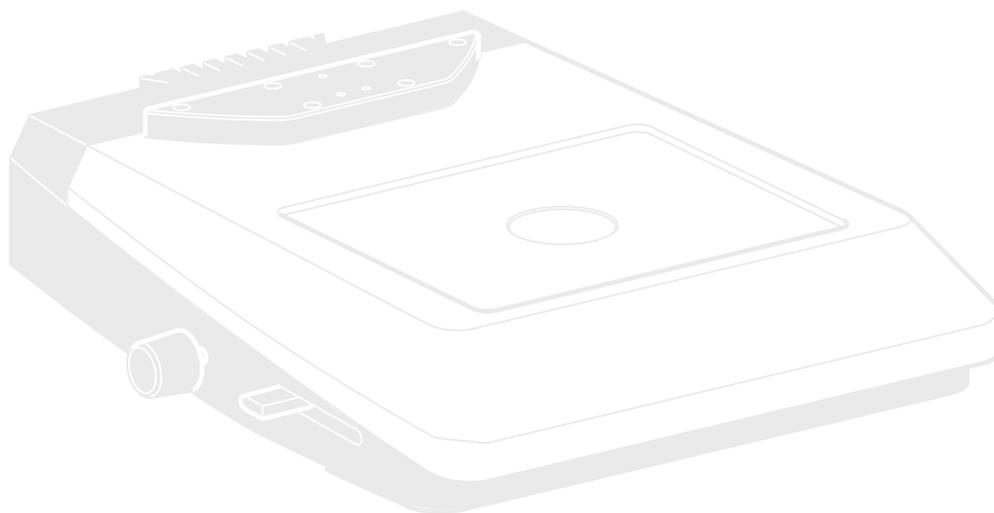
Planachromatic objective 1×

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 all the way to the border.

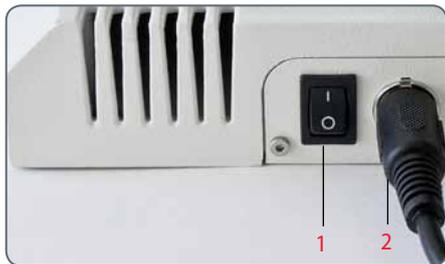
Achromatic objectives with a long focal length

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

Bases



Leica TL5000 Ergo Transmitted Light Base: Controls



Rear side of the TL5000 Ergo

- 1 Power switch for the base
- 2 Power supply connection



Left side of the TL5000 Ergo

- 1 LED display for opening and positioning the aperture or for balance in DF mode.
- 2 Control for the size of the aperture/balance
- 3 "BF" button for bright field (press and hold for 2 seconds to (de)activate the automatic aperture)
- 4 "RC" button for Rottermann Contrast / in the RC mode, press and hold the button to define the aperture size
- 5 "DF" button for dark field



Right side of the TL5000 Ergo

- 1 On/Off switch for the light source / Press and hold for 5 seconds to reset the base to factory default settings
- 2 Controls for controlling the brightness intensity



Refer also to the separately provided User Manual for the TL5000 Ergo transmitted light base.

Leica TL5000 Ergo Transmitted Light Base: Operation



The transmitted light base must only be connected to a grounded socket with a faultless power cable! Failure to observe these warnings may result in serious personal injury or even death!



The LED illumination can be very bright! Check and adjust the intensity of the illumination to a suitable brightness before looking through the eyepieces.

Switching the transmitted light base on and off

1. Switch on the transmitted light base with the power switch on the rear side.



2. Press the on/off switch on the right side once to turn on the illumination.



Continued on next page.

Leica TL5000 Ergo Transmitted Light Base: Operation (Continued)

3. Look through the eyepiece and adjust the light intensity using the control on the right side. The intensity of the illumination is visualized by the LED scale.



- 4 Press the on/off switch on the right side once again to turn off the illumination on the base.

 The following assumes that the power switch on the rear side of the device is always switched on. This switch is not mentioned in the remaining part of this User Manual.





Technical Data

Leica TL5000 Ergo Transmitted Light Base

Light source	
Light source	LED
Illuminated field: Bright field Ø	65 mm
Illuminated field: Dark field Ø	40 mm
Relief Contrast System (RC™)	Yes
Internal shutter/lamp control	Yes
Integrated filter holder	Yes
Matching of high num. aperture	Yes
Remote control options	Yes
AntiShock™ Pads	Yes
Dimensions (W×H×D)	412×341×46 mm
Power supply	
Input	100–240 VAC 47 – 63 Hz 3.2 A
Output	33 VDC 3.93 A 130 W MAX
Connections	
Power supply	1

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 incident light 1.5×, tube factor
r	Factor 1.25×

Calculation example: magnification in the binocular tube

$$\text{MTOT VIS} = \text{MO} \times \text{ME} \times z \times q \times r$$

or

$$1 \times 25 \times 4 \times 1.5 \times 1.25 = 187.5\times$$

Calculation example: field of view diameter in the specimen

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

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.

EC Declaration of Conformity

To download the EC Declaration of Conformity, use this link

<http://www.leica-microsystems.com/products/stereo-microscopes-microscopes/research-manual/>

Select the microscope type and go to the "Download" page.

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 (continued)

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 bellows and a soft paintbrush.
- ★ Clean eyepieces and objectives with special optics cleaning cloths and pure alcohol.



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