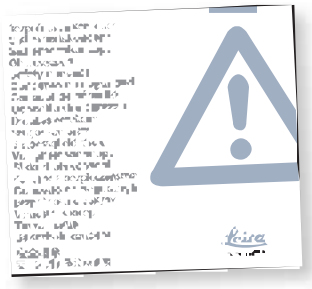
Leica
MICROSYSTEMS

Leica M165 FC
Leica M205 FA / M205 FCA
User Manual

General Instructions

Safety concept

Before using your microscope for the first time, please read the "Safety concept" booklet 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, chemical or technical for cleaning.
- Never use chemicals to clean coated surfaces or accessories with rubberized parts. This could damage the surfaces, and objectives could be contaminated by eroded 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.

Servicing

- Tasks 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

Special 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 accessible hot surfaces, e.g. those of light bulbs.

Important information

This symbol indicates additional information or explanations that intend 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 Instructions

Description

The individual modules fulfil the highest requirements for observation and documentation of Leica stereo microscopes of the M series.

Intended 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

- Electrical components must be placed at least 10 cm away from the wall and from flammable substances.

- 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 build-up of fungus.

Responsibilities of person in charge of instrument

- Refer to "Safety Concept" booklet

Ensure that:

- The M series stereo microscopes 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 instructions.

Safety Instructions (Continued)

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.

Integration 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 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.

Safety Instructions (Continued)

Direct contact with eyepieces is a potential transmission method for accidental and invisible infections of the eye.

The risk can be reduced to a minimum by using personal eyepieces for each individual or disinfected eyepieces.

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 path to protect the eyes.
- The stray grid protection on the condenser housing prevents radiation of the hands.

Warning

UV radiation could damage the eyes. Therefore:

- Never look into the grid scale on the specimen plane without the UV protection screen.
- Never look into the eyepieces without excitation filter in the beam path.
- Fill empty filter positions with dummy filter carriers (e.g. 11665701).
- Do not select a white, strongly reflective background for the specimen.

Safety Instructions (Continued)

Supply unit

Lamp housing

Mercury lamp

Contents

Contents (Continued)

Contents (Continued)

The Leica M Series for Fluorescence

Congratulations!

A Step Towards Infinity

Ever since the 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.

Limits are made to be broken.
The Leica M205 FA is the world's first fluorescence stereomicroscope with a zoom range of 20.5:1. This accomplishment, however, was not enough for Leica's engineers. With the new FusionOptics in the Leica M205 FA / M205 FCA, they have succeeded in going yet another step beyond previous limits. In addition to the increase in magnification, the resolution, too, has been increased to up to 1,050 lp/mm*, which corresponds to a resolved structure size of 472 nm.

Of course, this increase in performance benefits your everyday work. Set up your specimens on the microscope table with comfortable freedom of movement and discover details in stereomicroscopy that you could never see before.

* Leica M205 FA with 2x planapochromat and 10x eyepieces

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 AI series. Optics carrier, stand, base and illuminator are all connected using electrical contacts – which provides a number of advantages.

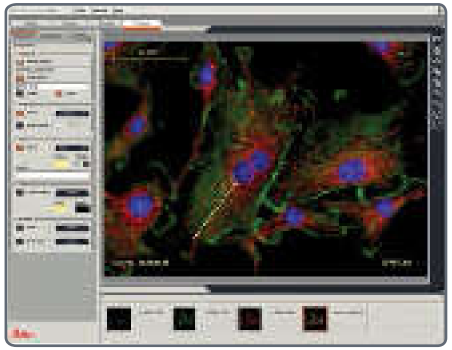
Reliability for your experiments

Exact reproducibility of results is an increasingly common demand, particularly in research and development. The continuous encoding captures parameters such as the magnification, the illumination, the position of the iris diaphragm and more and transmits the information to the Leica LAS software. Thus you always know the conditions under which an image was acquired.

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 camera. The direct result is that you need fewer cables – this not only makes your workstation neater and more comfortable, it even makes it safer.

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



Leica Application Suite (LAS) evaluates the transmitted data and can restore the test situation later.

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 the 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, meaning that when used with the objective nosepiece, they can be replaced while keeping the specimen in perfect focus.

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

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

On We Go

Assembly

Assembling the Focusing Column for TL Bases

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

Assembling the focusing column

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

Assembling the Focusing Column With an Incident-light Base

When using an incident-light base, the focusing column and motorized focus are installed directly on the base; no extension cable is required.

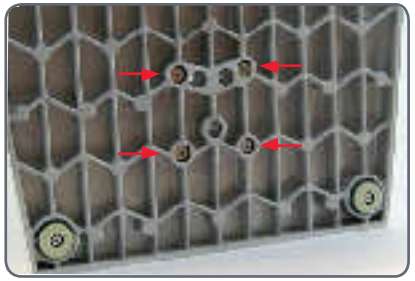
Tools used

- Hex socket screwdriver, 3 mm

Assembly

1. Place the focusing column on the base.

2. Insert the four screws provided into the outer holes of the base.



3. Screw the base securely onto the focusing drive.

Motorized Focus: Restricting the Travel Path

Depending on the work situation, it is useful to restrict the maximum travel path of the stereomicroscope. This prevents injury during handling of the sample caused by fingers or hands becoming trapped or the specimen touching the objective or even being damaged by it.

Readjusting the motorized focus
The motorized focus is factory-adjusted and normally does not need to be readjusted – even if the maximum travel path is changed.

Exception: If the power fails while the motorized focus is moving, the position data are lost. In this case, the calibration must be repeated using the Leica LAS software or the Leica SmartTouch. To do so, please consult the respective manual.

Restricting the bottom travel range

1. Move the motorized focus into the lowest position you want to reach.

2. Unscrew the screw of the limit stop on the side of the focusing column.

3. Push the limit stop to the height of the motorized focus.

It is easiest to move the limit stop by keeping the screwdriver inserted and moving it upwards.

4. Tighten the screw of the limit stop.

Optics Carrier

Tools used

- Hex socket screwdriver, 2 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 endscrew. Tighten 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 eyepieces of 10×, 16×, 25× and 10× wide-field eyepieces for persons wearing glasses.

Preparation

1. If you want to use an additional graticule, insert it now (page 79).

2. Remove the eyepiece 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.

Alternative fastening options

- If using the objective nosepiece, read the instructions on page 28.
- If using the Leica TwoCam, read the instructions on page 30.

UV Protection Screen: Assembly

Tools used

- Allen key

Intended use

The UV protection screen in front of the spectrometer shields the user from looking directly into the UV rays.

Safety Notes

UV radiation can damage the eyes. Therefore, it is mandatory to install the UV filter and adjust it correctly.

Always position the UV protection screen so that the operator can never look directly at the light source.

Use with one objective

1. Adjust the UV protection screen slightly using the arm.
2. Unscrew the hexagon head screw.
3. Adjust the UV protection screen using the arm.
4. Tighten the hexagon head screw.
5. Fasten the UV protection screen using a hexagon head screw in the elongated hole on the microscope carrier.

Objective Nosepiece – Assembly

Preparations

⚠ Hold the objectives firmly during assembly and disassembly so that they do not fall onto the stage plate.

- Move the drive housing all the way upwards and remove the optics carrier, if the carrier has already been installed.

Assembly

1. Remove the transport anchor from the objective nosepiece.

2. Rotate the mounting part by 90° and attach the objective nosepiece to the drive housing from the front (!). Screw the objective nosepiece firmly into place.

3. Unscrew the three Phillips screws on the objective mount of the optics carrier and remove the intermediate ring.

4. Screw the optics carrier onto the objective nosepiece.

5. Screw both objectives onto the objective nosepiece. It makes no difference which position an objective occupies.

6. Unscrew the locking screws on both sides of the objective nosepiece.

You can now adjust the parfocality (see instructions on the next page).

Objective Nosepiece – Adjusting Parfocality

The following procedure only has to be carried out once. Afterwards, both objectives are parfocal, meaning that the specimen remains in focus when the objective nosepiece is rotated.

This procedure must be repeated if you replace one of the two objectives with another.

The following example assumes the combination of the 1X and 2X planachromats. If you are using another objective combination, replace the 2X objective in the description with the objective with the stronger magnification.

Preparation

- Open the lid carefully.
- Set the diopter correction of the eyepieces to 0.

Adjustment

1. Rotate the 2X objective into the beam path and set it to the lowest magnification.
2. Focus on the specimen.
3. Rotate the 1X objective into the beam path.
4. Turn the objective on the thread in both directions until the specimen appears equally sharp.
5. Toggle to the 2X objective.
6. Select the strongest magnification and refocus until the specimen appears equally sharp.
7. Toggle to the 1X objective.
8. Turn the objective on the thread in both directions until the specimen appears equally sharp.

By means of zooming, check that the behavior of the objectives is parfocal. Repeat the check with the other objectives. If it is not parfocal, repeat the procedure.

9. Tighten the locking screws.

Leica FluoCombi III – Preparations

Leica FluoCombi III – Assembly

1. Guide the TubeCamera [illegible] while holding it flat, ensure that it is aligned with the notch on the focusing column at the left end right.

2. Hold the TubeCamera [illegible] secure by and screw it to the focusing column using the provided screw.

Leica FluoCombi III – Assembly (Continued)

Assembling the optics carrier

1. Unscrew the three screws and the adapter ring on the optics carrier.

2. Attach the optics carrier to the FluoCombi and screw it into place.

3. Open the iris diaphragm completely.

4. Assemble the tube (see page 24).

5. Assemble the illuminator (see page 50 ff.)

Leica FluoCombi III – Adjusting the Parfocality

Setting up the objective nosepiece

The following configuration only has to be carried out once. It ensures that the surface of the specimen is in focus, and thus the specimen does not need to be brought into focus again.

1. Place a specimen under the 5× objective.
2. Rotate the desired 5× objective under the beam path.
3. Reduce the view so that you can see the specimen in the overview.
4. Center the specimen under the beam path.
5. Adjust the magnification to the highest level and focus on a flat specimen.
6. Rotate the 5× objective under the beam path.
7. Unscrew the centering screw on the objective.

8. Reduce the view so that you can see the specimen in the overview.

Leica FluoCombi III – Adjusting the Parfocality (Continued)

9. By turning the objective ring, focus on the specimen until the specimen appears absolutely sharp.

10. Enlarge the view just enough for the center of the specimen to be visible in the field of view.

11. Refocus.

12. Tighten the clamping screw (see Step 7).

13. Rotate the stereo achromatic objective under the beam path.

This causes the two objectives to be parfocal. This means that from then on, you can toggle between the two objectives without refocusing.

Leica FluoCombi III – Centering the Objectives

The following configuration only has to be carried out once. It ensures that the specimen remains in the optical center when the objective is changed.

To attain optimum results for the following settings, insert a graticule into the eyepiece. This makes locating the center vastly easier.

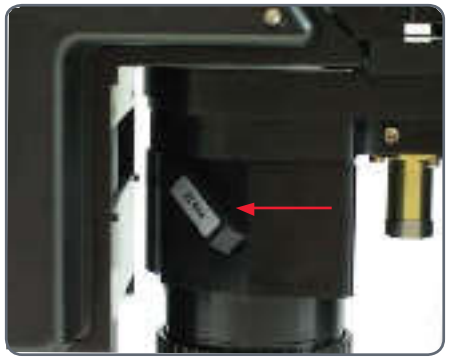
Centering the objective

1. Rotate the 5x achromat under the beam path.
2. Focus on the midpoint of the specimen.
3. Rotate the stereo achromatic objective under the beam path.
4. Center the objective over the specimen by loosening or tightening the screw on one side of the objective holder while turning the screw on the other side in the opposite direction.

Leica FluoCombi III – Filter and UV Protection Screen

Inserting the dichroic mirror

1. Pull the dummy filter carrier out of the holder.



2. Insert the corresponding dichroic mirror.

Assembling the UV protection screen

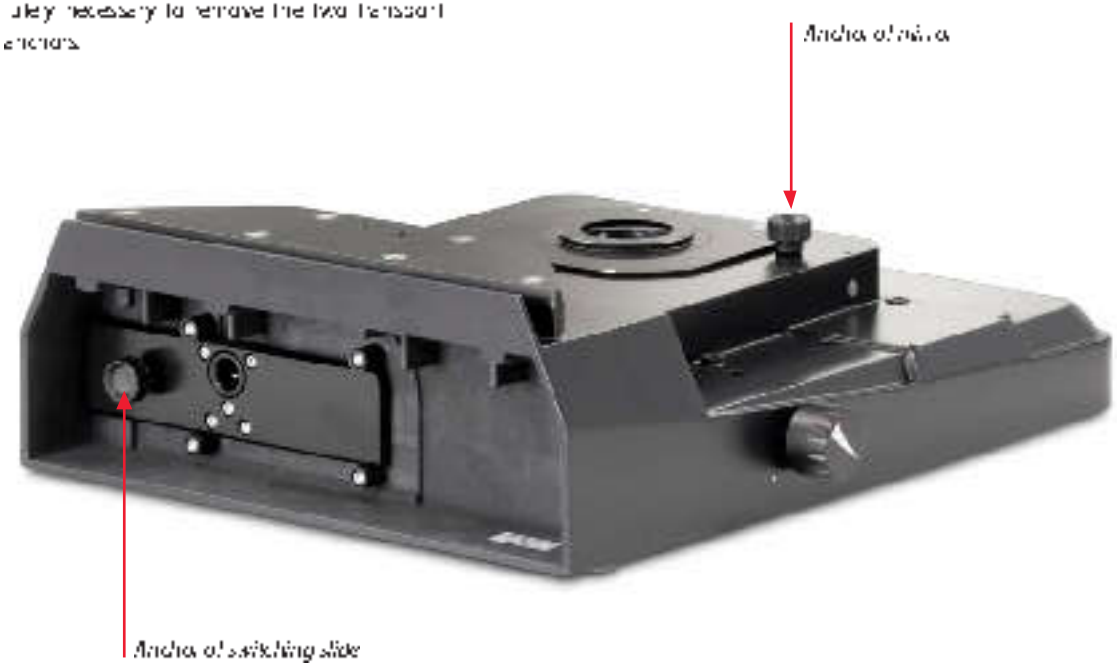
1. Screw the UV protection screen to the holder provided on the dust cover.

2. Orient the UV protection screen so that you cannot look directly into the UV light.

Transmitted-light Base Leica TL BFDF: Before First Use

Removing the transport anchors

Before you can use the transmitted-light base for the first time, it is absolutely necessary to remove the two transport anchors.



Transmitted-light Base Leica TL BFDF

Standard delivery

The base is delivered with the adapter plate installed. The selected stage (Leica scPro mechanical stage or Leica slide/dish stage 10 450 562), and the focusing drive will have to be mounted later.

Stage assembly

The Leica TL BFDF transmitted-light base can be equipped with three different stages:

- Leica scPro mechanical stage
- Leica scPro universal mechanical stage
- Leica slide/dish stage 10 450 562

The selected stage is mounted on the base before commissioning. You can switch between the stages at any time with just a few hand movements.

The following step is assumed as base of the base without the stage mounted. Disassembly is performed in reverse order of the following steps.

Standard stage

1. Take the glass plate from the rectangular opening in the slide/dish stage.
2. Push on the stage on the transmitted-light base in such way that the four holes align over those in the base.
3. Attach the stage to the base with the four supplied hexagon head screws.
4. Insert the glass plate back into the slide/dish stage.

Leica TL RC / Leica TL RCI

Standard stage

1.

2.

Stage assembly

Leica IsoPro Manual Mechanical Stage: Assembly

Leica IsoPro Manual Mechanical Stage: Assembly (Continued)

1. Take the glass plate from the mechanical stage and turn it around.

2. Change the gear rod from the left to the right-hand side.

Control assembly

1. Take the glass plate from the mechanical stage and turn it around.

2. Attach the axis with the control buttons to the desired side. The fastener snaps into the mechanical stage magnetically.

4. Attach the axis with the two supplied hexagon head screws.

5. Attach the cover plate to the mechanical stage.

Mechanical stage assembly

1. Place the mechanical stage onto the base.

2. Pull the upper part of the mechanical stage carefully towards the user, fixing the lower part onto the transmitted-light base.

Leica IsoPro Manual Mechanical Stage: Assembly (Continued)

3. Attach the mechanical stage evenly to the three threaded holes.

4. Now move the mechanical stage as far as it will go in the desired direction.

5. Insert the glass slide into the mechanical stage.

Focusing drive and column

1. Unscrew the external slide from the base using the Allen key provided.

2. Attach your focusing drive column from below using the three hexagon head screws.

3. Reattach the external slide to its original position using the three hexagon head screws.

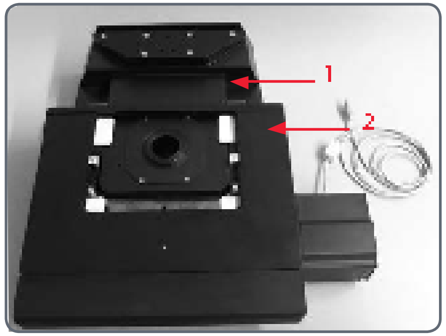
Leica IsoPro Motorized Mechanical Stage: Assembly

Basics

The transmitted-light bases of the Leica TL series (TL BFDF, TL RC, TL RCI) are supplied with an installed extension plate. The selected stage (Leica IsoPro mechanical stage or standard stage 10 450 562) and the focusing drive will have to be mounted later.

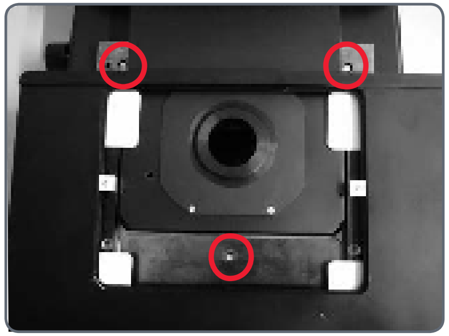
The motorized mechanical stage is a sensitive precision instrument. During installation, avoid subjecting the stage to impact or severe vibrations.

1. Unpack the mechanical stage from the transport packaging and position it on the transmitted-light base.



1. Microscope base
2. Motorized mechanical stage

2. Secure the motorized mechanical stage to the base using three M4 screws.



3x M4 screws

Leica IsoPro Motorized Mechanical Stage: Assembly (Continued)

Leica IsoPro Motorized Mechanical Stage: Assembly (Continued)

The bases

The TL BFDF, TL RCI and RC transmitted-light bases can be equipped with three different stages: Standard stage, manual and automated IsoPro mechanical stage. The selected stage is mounted on the base before commissioning. You can switch between the stages at any time with just a few hand movements.

The following paragraph assumes use of the base without the stage mounted. Disassembly is performed in reverse order of the following steps.

Mechanical stage and base

⚠ Never move the sledge of the motorized mechanical stage manually in the X direction, as otherwise the mechanical system will be damaged.

1. Place the mechanical stage onto the base.
2. Pull the upper part of the mechanical stage carefully towards the user and fasten the lower part onto the transmitted-light base.
3. Attach the mechanical stage evenly to the three threaded holes.
4. Now move the mechanical stage as far as it will go in the direction of the column.
5. Insert the glass plate into the mechanical stage.

Leica IsoPro Motorized Mechanical Stage: Assembly (Continued)

Mechanical stage for X-Y stage control module

1. Plug the CTL2 plug of the mechanical stage motor cable into one of the three available CTL2 interfaces.

2. Plug the CTL2 plug of the Leica PSU control module into another CTL2 interface.

- The third CTL2 interface is available for connecting other instruments, such as the Leica foot switch (10 447 398) or TL RCI transmitted light base (10 776 352).

- The 15-pin Sub-D interface is intended for use with the Leica SmartMove controller (11 501 197).

3. Plug power cable into the socket provided and into a grounded power socket.

As soon as all instruments have been plugged into the control box and it has been plugged into the power supply, the mechanical stage in the Leica automation system drives to the initial position.

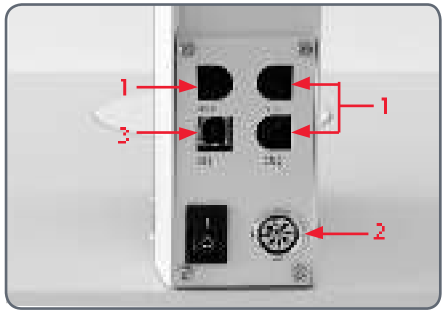
4. Connect the PC (where applicable) and X/Y Stage DCI Module (using a suitable USB cable).

Cables: Connections

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

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

The terminals



The connection to the PC and to other instruments is made using the terminals on the rear side of the column.

1. 3 CTL2 terminals for auxiliary equipment such as the ring illuminator, the base and other accessories from the Leica product range.
2. Terminal for the power supply provided.
3. USB terminal for the connection to the PC.

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

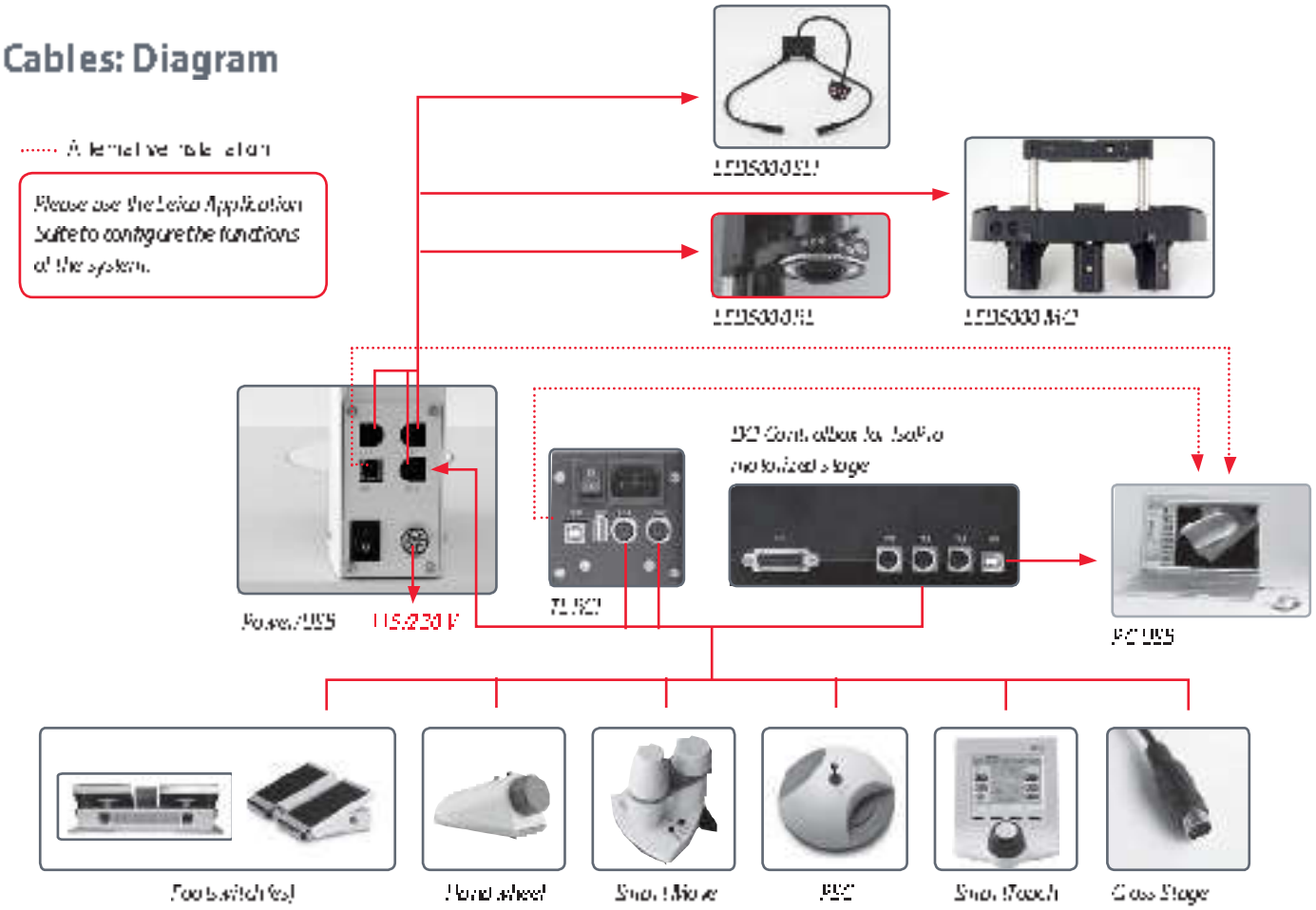
1. Unscrew the three screws on the cable duct.

2. Remove the cover of the cable duct.

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

To facilitate 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.

Cables: Diagram



Leica LED5000 MCI: Alternative Assembly

Leica LED5000 RL: Assembly

Required tools

- None

The Leica LED5000 RL is installed on the objective using a single screw. It has been optimized for a working distance between 50 mm and 80 mm.

Constraints

The Leica LED5000 RL can be used only in conjunction with the planapochromat 1X and planapochromat 0.63X objectives. With all other objectives, the working distance is too low for adequate illumination.

The ring illuminator cannot be used together with the objective nosepiece.

Assembly

1. Connect the Leica CAN bus cable provided to the ring illuminator.

2. Place the Leica LED5000 RL against the objective from below, push it as far as it will go and screw it into place.

3. Plug the other end of the cable into an available CTL2 socket on the column.

Continued on next page.

Leica LED5000 RL: Assembly (Continued)

If you work with the manual focusing column without integrated electronics, the Leica LED5000 RL must be supplied with power via an external power supply unit (not included in the delivery package). Moreover, the illuminator cannot be controlled via Leica Application Suite in this case.

For optimum accessibility of the specimen, the ring illuminator should be installed with the cable facing backwards. However, it is also possible to turn the ring illuminator sideways, for example if simultaneously using the Leica LED5000 MC system illuminator. In this case, the ring illuminator cannot be connected directly to the Leica LED5000 MCI.

Leica EL6000 – Safety Notes

The manufacturer assumes no responsibility or liability for any use outside the intended use or use outside of the specifications from Leica Microsystems Wetzlar GmbH for any resulting from such use.

In such cases, the Declaration of Conformity shall be invalid.

This VDI device is not intended for use in the patient environment defined by DIN VDE 0100-710. It is also not intended to be combined with medical devices as defined by EN 60601-1. If a microscope is electrically connected to a medical instrument in accordance with EN 60601-1, the requirements defined in EN 60601-1-1 shall apply.

General safety notes

This safety class I device was built and tested in accordance with:
DIN EN 61010-2-101:2002
DIN EN 61010-1:2001,
IEC 1010-1:2001.
Safety requirements for electrical equipment for measurement, control and laboratory use.

The devices and accessories described in this operating manual have been tested for safety and potential hazards.

The responsible Leica affiliate or the main plant in Wetzlar must be consulted whenever the device is altered, modified or used in conjunction with non-Leica components that are outside of the scope of this manual.

Unauthorized interventions in the instrument or non-compliance with these safety notes void all rights to any warranty claims.

If any safety defects on the functions of the Leica EL6000 are identified, the instrument must be immediately disconnected from the power system and secured against additional use. For repair, the Leica EL6000 must be sent to the supplier or an authorized representative of the supplier.

Leica EL6000 – Safety Notes (Continued)

⚠ The Leica EL6000 compact light source generates high-energy light with visible components. There is a risk of being dazzled or blinded by light. Never look directly into the light guide output of the instrument or into the output of the light guide connected to the instrument. Always ensure that the output of the connected light guide is securely connected to the system to be illuminated before switching on the compact light source. Furthermore, before switching on the compact light source, dim the light output all the way using the intensity switch (6) in its stop of the switch to prevent damage to the connected system.

⚠ To prevent damage to the light guide connected to the device, the heat-absorbing filter inserted into the device must be free of damage (glass, cracks, etc.). If the heat-absorbing filter is not inserted or is defective, the service life of the light guide will be decreased.

⚠ The interior of the lamp inserted into the unit contains highly toxic substances. At the end of its service life, dispose of the lamp according to applicable regulations. The manufacturer of the lamp provides corresponding information, for example in the lamp's shipping documents. Follow the manufacturer's instructions in case the lamp bursts.

⚠ The Leica EL6000 compact light source is designed for a voltage range of 100–240 VAC, 50–60 Hz. Within this voltage and frequency range, the instrument always adapts to the connected power supply. Operating the instrument with a power supply voltage outside this range can destroy the instrument and the connected components.

⚠ Only fuses of the specified type and the listed rated current may be used as replacements. The use of incorrect fuses may result in a fire hazard.

⚠ The instrument is intended exclusively for operation in dry rooms. Do not use the instrument in rooms where there is an Ex hazard.

↵

Leica EL6000 – Safety Notes (Continued)

Electrical safety	
For indoor use only	
Supply voltage	100–240 V ~ ±10 %
Frequency	50–60 Hz
Power consumption	Max. 210 VA
Fuses	5×20, 2.5 A, slow-blowing, breaking capacity H, see page 117
Ambient temperature	0–40 °C
Relative humidity	10 %–90 %
Overvoltage category	
Pollution degree	2

Leica EL6000 – Preparations

Setting up the instrument

⚠ Set up the Leica EL6000 so that the front is readily accessible and visible.

- The ventilation slots on the sides and back panel of the device must not be covered.
- Maintain a free room of at least 150 mm on the rear panel of the instrument.

Instructions for lamp replacement

⚠ The lamp contains mercury. Be absolutely certain to follow the handling instructions and safety notes provided with the lamp.

⚠ Maintain cleanliness when inserting the lamp. Remove any clinging packaging materials.

⚠ The lamp used in the instrument becomes very hot during operation and has high internal pressure when hot. Before changing the lamp, it is mandatory to allow the instrument to cool off for at least 20 minutes.

⚠ The Leica EL6000 compact light source comes with a factory-supplied lamp, but the lamp is not installed when shipped. This minimizes the danger of damage to the lamp during transport.

⚠ Before transporting the Leica EL6000 compact light source, you first have to remove the lamp.

Inserting the lamp

1. Pull the power plug out of the socket, so that the EL6000 is disconnected from the power system.
2. Unscrew both screws of the cover using a 3 mm Allen key.

3. Remove the housing cover.

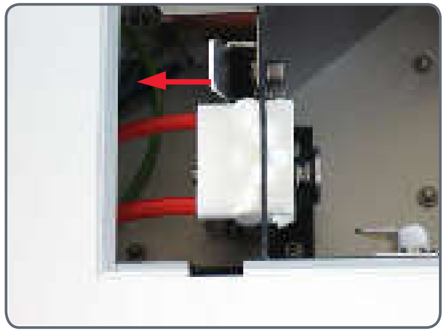
↵

Leica EL6000 – Preparations (Continued)

4. Carefully lay the Leica EL6000 on its side so that the opening faces you.

This makes it easier to insert the lamp.

5. Pull the pressure bolt back towards the front plate using the lever.



6. Insert the lamp.

Ensure that the groove in the contact surface of the lamp matches up with the corresponding plug in the lamp mount.

Leica EL6000 – Preparations (Continued)

Leica EL6000 – Connection to the Fluorescence Lamp Housing

⚠ Always connect the light guide to the arm housing of the sleeved in cascade in order to prevent danger to the user from the high-energy light.

1. Unscrew the cast iron ring screw and remove the protective cover of the fluorescence arm housing.

2. Insert the adapter into the fluorescence arm housing and retighten the locking screw.

3. Unscrew the threaded protective cap on the light guide.

4. Insert the short end of the light guide into the arm housing of the sleeved in cascade as far as it will go.

5. Securely tighten the clamping screw.

Leica EL6000 – Connection to the Fluorescence Lamp Housing (Continued)

6. Insert the plug end of the grid guide into the grid output of the Leica EL6000. There must be no clearance.

⚠ Only use grid guide with the grid mask of the type "Standard", as otherwise damage to the instrument and danger to the user can result (risk of being dazzled).

⚠ Before you open the shutter, the grid guide must be connected on both sides. Otherwise, the escaping light can cause injury to eyes and skin and damage to furniture. Never look into the grid escaping from the grid guide.

7. Connect the Leica EL6000 to the power system using the power cable.

Leica EL6000 – Replacing the Lamp

The procedure for replacing the lamp does not differ from the installation procedure outlined on page 57 except for the fact that the existing lamp has to be removed first.

Replacing the Lamp

The lamp used in the instrument becomes very hot during operation and has high internal pressure when hot. Before changing the lamp, it is mandatory to allow the instrument to cool off for at least 20 minutes.

1. Pull the power plug out of the socket, so that the EL6000 is disconnected from the power system.
2. Unscrew both screws of the cover using a 3 mm allen key.
3. Remove the housing cover.
4. Carefully lay the Leica EL6000 on its side so that the opening faces you.

This makes it easier to insert the lamp.

5. Pull the pressure bolt back towards the front plate using the lever.
6. Pull out the lamp and disconnect the plug from the coupling in the instrument.
7. Install the new lamp as outlined on page 58, beginning with item 6.

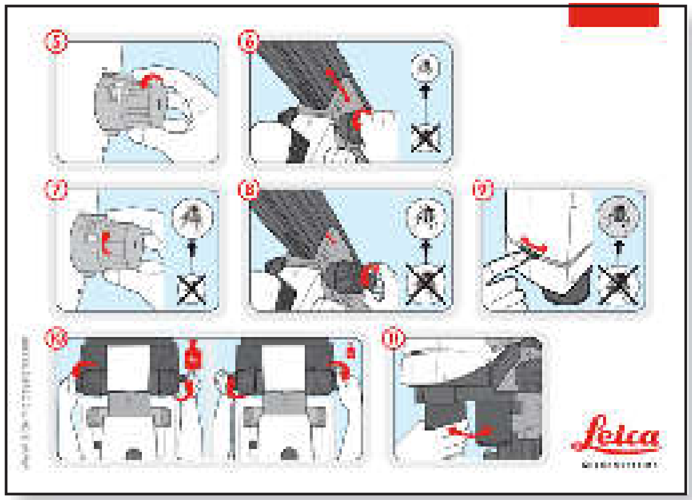
Quick Start Guide

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. *Eyepieces for spectacle wearers with diopter correction and eyecups*
2. *Trinocular tube*
3. *Fluorescence housing*
4. *Filter Changer*
5. *Display*
6. *Motorized Focus*
7. *Objective Nosepiece*
8. *Leica EasyTouch*
9. *UV protection screen*

The Correct Interpupillary Distance

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 reticle 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 77.

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 scale to the "0" mark.

If you wear glasses:

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

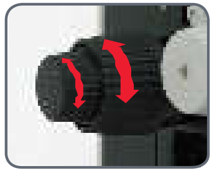
2. If an eyepiece is equipped with the integrated dioptric correction, turn the scale to the "0" mark.

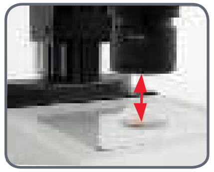
By the way, one benefit of viewing with eyeglasses is a drastically lower risk of bacterial transmission (see page 76). The soft material of the eyecups ensures that your glasses will not be scratched, even if they contact the eyepiece.

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

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

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 Magnification (Zoom)

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

- Leica M165 = 16.5:1
- Leica M205 = 20.5:1

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.

Ratchet Steps and Magnification Levels

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

Enabling and disabling ratchet steps

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 table on page 136 provides additional information about the magnifications and fields of view determined, 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

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

Requirements for parfocal work

- If you are using an eyeglass with diopter correction, the procedure differs from this description. For more information, refer to page 78.
- For the procedure for adjusting the parfocality for the objectives, refer to page 29.
- For the procedure for adjusting the parfocality for the Leica TwinCam, refer to page 33.

Parfocality

1. Change the view to the next main level.
2. Focus on the specimen.

You are done. Even if you select a smaller working distance, the specimen remains in focus.

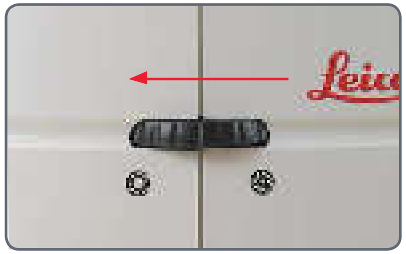
The parfocality is maintained until you focus on another level of the specimen.

Iris Diaphragm

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

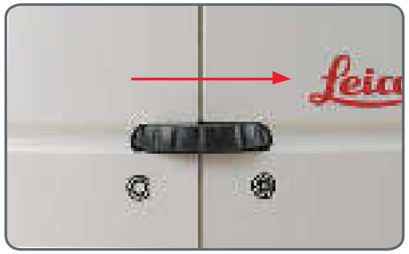
Closing the iris diaphragm

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

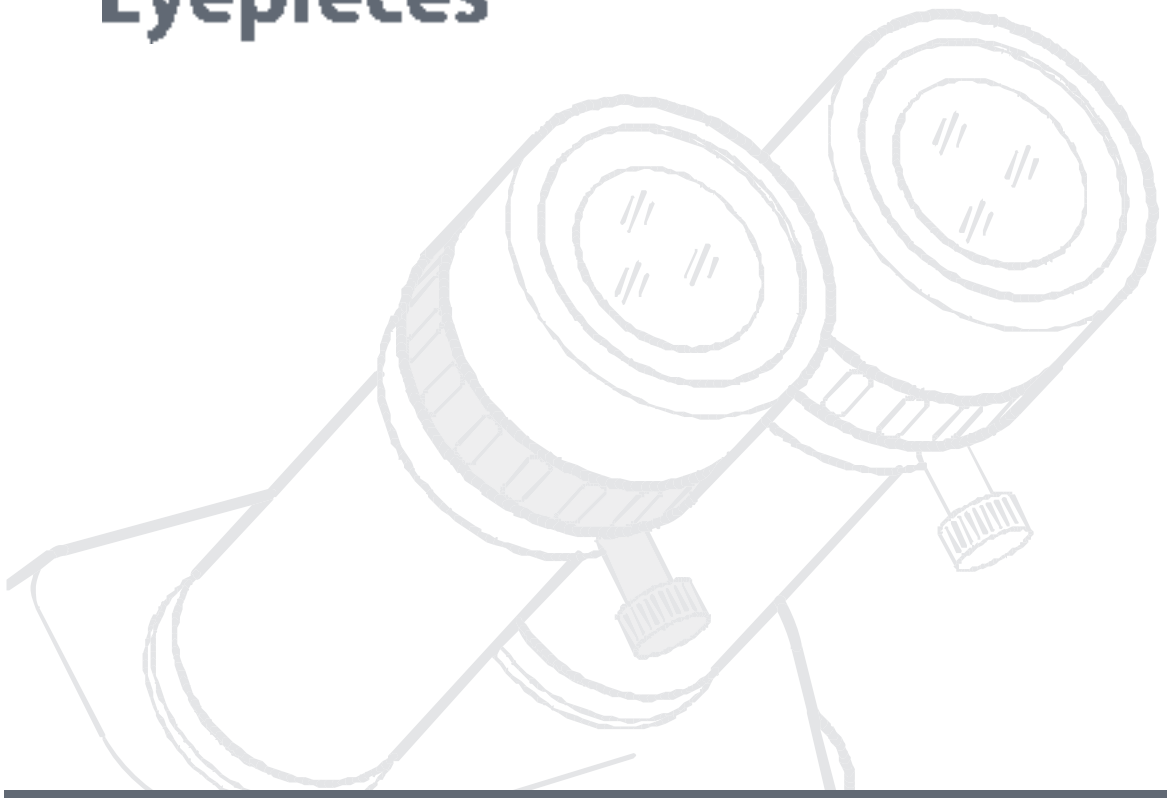


Opening the Iris Diaphragm

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



Eyepieces



Magnification Factors 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 10× and 40×.

The following eyepieces are available for the M series:

Magnification	Diopter correction	Order number
10×	± 5 diopter setting	10 / 50 630
16×	± 5 diopter setting	10 / 50 631
25×	± 5 diopter setting	10 / 50 632
40×	± 5 diopter setting	10 / 50 633

Health Notes

Potential sources of infection

⚠ Direct contact with eyes etc. is a potential transmission method for bacterial and viral infections of the eye. The risk can be restricted in many cases by using individual eyes etc. or detachable eyecups. Eyecups can be ordered separately. Please contact your service center.

Separate eyecups are an effective way of preventing infections.

Dioptric Correction

All Leica eyepieces are also available with built-in dioptric correction, allowing them to also 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 78.

Dioptric Correction and Parfocality

Leica stereo microscopes 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.

Preparations

- Move the lever of the video/photo tube to the "observation" position and open the diaphragm.
- If you are using the microscope camera AX, set it to stereoscopic observation.

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 setting).
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

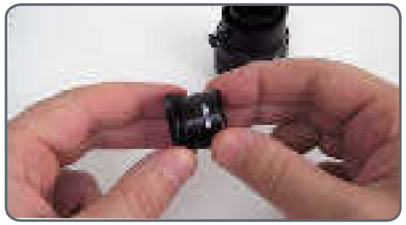
Use

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.

Use with the Leica AX carrier

It is possible to measure with the microscope carrier AX in vertical position. The measurements are more accurate without the convergence angle in the stereoscopic image.

Photography & Video

Photography & Video

Leica Application Suite

Leica DFC cameras

Adapter

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 desire 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 the correct size 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.

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 separate user manuals along with instructions for their assembly and use.

Name	MPixel	Sensor	Size	Pixel Size	Cooling	Interface		C-Mount
MC170 HD	5	CMOS c	1/2.3"	2.35 µm	No	USB2	HD	0.4x/0.5x
MC190 HD	10	CMOS c	1/2.3"	1.67 µm	No	USB2	HD	0.4x/0.5x
DMC2900	3	CMOS c	1/2"	3.2 µm	No	USB3		0.5x
DFC295	3	CMOS c	1/2"	3.2 µm	No	FW		0.5x
DFC7000T	2.8	CCD c	2/3"	4.54 µm	Yes	USB3		0.63x
DMC4500	5	CCD c	2/3"	3.4 µm	No	USB3		0.63x
DFC450 C	5	CCD c	2/3"	3.4 µm	Yes	FW	Sync	0.5x
DFC425	5	CCD c	2/3"	2.7 µm	Yes	FW	Sync	0.63x
DFC550	12.5	CCD c	2/3"	6.45 µm	Yes	FW	Sync	0.63x
DFC3000G	1.3	CCD m	1/3"	3.75 µm	No	USB3	Sync	0.35x/0.4x
DFC365FX	1.4	CCD m	2/3"	6.45 µm	Yes	FW	Sync	0.7x

c: color / m: monochrome / *: recommended Status 2016/01

Trinocular Video/Phototube 50 %

Use

With this trinocular beam path, the trinocular video/phototube 50 % enables you to simultaneously view and photograph the specimen. The available light is divided as follows:

- 50 % is available for the binocular eyepieces.
- 50 % of the light is diverted to the video/photo beam path.

Assembly

Fasten the "trinocular tube 50 %" to the optics carrier instead of the trinocular observation tube, refer to page 21.

Trinocular Video/Phototube 100 %

Switchover

Trinocular Video/Phototube 100 %: ErgoTube 5°–45°

Use

The trinocular ErgoTube can provide the user a comfortable and ergonomic observing position by allowing the user to fine-tune the viewing angle of the eyepieces to best fit their posture.

The shutter slider switches the light beam path from 100 % of light to the eyepieces to 100 % light to the camera port. The shutter slider on the left beam path is closed to prevent stray light entering the tube.

Assembly

Before mounting the ErgoTube, please remove the transport lock screw under the tube. Otherwise the shutter slider cannot be used.

Microscope Carrier

The Objective Nosepiece

Use

The objective nosepiece enables you to switch between two objectives using just one hand movement, for example between a 1X and a 2X planapochromat.

Parfocal work

With the new M series objectives, the parfocality is maintained even when objectives are changed, meaning that the specimen remains in sharp focus during the change.

Older Leica objectives can continue to be used, but without parfocality during the objective change.

Technical constraints

The objective nosepiece cannot be used together with the LED5000 MCI system illumination, as the objective nosepiece can no longer be rotated.

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 plan achromatic and plan apochromatic objectives and also universal 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 microtitre plates.
- With plan apochromatic objectives, the finest structures are visible with high contrast. The sophisticated apochromatic correction of these objectives results in 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 156).

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

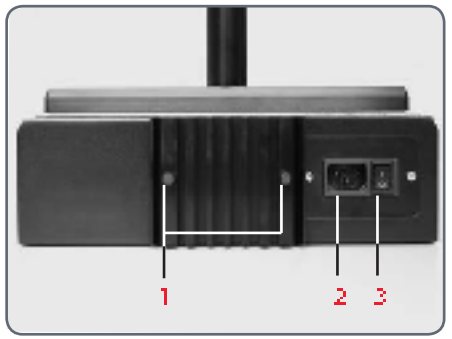
For special applications, achromatic objectives with long working distances and focal lengths of f=100 mm to f=200 mm are available.

Bases

Leica TL ST Transmitted-light Base: Controls

1. *Adapter plate for easy assembly of focusing drives*
2. *Removable glass plate*
3. *Controller for light intensity*
4. *Adjustment for deflection mirror*

Extension plate of the transmitted-light base TL ST



Rear side of the transmitted-light base TL ST

1. *Screws for changing the halogen lamp*
2. *Power connection socket*
3. *Power switch*

Leica TL ST Transmitted-light Base: Operation

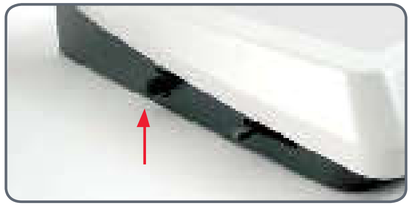
Light intensity control

The left control adjusts the intensity of the 12V/20W halogen illumination.

1. Switch on the illumination of the base at the power switch.

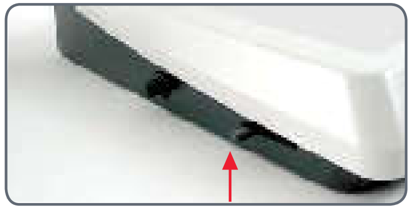
2. Focus on the specimen.

3. Set the illumination to the desired intensity using the left control.



Transmitted-light control

The transmitted-light base TL ST has a slider that automatically moves the deflection mirror in the base when moved. The mirror is kept in the correct position at all times and permits smooth changeover between bright field and oblique transmitted light.



Bright field

Bright field is suitable for examining translucent objects featuring contrasting structures. The object is directly illuminated from below and is seen in its natural colors against a bright background.

- Move the slider backwards until the desired effect is achieved.

Inclined transmitted light

Transmitted light that traverses the object obliquely provides additional resolution and information when observing semi-transparent, opaque objects.

- Slowly pull the slider towards yourself until the desired effect is achieved.

Leica TL ST Transmitted-light Base: Changing Bulbs

Changing the halogen lamp

Before you change the lamp, it is absolutely necessary to unplug the power plug from the base to prevent the risk of electric shock.

The halogen lamp becomes very hot during operation. Therefore, to avoid being burned, let the base cool off for approx. 10 minutes after switching it off!

Do not touch new halogen lamps with your bare fingers – this drastically reduces the service life of the lamp.

Changing bulbs

1. Unscrew the two screws on the heat sink and pull the heat sink out, along with the lamp.

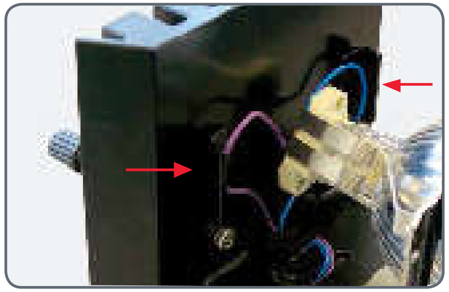
2. Carefully pull out the lamp and mount by pulling them upwards.

3. Disconnect the lamp from the mount.

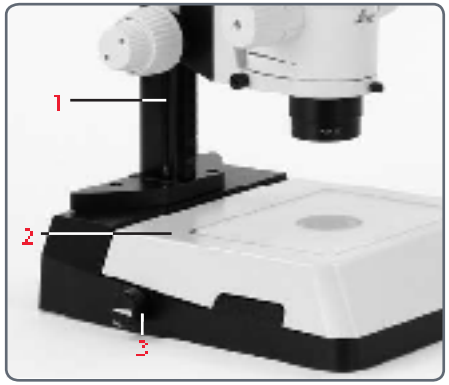
4. Insert the new lamp into the mount and reinsert the lamp holder.

Precautionary measures

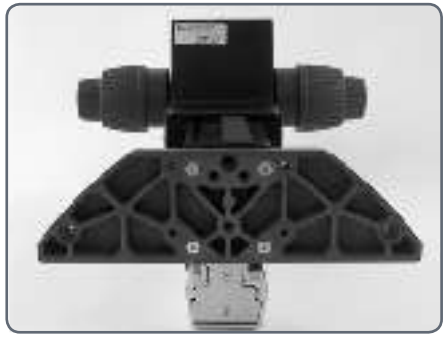
When inserting the lamp, ensure that the cables are inside the two metal clamps. This prevents the cables from getting caught during insertion.



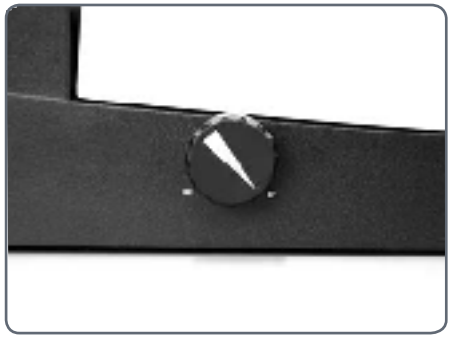
Leica TL BFDF Transmitted-light Base: Controls



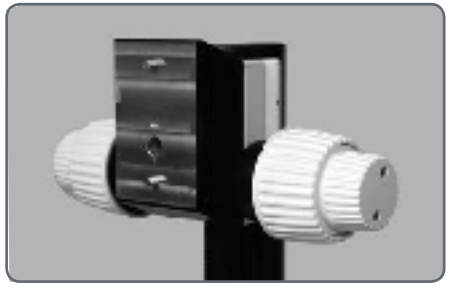
1. Adapter plate for easy assembly of focusing drives
2. Standard stage 10 150 552
3. Button to toggle between bright field and dark field



Extension plate of the Transmitted-light base TL BDF



Button to toggle between bright field and dark field



Adapter for the focusing drive

Connector for cold light sources
light conductor, active Ø = 10mm,
end tube Ø = 12mm)

Leica TL BFDF Transmitted-light Base: Operation

Light intensity control

⚠ Observe the user manuals – in particular, the safety regulations – from the manufacturers of the grid guide and cold grid source.

- Switch on the cold grid source according to the manufacturer's user manual and adjust the grid brightness.

Transmitted-light control

The Leica TL BFDF transmitted-grid base has a control that switches the grid from "bright field" to "dark field".

Bright field

Bright field is suitable for examining translucent objects featuring contrasting structures. The object is directly illuminated from below and appears in its natural colors against a bright background.

- Turn the control as far as it will go towards "BF" ("bright field").

Dark field

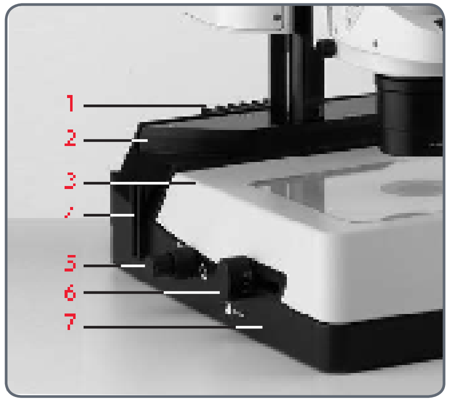
In dark-field illumination, a ring illuminator is used in such a way that the direct grid does not reach the objective without a specimen. Only the structure of semi-transparent, opaque objects observed in the grid, making the object visible against a dark background.

- Turn the control as far as it will go towards "DF" ("dark field").

Fingertip with bright field illumination

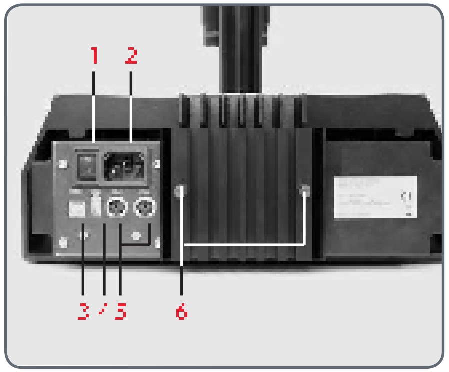
Identical subject with dark field illumination

Leica TL RC / Leica TL RCI: Controls



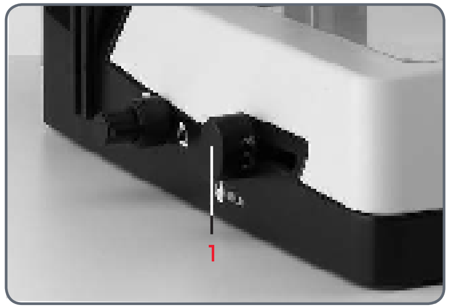
1. Heat sink of the integrated halogen illumination (only TL RCI)
2. Extension plate for focusing drives
3. Standard stage 10 450 562
4. Filter holder
5. Control of top and bottom flaps of the Rottermann Contrast
6. Button for mirror and horizontal movement of the mirror
7. Transmitted-light base

Vertical column – transmitted-light base adapter plate



1. Power switch
2. Power connection socket
3. USB socket, type B
4. USB socket, type A
5. 2 CAN bus
6. Screws for changing the halogen lamp

Leica TL RCI: The Deflection Mirror



Inverted world?

Depending on the properties of the specimen (refractive index of the environment) and the perception of the viewer, it is possible that the switches described below for positive and inverted relief contrast are to be operated in reverse. This means that the lower switch, rather than the upper switch, controls inverted the relief contrast and vice versa.

Tilted mirror

The built-in mirror features one flat and one concave side and can be rotated and moved. The concave side is intended for use at high magnifications to increase the NA of the base. The flat side is designed to deliver even an illumination at low magnifications. The black rotary knob on the left side of the transmitted-light base can be used to rotate the built-in deflecting mirror and move it forwards/back.

The concave cutout on the handle indicates the concave side of the mirror, allowing intuitive operation at any time without eye contact.

The angle of light incidence in the specimen plane changes depending on the tilt and position of the mirror. As a result, switching between transmitted light bright field, oblique illumination and dark field-like illumination is possible.

Functions of the rotary knob

The rotary knob (1) fulfills the following tasks:

- Turning the deflection mirror from the flat to the concave side
- Slightly tilting to guide the light beam through the specimen plane at a steeper or flatter angle
- Moving the deflection mirror (forwards/ back)

Leica TL RCI: Color Intensity and Temperature

1. *Potentiometer for controlling the CCIC (Constant Color Intensity Control) illumination intensity*
2. *Potentiometer for controlling the color temperature*

The transmitted-light base TL RC has two electronic potentiometers that control the color intensity (1) and color temperature (2).

The controller for the color temperature simultaneously serves as an electronic shutter:

- To interrupt your work, click the potentiometer (2).
- Click again to switch on the illumination. The electronics returns the color temperature to the previously configured settings.

Using a USB mouse (only TL RCI)

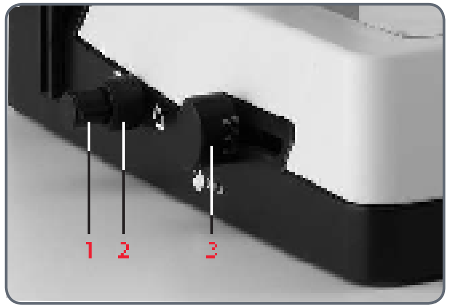
The Leica USB mouse controls the CCIC and dimming function of the TL RCI base. Connect the mouse to the corresponding USB port of the base.

- The scroll wheel of the mouse is occupied by default with the CCIC control system and is used to control the illumination intensity.
- To switch the illumination on or off, briefly click the scroll wheel.
- To enter or exit dimming mode, click and hold down the scroll wheel for longer than 2 seconds.

Leica TL RC / Leica TL RCI: Operation

Setting the relief contrast

The two switches on the left side of the transmitted-light base TL RC/TL RCI activate two built-in flaps. The outer switch (1) controls the inverted relief contrast, and the inner switch (2) adjusts the positive relief contrast.



1. *Switch for adjusting the inverted relief contrast*
2. *Switch for adjusting the positive relief contrast*
3. *Deflection mirror*

Depending on the flap position, a part of the opening of the built-in Fresnel lenses are covered, which results in the different contrast effects. Phase structures typically act as spatial, relief-type images – in the positive relief contrast as mounds, in the inverted relief contrast as valleys.

Increased contrast without relief is attained if both diaphragms are set to '0'. A gapless illuminated area is created. By tilting the deflection mirror slightly, you can move the gap over the entire field of view and quickly toggle between positive and negative relief images. The dynamic effect makes it easy to distinguish phase structures from amplitude structures.

Leica TL RCI: Methods in Transmitted Light

Vertical bright-field illumination

Suitable for stained and unstained specimens with sufficient contrast.

The light beams are deflected vertically through the specimen. This results in the most accurate bright field with maximum brightness.

Inclined transmitted light

Suitable for semi-transparent, opaque specimens such as foraminifera and fish eggs. Move the deflection mirror until the desired details are visible.

Single-sided dark field

Suitable for fixed specimens and fine structures.

The flatter the angle at which the light beams are deflected into the specimen plane, the darker the substrate appears. A dark field-like transmitted light is created. Outlines, fine edges and structures appear bright, in contrast with the dark background, through diffraction of the light beams on the dark background.

Leica TL RCI: Relief Images

Starting position

1. Push the deflection mirror all the way back towards the column.
2. Turn the deflection mirror into the notch position marked with "S".

Positive relief contrast

Suitable for semi-transparent and transparent specimens. These settings result in the positive relief contrast. Phase structures look like they are

The effect can be strengthened or weakened by gently tilting the deflection mirror.

Negative relief contrast

Suitable for semi-transparent and transparent specimens. These settings result in the negative relief contrast. Phase structures look like they are

The effect can be strengthened or weakened by gently tilting the deflection mirror.

Leica TL RCI: Relief Images (Continued)

Dynamic relief contrast

Suitable for semi-transparent and translucent specimens.

By tilting the deflection mirror slightly, you can move the gaps over the entire field of view and quickly toggle between positive and negative relief images. The dynamic effect makes it easy to distinguish these structures from embedded structures.

Constraints

The relief methods provide good results from mid-zoom to high magnifications and with 1×, 1.6× and 2× objectives. In the lower zoom range and with weaker specimens, the object field may not be uniformly illuminated.

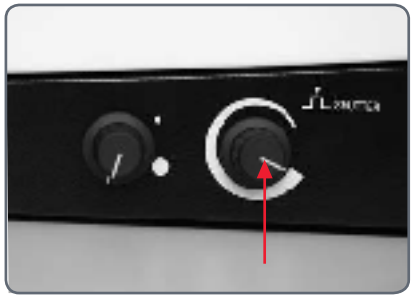
We recommend using the transmitted-light base with 1× or higher objectives, and not objectives with the long focal length.

Using Filters

Filters for Leica TL RC and TL RD

The [illegible] filter bases TL RC and TL RD can be equipped with up to three filters – available as accessories – simultaneously. By customer request, the filters are also available as one-off items.

1. Switch off the light source or click [illegible] TL RC the button for the shutter.



2. Take the empty filter from an available filter slot in the filter holder.
3. Insert the desired filter.

4. Switch the light source back on.

Daylight filter for Leica TL ST

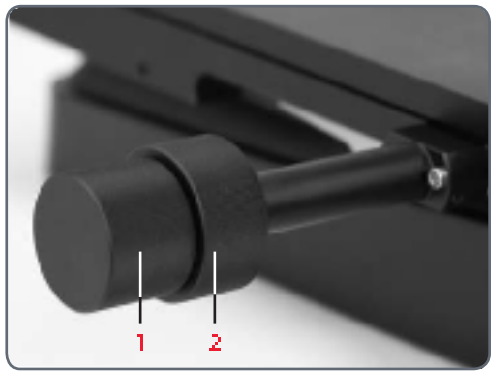
A daylight filter is also available for the Leica TL ST [illegible] filter base.

Leica IsoPro (Non-motorized): Controls

Operating the Leica IsoPromechanical stage

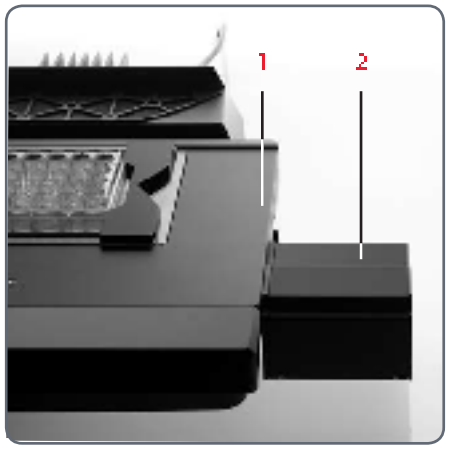
1. To move the stage in the X direction, rotate the coaxial knob.

2. To move the stage in the Y direction, rotate the inner coaxial knob.



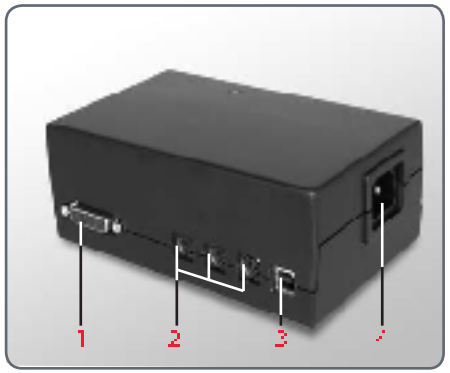
Leica IsoPro (Motorized): Controls

IsoPro



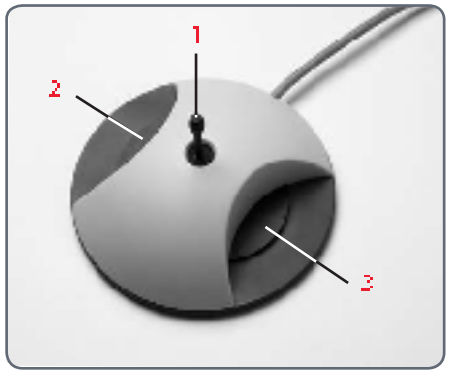
1. *Leica IsoKorro motorized mechanical stage*
2. *Housing with motorization*

X/Y Stage DCI module



1. *Sub-D interface to Leica Smartmove*
2. *2 CTS2 interfaces*
3. *USB interface (type B)*
4. *Socket for grounded power cable*

Leica PSC Controller



1. *Quick control menu y function*
2. *Fine control in X direction*
3. *Fine control in Y direction*

System Illumination

Leica LED5000 MCI (Continued)

Using the keyboard

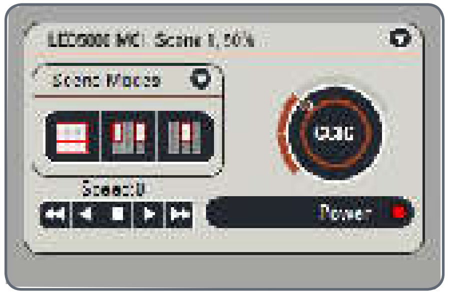
- Use the ⏻ key to switch the illumination on or off.
- Use the "+" and "–" keys to adjust the brightness in 10 % increments. Touch either of the two buttons to adjust the intensity in small increments. Hold a key to change the intensity more quickly.

The illumination scenarios

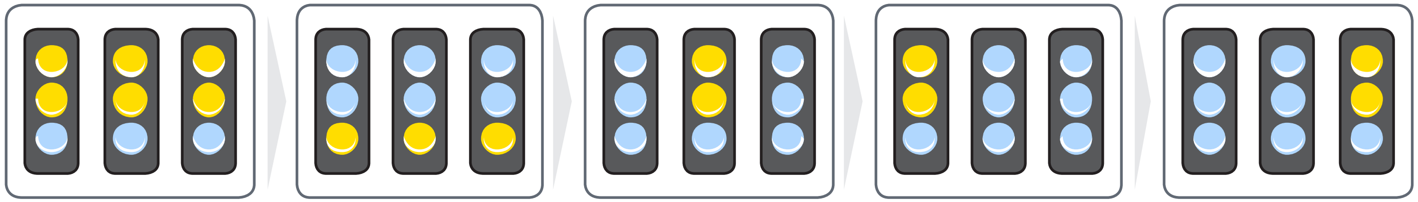
Use the "<" and ">" keys to toggle between the illumination scenarios as shown below.

Maximum brightness

For temperature reasons, it is not possible to switch on all nine LEDs simultaneously. Therefore, to provide bright overall illumination, the top two rows are activated. The bottom row primarily provides contrast.



The Leica LED5000 MCI can also be controlled by the LAS (Leica Application Suite) software.



Maximum brightness | *Maximum contrast* | *Point illumination from the rear* | *Point illumination from the left* | *Point illumination from the right*

Heat-absorbing filter

Special features:

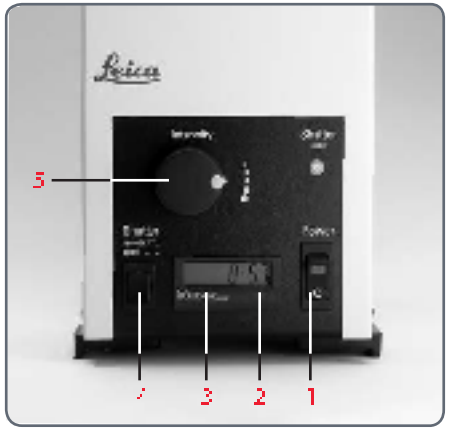
Leica EL6000 – About the Instrument (Continued)

Identification of the instrument

Compatible light guides

Leica EL6000 – Operation

Controls



1. *Power switch/power indicator*
2. *Reset button for running-time meter*
3. *Running-time meter*
4. *Shutter control*
5. *Intensity switch*

Running-time meter

The running-time meter measures the running time of the entire optical system of the Leica EL6000 connected light source. The running-time meter displays the current status in this format: hours – minutes.

1. Press the reset button to set the running-time meter of the entire unit to 0.

The running-time meter should be reset after every lamp replacement so that it always displays the current, accurate lamp life.

Discontinue using the entire unit when it reaches the end of the life specified by the manufacturer.

Shutter control

- In the "open" position, the shutter of the Leica EL6000 is open – regardless of the signal from the remote control.
- The shutter control is in the "remote" position, the shutter is controlled by the remote control.

Intensity switch

The intensity switch provides optical dimming of the light in five fixed increments.

Leica EL6000 – Troubleshooting

Fault description	Possible faults	Remedy
Power indicator is not illuminated after being switched on, instrument shows no function	No power supply voltage present; connecting cable not plugged in correctly/defective	Check power supply voltage and connecting cable
	Fuses in instrument defective	Replace fuses, use permitted replacement type only (See page 114)
Power switch is illuminated after being switched on, instrument shows no function	Housing cover loose or removed	Attach housing cover securely
	Lamp worn out	Replace lamp
Target system receives too little light or none at all	Shutter closed or intensity switch at left limit stop	Open shutter or rotate intensity switch towards the right
	Light guide not inserted into light guide outlet properly	Check light guide
	Light guide damaged/defective	Repair or replace

If these actions do not fix the problem, send the Leica EL6000 compact light source to Leica Service with an exact description of the malfunction.

Cleaning and Maintenance

⚠ Before carrying out cleaning tasks, switch off the Leica EL6000 compact light source.

Use only a dry, lint-free cloth for cleaning. When cleaning, ensure that no dust or other foreign bodies enter the device through the ventilation slots.

In case of damage (even external damage), immediately stop using the Leica EL6000 compact light source and send it to service.

If it will not be used for a long time, protect the Leica EL6000 compact light source from dust using a suitable cover (such as the plastic bag from the original packaging).

Spare parts and accessories

The only parts of the Leica EL6000 compact light source that may be replaced by the user are the instrument fuses and the lamp.

▶ The replacement of the lamp is described on page 62.

Replacing the instrument fuse

1. Disconnect the Leica EL6000 from the power supply.
2. Open the drawer with the instrument fuses located close to the power supply inlet.
3. Replace the instrument fuse.

Permitted replacement fuses	
Fuse 5x20, 2.5 A, slow-blowing, breaking capacity	
Wickmann Series 181	www.wickmann.com
Schurter Series SPT 5x20	www.schurter.ch

Repairs

Opening or working on the Leica EL6000 compact light source in any manner other than described above (changing lamps, changing fuses) may be carried out by the supplier of the instrument or the supplier's authorized representatives.

Fluorescence

Filter Changer

The patented FLUO III/F filter system consists of a filter changer for barrier and excitation filters, a UV shutter that can be activated/deactivated, and a filter insert for a filter holder with your choice of filter.

The filter changer can hold a total of 4 filter sets. The filter sets for fluorescence are labeled (see page 119). The fluorescence filters have a transponder with the specific filter data for the Leica M165 FC, M205 FA and M205 FCA.

The scope of delivery of the Leica M205 FA/ M205 FCA and Leica M165 FC includes three simple filter holders without fluorescence for empty filter positions and transmitted or incident light observation without fluorescence. These filter holders have two empty openings for the observation beam paths. The third opening for the UV fluorescence beam path is closed.

If you are using fewer than four filter holders with fluorescence filters, always insert the included simple filter holders with closed UV fluorescence beam path into the available slots. Otherwise, there is a risk of danger to the eyes from direct UV radiation from the fluorescence beam path.

A selection of the available filters including simple filter holder (bottom right)

The simple filter holders also protect the system from dust.

Filter sets for fluorescence

The filter sets for fluorescence contain, on one filter holder, two barrier filters to the visual beam paths and one excitation filter to the illumination beam path. The fluorescence filters have a transponder with the specific filter data for use with the motorized Leica M205 FA/ M205 FCA. The filter sets are labeled (see page 119).

FIM – Fluorescence Intensity Manager

FIM consists of a diaphragm disk with single diaphragms of varying transmission capacities. The intensity of the excitation light can be reduced in five fixed steps. The light can be changed from 100 % to 55 %, 30 % and 17 % down to 10 %.

The advantage of this procedure is its absolute reproducibility and fast switching between the intensity levels. A separate FIM level can be stored for every fluorescence filter. Different intensities of fluorescence can thus be calibrated to one another.

About Fluorescence Microscopy (Only Applicable for Leica M205 FA)

Functional principle

Fluorescent substances (light emitting) are excited with short-wave excitation light, and fluorescence microscopy takes advantage of this property. Specimens without self-fluorescence are stained with a fluorescent substance. One such dye is green fluorescent protein (GFP), which is used in molecular biology.

The Leica M Series

The Leica M series fluorescence stereo microscopes allow entire fluorescent specimens to be studied, documented and in three dimensions. The fully asymmetrical optics system and the enormous zoom range make the Leica M series stereo microscopes your first choice. The patented TwinLight illumination for fluorescence illumination and the patented FLUOIIP filter system generate highest-quality fluorescence images. The very bright high-pressure mercury burner and specially selected filter sets enable you to distinguish the finest structures and enhance the quality of information for incident light fluorescence.

The filter system

The FLUOIIP filter system consists of a rapid filter changer for barrier and excitation filters and a filter insert for a filter holder with your choice of filter. A total of four filter sets (which are labeled) can be used in the rapid filter changer. An empty filter cartridge is also available for individual filter combinations. Each filter set includes two barrier filters to the visual beam paths and an excitation filter to the illumination beam path.

Rapid Filter Changers and Filter Types

The rapid filter changer must be equipped with four filter holders at all times. This list includes all standard filter sets, more filters are available on request.

Filter sets	Excitation filter	Barrier filter	Designation
GFP	425/60 nm (395–455 nm)	480 LP	GFP1
GFP Plus	480/40 nm (460–500 nm)	510 LP	GFP2
GFP plants	470/40 nm (450–490 nm)	525/50 nm (500–550 nm)	GFP3
UV	360/40 nm (340–380 nm)	420 LP	UV
Violet	425/40 nm (405–445 nm)	460 LP	V
Blue	470/40 nm (450–490 nm)	515 LP	B
Green	546/10 nm (541–551 nm)	590 LP	G
CFP	436/20 nm (426–446 nm)	480/40 nm (460–500 nm)	CFP
YFP	510/20 nm (500–520 nm)	560/40 nm (540–580 nm)	YFP
Texas Red	560/40 nm (540–580 nm)	610 LP	TXR
DsRED	545/30 nm (530–560 nm)	620/60 nm (590–650 nm)	DSR
CY5	620/60 nm (590–650 nm)	700/75 nm (663–737 nm)	CY5
CY3	555/60 nm (530–580 nm)	610/75 nm (573–648 nm)	CY3

Simple Filter Holders

Simple filter holders

Three simple filter holders are included with the Leica M165 TC and the Leica M205 FA/ M205 FCA. These filter holders have two empty observation beam paths. The third observation beam path is closed.

- Use this filter holder if you want to work briefly (no more than 15 seconds) without fluorescence illumination.

So that the filter holder is not heated, do not block the mercury arc for longer than 15 seconds.

Safety Notes

- If you want to block the mercury arc for longer than that, deactivate the UV shutter.
- Use the filter if you want to change to transmitted arc or incident arc observation without fluorescence.
- Always place a simple filter holder into the empty filter changer positions in order to protect yourself from UV radiation and protect the system from dust.

If you are using fewer than four filter holders with fluorescence filters, always insert the included simple filter holders with closed observation beam paths into the available slots. Otherwise, there is a risk of danger to the eyes from direct UV radiation from the third beam path.

Equipping the Filter Changer

When inserting the filter sets, avoid touching the filters in order to avoid fingerprints. Clean dirty filters immediately using soft, lint-free cloth and suitable cleaning agent.

Removing the simple filter holder

The Leica M165 TC and the Leica M205 FA / M205 FCA are equipped at the factory with simple filter holders as "dummies". These must be removed before inserting a filter.

1. Grasp the recess of the dummy in the filter changer and pull it out.

Inserting the filter

1. Place the filter into the filter changer.

Ensure that the contour of the filter holder matches the contour of the filter cascade.

2. Rotate the filter changer by hand until it clicks into place.

If the filter holder has not been inserted correctly, the filter changer does not rotate.

3. Insert a total of four filters.

Slot for filter slide

There is a slot in the filter changer system for an individually selectable filter, for example a neutral density filter.

Observation Without Fluorescence

We recommend that you first familiarize yourself with the controls of your Leica fluorescence microscope in transmitted light without the presence of fluorescence illumination.

After switching on the high-pressure mercury burner, you must adjust the lamp immediately (see User Manual M2-216-1).

We recommend that you first familiarize yourself with the basic functions of your Leica stereomicroscope as they are described in the previous section of this User Manual. These include the binocular tube, the eyepieces, the zoom magnification changer, the focusing drive, and others.

The following describes the specific functions of the fluorescence system only.

Observation without Fluorescence

The FLUO III™ filter system includes a UV shutter that can be used to close the illumination beam path. This feature protects the mercury lamp, which should not be switched on and off too frequently. If, for instance, you need to interrupt your work, you do not have to switch off the high-pressure mercury burner to preserve sensitive specimens from being burned out or bleached out.

When working with the EL6000 it is recommended to use the shutter on the lamp to extend the lifetime of the light guide. Switching the high-pressure mercury burner on and off frequently decreases its life and causes delays, as the lamp can only be switched back on after it has cooled. Instead, you can close the UV shutter and reopen it when you return to your workplace.

Close the UV shutter when you do not want to view the specimen with fluorescence illumination, but only with transmitted light.

Double Iris Aperture

The double iris diaphragm regulates the depth of field. Note that:

- The greater the depth of field, the darker the image becomes.
- In the same way, the exposure time becomes longer for photographs.
- The resolution decreases.

Adjusting the double-iris diaphragm using the knurled ring

Commissioning the Fluorescence System

After switching on the high-pressure mercury burner, you must adjust the arc centre immediately (see User Manual M2-216-1). Do not switch on the supply unit until you feel confident using the described procedure.

⚠ To avoid accidents when handling mercury arc lamps and the arc lamp housing:

1. Switch off the supply unit (see User Manual M2-216-1).
2. Wait 2–3 minutes.
3. Adjust the arc centre according to User Manual M2-216-1.

⚠ For observation with fluorescence light, always position the stained slide correctly to protect the observer (see page 27).

Accessories

Leica Hand Wheel and Foot Switch

Up to five foot switches can be configured with a microscope system. They can be programmed in LAS or LAS X to control focus, filter wheel, illumination, and individual memory positions.

The hand wheel is designed to control the motor focus.

Leica SmartMove

With its three controllers and clutch, the Leica SmartMove control unit offers the right feel for handling motorized Leica instruments.

Controls

The functions of the individual controls can be configured both directly on the Leica SmartMove and using the Leica Application Suite.

For a detailed description of the functions and settings, please refer to the Leica SmartMove manual or the Leica Application Suite help file.

Leica SmartTouch

With the touchscreen of the Leica SmartTouch, you can control your experiment procedures with flexible hand movements and never lose sight of your microscope and specimen.

The most important control functions on the control unit can be adjusted to your specific needs with freely programmable rotary knobs and function buttons.

Controls

The functions of the individual knobs and screen elements can be configured both directly on the Leica SmartTouch and using the Leica Application Suite.

The standard configuration when shipped from the factory is as follows:

- Top part of the knob = zoom
- Upper part of the knob = focus
- Buttons = left filter, right filter, shutter

For a detailed description of the functions and settings, please refer to the Leica SmartTouch manual or the Leica Application Suite help file.

Leica PSC Controller

Use

The Leica PSC controller gives you direct and control of the Leica motorized mechanical stage.

Connection

Connect the Leica PSC controller and the Leica motorized mechanical stage to the DX I box.

Passing over the specimen quickly

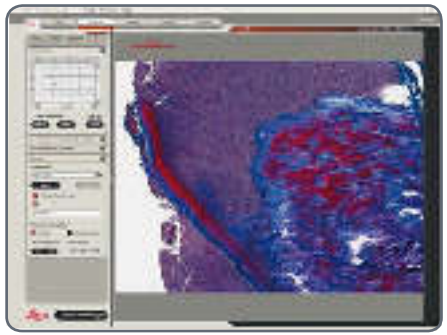
- Move the joystick in any desired direction, including diagonally to control the mechanical stage quickly.

Fine control of the mechanical stage

The motorized Leica motorized mechanical stage offers an accuracy of up to 0.25 µm. To move to a specific point with maximum accuracy, use the left and right keys on the joystick.

Control by LAS

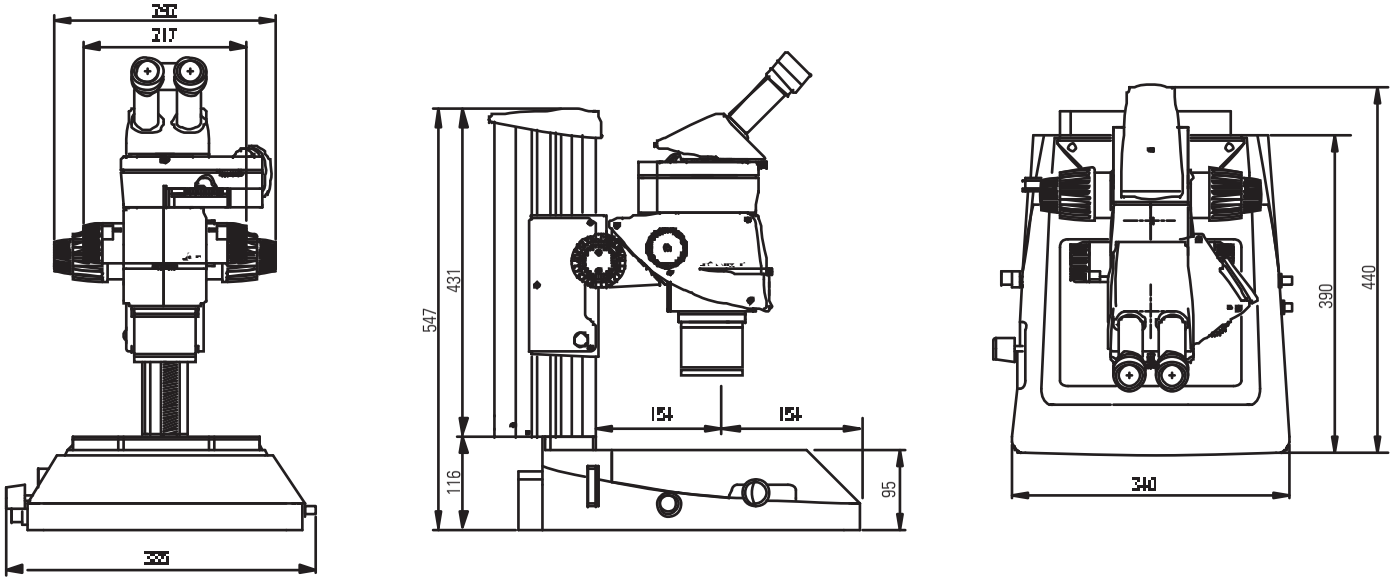
The instructions for controlling the Leica motorized mechanical stage using the Leica Application Suite are provided in the software's help file.



Dimensional Drawings

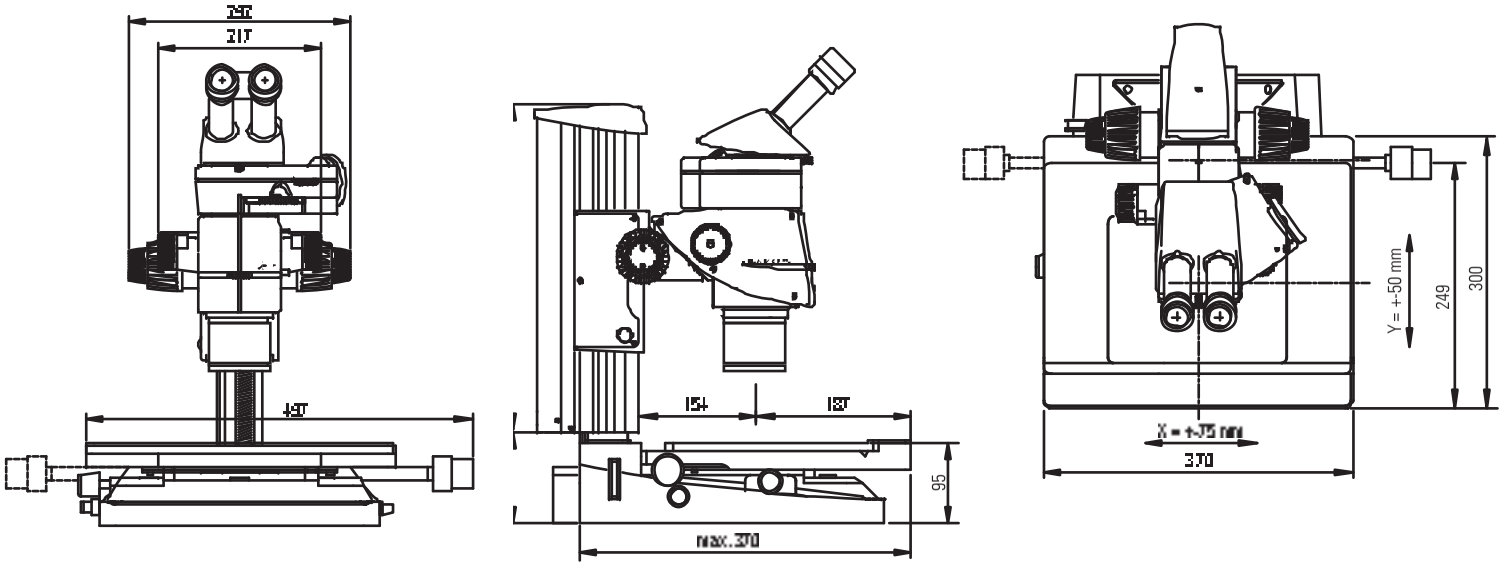
Leica M165 FC

Leica M165 FC with transmitted-light stand and focusing column
(dimensions in mm)



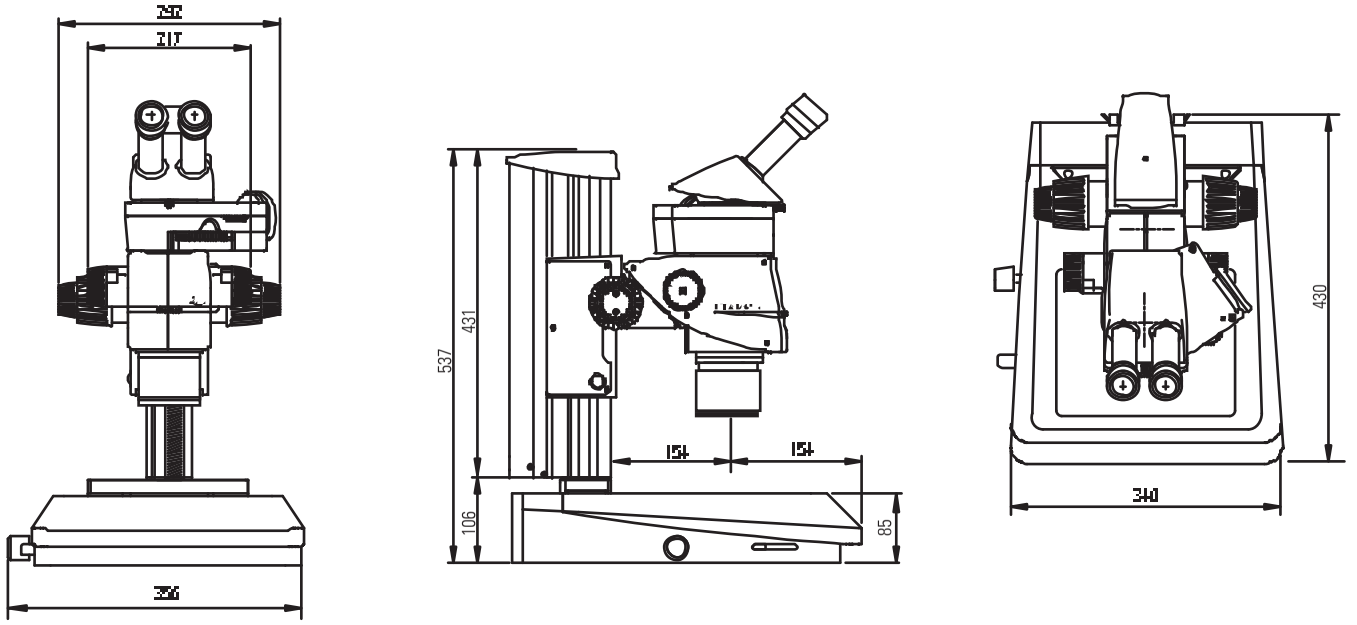
Leica M165 FC (Continued)

Leica M165 FC with transmitted-light stand TL RCI, manual cross-stage Leica bioPro and manual focus



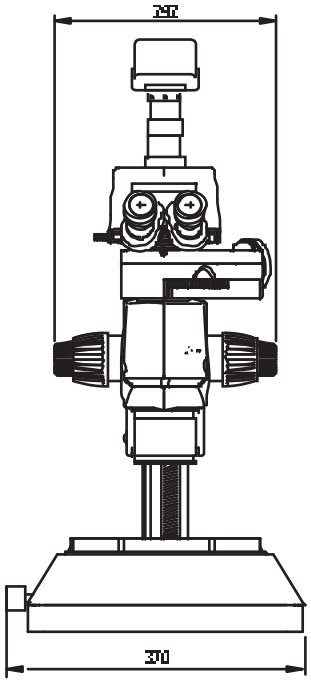
Leica M165 FC (Continued)

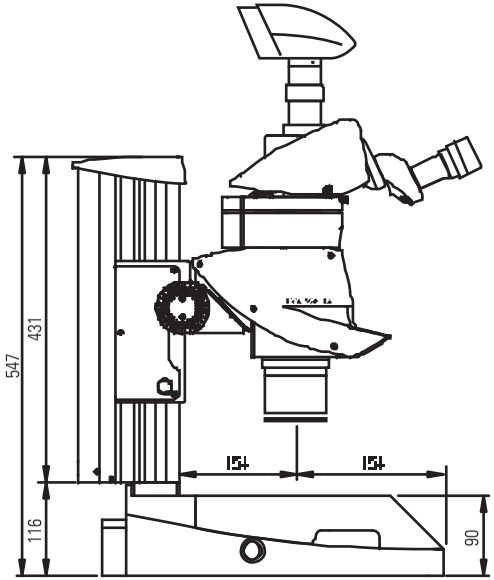
Leica M165 FC with transmitted-light stand TL RCI and manual focus

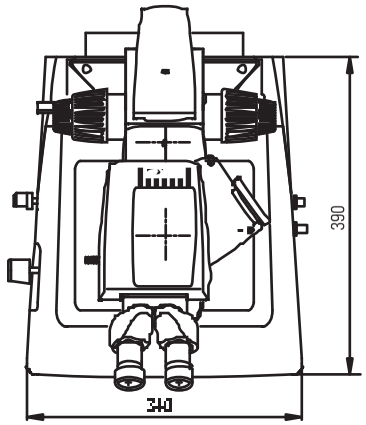


Leica M205 FA

Leica M205 FA with transmitted-light stand TL BFDF, trinocular ErgoTube, DFC camera and motorized focus
(dimensions in mm)

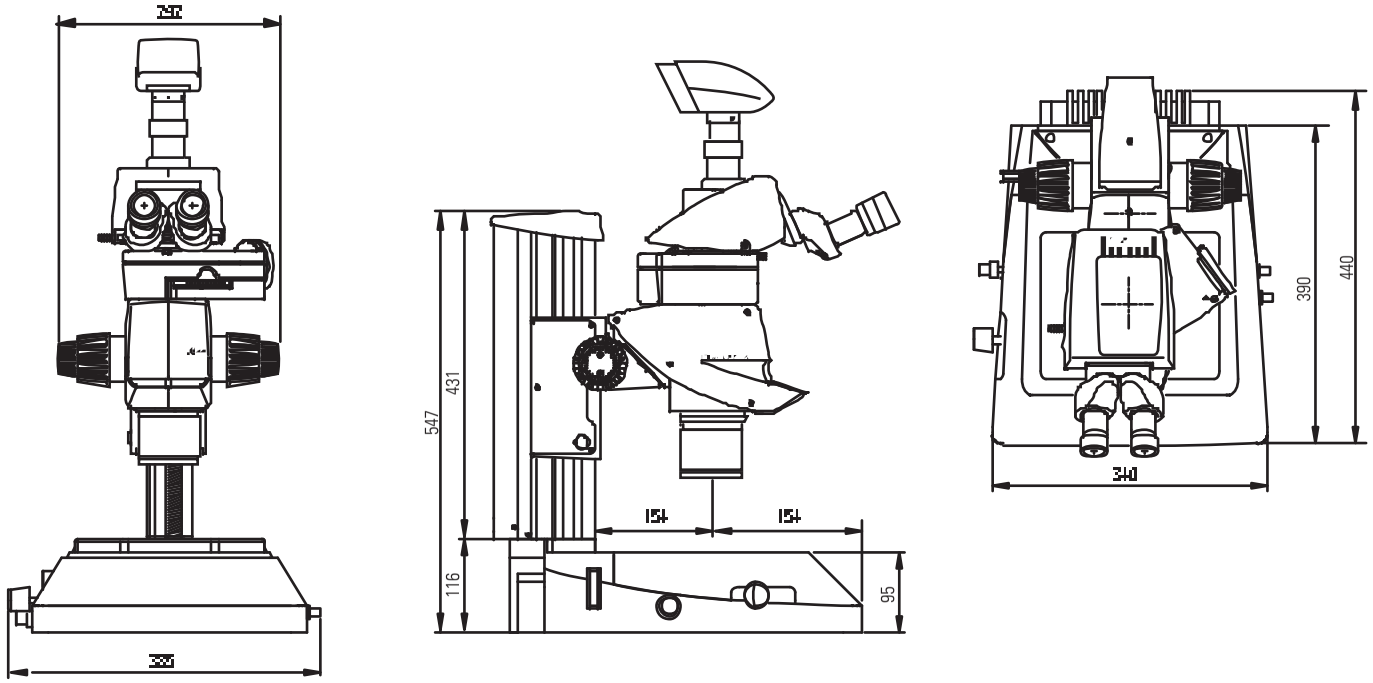






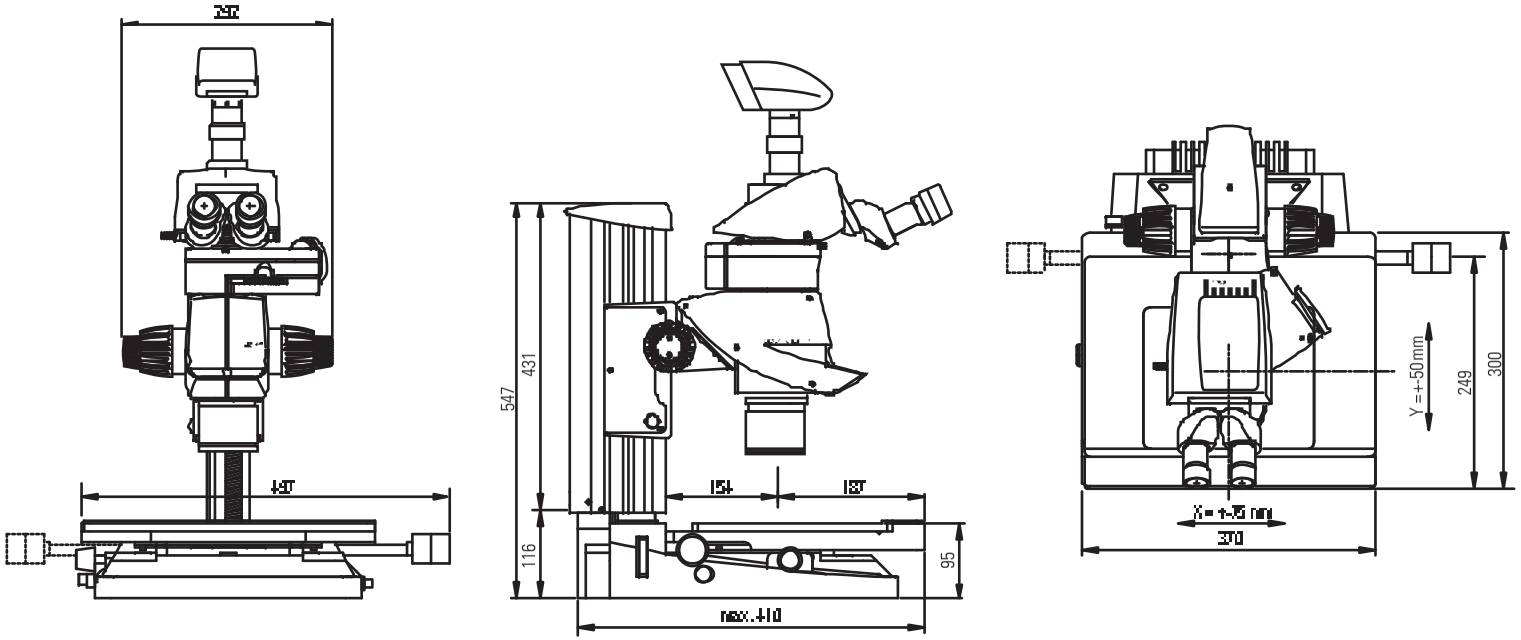
Leica M205 FA (Continued)

Leica M205 FA with transmitted-light stand TL RCI, trinocular ErgoTube, DFC camera and motorized focus



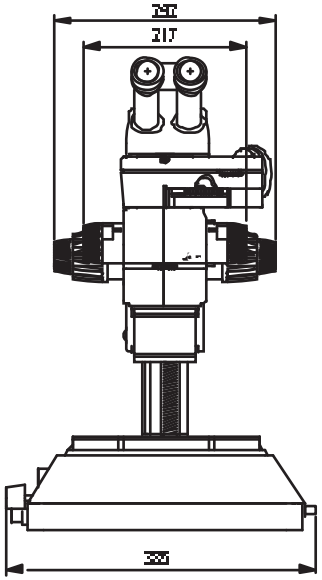
Leica M205 FA (Continued)

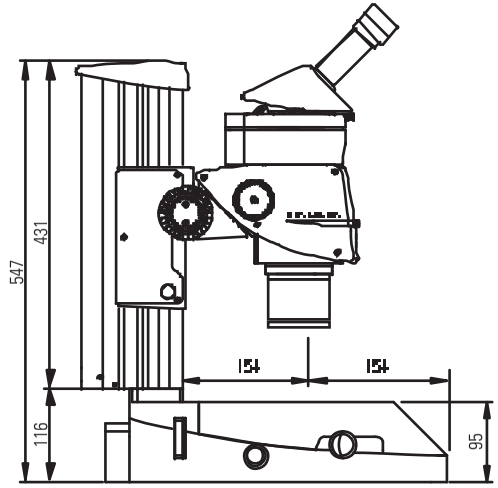
Leica M205 FA with transmitted-light stand TL RCI, IsoPro mechanical stage, trinocular ErgoTube, DFC camera and motorized focus

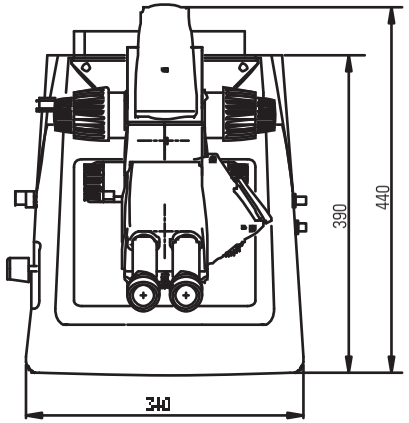


Leica M205 FCA

Leica M205 FCA with transmitted-light base and focusing column
(dimensions in mm)

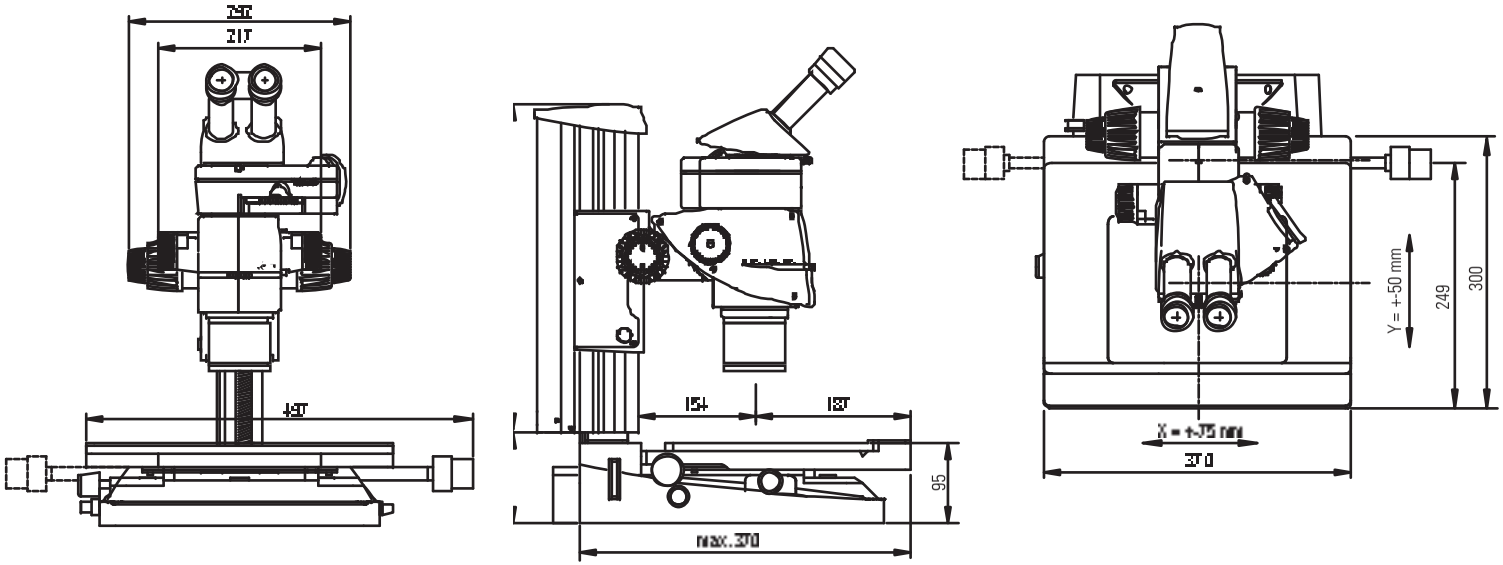






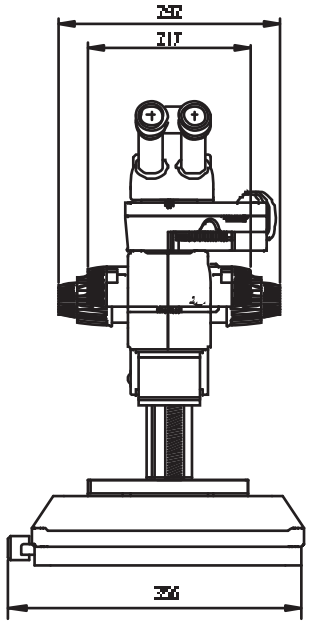
Leica M205 FCA (Continued)

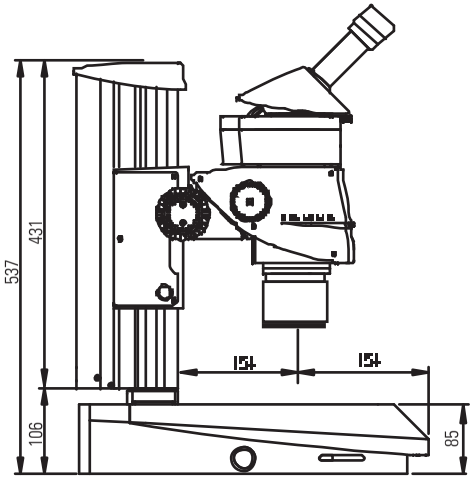
Leica M205 FCA with transmitted-light stand TL RCI, Leica bioPro manual mechanical stage and manual focus

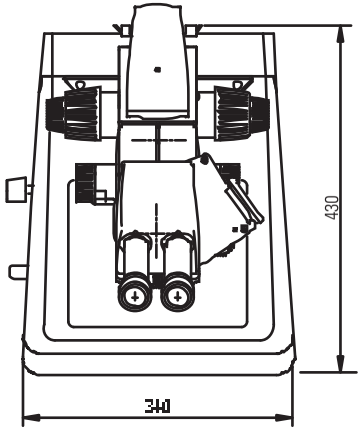


Leica M205 FCA (Continued)

Leica M205 FCA with transmitted-light stand TL RCI and manual focus

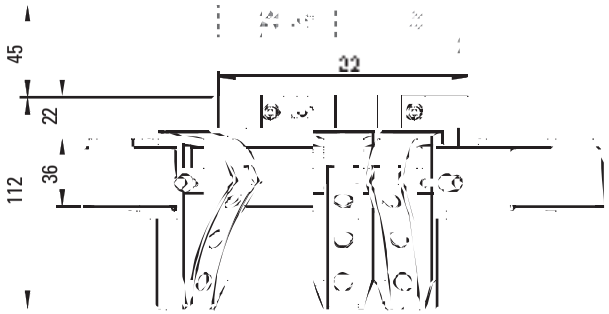


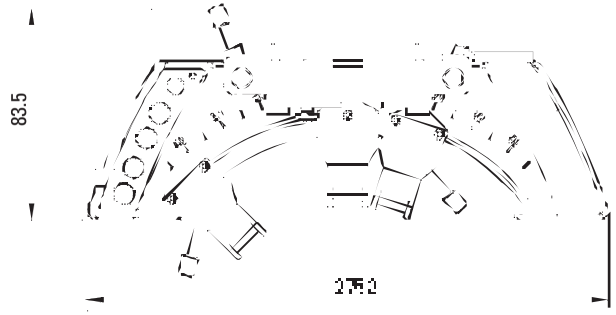


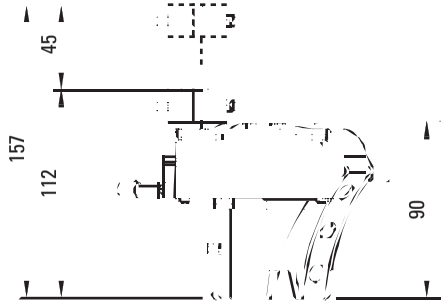


Leica LED5000 MCI

Leica LED5000 MCI
(dimensions in mm)

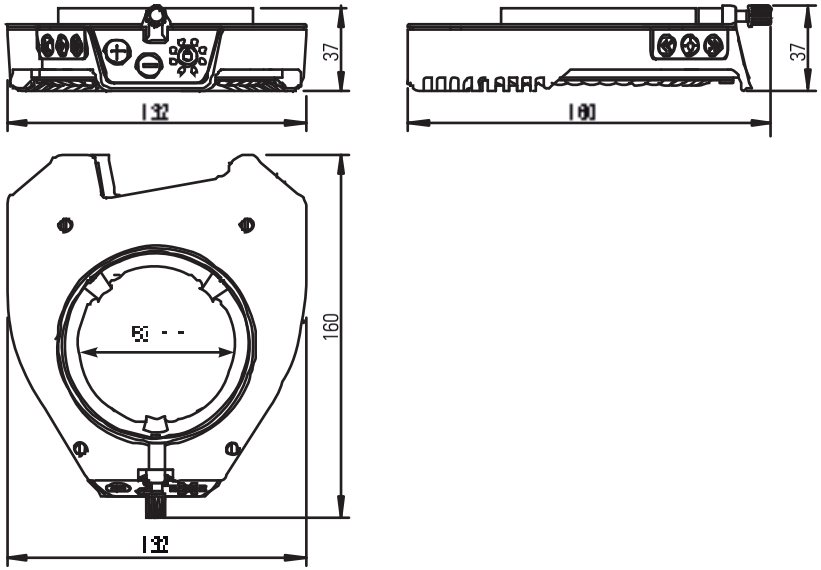




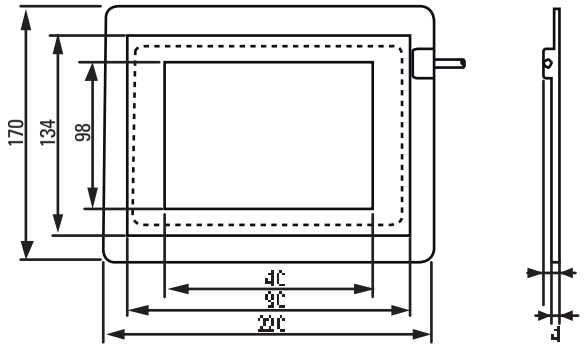


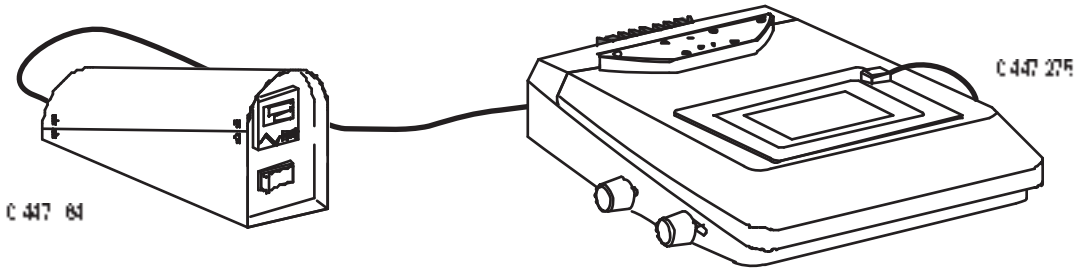
Leica LED5000 RL

Leica LED5000 RL
(dimensions in mm)



Leica MATS TL





Specifications

Leica M165 FC / Leica M205 FA / Leica M205 FCA

	Leica M165 FC	Leica M205 FA	Leica M205 FCA
Optical data			
Zoom	16.5:1 manual, coded	20.5:1 motorized with Tube and Optics	20.5:1 manual, coded with Tube and Optics
Below: Intended optics (1x objective/10x eyepiece)			
– Zoom range	7.3x–120x	7.8x–160x	7.8x–160x
– Resolution	max. 732 lp/mm	max. 525 lp/mm	max. 525 lp/mm
– Working distance	61.5 mm (planachromatic)	61.5 mm (planachromatic)	61.5 mm (planachromatic)
– Object field	Ø 31.5 mm – 1.92 mm	Ø 29.5 mm – 1.44 mm	Ø 29.5 mm – 1.44 mm
Maximum values (based on optics combination)			
– Magnification	960x	1,280x	1,280x
– Resolution	906 lp/mm	1,050 lp/mm	1,050 lp/mm
– Visible structure width	551 nm	476 nm	476 nm
– Numerical aperture	0.302	0.35	0.35
– Object field	Ø 6.3 mm	Ø 5.9 mm	Ø 5.9 mm
Working distances	135 mm (0.5x planachromatic) 112 mm (0.8x planachromatic) 67 mm (0.63x planachromatic) 61.5 mm (1x planachromatic) 30.5 mm (1.6x planachromatic) 20.1 mm (2x planachromatic)		

Leica M165 FC / Leica M205 FA / Leica M205 FCA (Continued)

	Leica M165 FC	Leica M205 FA	Leica M205 FCA
Optics carrier			
100 % apochromatic optical system	CMO (Common Main Objective) lead-free		
Specific surface resistivity (housing)	2 × 10¹¹ Ω/mm² discharge time <2 seconds from 1,000 V to 100 V		
Encoded/automated (M205 FA)	Zoom, iris diaphragm, objective nosepiece	Zoom, iris diaphragm, objective nosepiece, FIM, filter	Zoom, iris diaphragm, objective nosepiece, filter
Engageable zoom notches	13 for repetitive tasks	14 for repetitive tasks	14 for repetitive tasks
Double-iris diaphragm for depth of field control	Built-in and coded	Built-in and motorized	Built-in and coded
FIM (Fluorescence Intensity Control)	–	Built-in and motorized	–
Accessories			
Standard objective (screw-in the objective nosepiece)	1× planapochromat		
Additional objectives (screw-in the objective nosepiece)	5× planapochromat, 2× planapochromat, 1.6× planapochromat, 0.63× planapochromat		

↵

Leica M165 FC / Leica M205 FA / Leica M205 FCA (Continued)

	Leica M165 FC	Leica M205 FA	Leica M205 FCA
Additional objectives (non-parfocal)	1× planapochromat, 0.8× planapochromat, 0.63× planapochromat, 0.5× planapochromat		
Interpupillary distance	50 mm – 105 mm		
Wide-field eyepieces for persons wearing glasses	10×, 16×, 25×, 40×, with adjustable eyecups & click stop		
Manual coarse/fine focus	Focusing range 130 mm or 330 mm, adjustable ease of movement	Focusing range 130 mm, adjustable ease of movement	Focusing range 130 mm, adjustable ease of movement
Motorized focusing drive	Motorized focusing drive with 300 mm profile column, with power supply		
Computer interface	USB		

Leica M165 FC / Leica M205 FA / Leica M205 FCA (Continued)

	Leica M165 FC	Leica M205 FA / Leica M205 FCA
Module System	**Stands, illuminators**	
Transmitted light stands	For bright field and bright/dark field, high-performance base: Bright field, single-sided dark field, with Rottermann Contrast and CCC	
Incident light stand	Large incident light base with black/white stage plate and Anti shock feet	
Stages	Gliding stage, MATS heating stage, cross stage, rotatable polarization stage, Leica IsoPro mechanical stage (manual and motorized)	
Illuminators	LED5000 MCI and LED5000 RL, fluorescence, oblique, coaxial, cold light sources	
	Misc. accessories	
Photography, video	– Leica DFC digital image capture system, various camera variants – Various adapters for commercially available CCD cameras	
Image archiving, image processing	Leica AF6000: Special software for all fluorescence tasks Leica Application Suite (LAS) consisting of basic program and various auxiliary modules	
Measurement graticules	For length measurements and counting	
Vertical and oblique observation	45° side view around the complete object	
Drawing tube	For both left and right-handed users	

For detailed information about optical accessories, binocular tubes, stands, illuminators and additional accessory modules for various applications, refer to the brochure "Leica M Stereomicroscopes – The Modular System", M1-105-[illegible]en.

Leica EL6000 – Specifications

Dimensions (W×H×D)	
Width×height×depth	130 mm×210 mm×290 mm
Environmental conditions	
Permitted ambient temperature	-20 to 85 °C
Permitted relative humidity	10 % to 90 %, non-condensing
Operation	
Permitted ambient temperature	0 to +70 °C
Permitted relative humidity	10 % to 90 %, non-condensing
Operational data	
Application area	Enclosed rooms
Altitude for use	Max. 2,000 m above sea level
Protective class	
Type of protection	IP20 (EN 60529)
EMC	
Emitted interference	EN 61326 (Class B)
Immunity to interference	EN 61326 Annex A
Voltage fluctuations, flicker	EN 61000-3-3
Harmonic currents	EN 61000-3-2
The instrument fulfills the requirements of EC Directive 89/336/EEC and the EMC Law of September 18, 1998	

Electrical safety	
Test according to EN 61010-1:2001	
Pollution degree	2
Overvoltage category	
Power input	
Design	Switched socket C320 C13 (EN 60320 C13)
Power supply voltage	100 to 240 VAC (±10%)
Power frequency	50 to 60 Hz
Fuse protection	2×T2.5 A; 3 breaking capacity H (manufacturer: Wickmann Series 181)
Power consumption	Max. 210 VA
Lamp	
Type	Mercury short arc reflector lamp
Designation	OSRAM HXP-R 120W/45C VS
Power consumption	120 W
Service life (manufacturer information)	Average value 2,000 h

Leica EL6000 – Specifications (Continued)

Light output	
Design	Type: Stop ring
Special feature	Self-locking when light guide is plugged in
Fan	
Switch-on delay	Approx. 60 s after igniting the lamp
Interface	
Type	Remote control input for internal shutter
Design	9-pin D-Sub socket
Remote signal level	
– Shutter closed	–8 to +0.8 V
– Shutter open	+2.4 to +8 V
– Input current	Approx. 1 mA
Footswitch	
– Shutter closed	Connection between pin 2 and 4
– Current	Approx. 1.2 mA
Shutter frequency	Max. 10 Hz

Protective functions	
Safety circuit	If the cover is open, all components in the instrument (except for the power input and power plug) are disconnected from the power supply voltage.
Overheating protection	In the event of overheating, the lamp supply is shut off. After cooling off, the lamp power supply in the Leica EL6000 compact light source is automatically switched on again.
Protection screen	If no light guide is plugged into the light output of the instrument, the light output is automatically closed off so that no light can escape.

Leica TL ST Transmitted-light Base

Light source	Halogen lamp 12V/20W
Quick illumination change	Yes
Illuminated area	50 mm
Power supply unit	Input voltage 100–240 V~, frequency 50–60 Hz energy consumption 30 W max., ambient temperature 10–40 °C
Connections	Power plug, power switch
Weight	7.4 kg

Illumination types

Bright field	Yes
Dark field	Yes (single-sided)
Oblique light	No
Relief Contrast System (RC)	No
CCIC (Constant Color Intensity Control)	No
Internal shutter/lamp control	No
Integrated filter holder	Yes
Coated discs for increasing the color temperature	Yes
Matching of light num. aperture	No
Remote control options	No
Anti Shock Pads	Yes
Dimensions (WxHxD)	340x430x85 mm

Leica TL BFDF Transmitted-light Base

Light source	External cold light source
Illuminated area	70 mm
Connections	Connection for cold light guide, active Ø=10mm, end tube Ø=13 mm
Weight	3.8 kg

Illumination types

Bright field	Yes
Dark field	Yes
Oblique light	No
Relief Contrast System (RC)	No
CCIC (Constant Color Intensity Control)	No
Internal shutter/aperture control	Yes*
Integrated filter holder	No
Coated disks for increasing the color temperature	No
Matching of light numerical aperture	Yes**
Remote control options	Yes***
Anti Shock Pads	Yes
Dimensions (WxHxD)	370x390x90 mm
*With cold light source Leica CLS150 LS	**Concave mirror ***With external light source

Leica TL RC / Leica TL RCI

	Leica TL RC	Leica TL RCI
Light source	External cold light source	Halogen lamp 12 V/20 W
Quick illumination change	–	Yes
Illuminated area	35 mm	35 mm
Power supply unit	–	100–240 V~, frequency 50–60 Hz energy consumption 30 W max., ambient temperature 10–40 °C
Connections	Connection for cold light guide, active Ø=10 mm, end tube Ø=13 mm	1x USB type A, 1x USB type B, 2x CAN-BUS
Weight	6.0 kg	7.2 kg

Illumination types

Bright field/dark field	Yes/yes	Yes/yes
Oblique light/Relief Contrast System (RC)	Yes/yes	Yes/yes
CCIC (Constant Color Intensity Control)	No	Yes
Internal shutter/lamp control	Yes**	Yes
Integrated filter holder	Yes	Yes
Coated optics for increasing the color temperature	Yes	Yes
Matching of light numerical aperture	Yes***	Yes***
Remote control options	Yes****	Yes
Anti Shock Pads	Yes	Yes
Dimensions of base (WxHxD)	340x390x95 mm	340x440x95 mm
*Single-sided **With cold light source Leica CLS 150 LS ***Concave mirror ****With external light source		

Leica TL5000 Ergo

Lightsource

Light source	LED
Illuminated area: Brightfield Ø	65 mm
Illuminated area: Darkfield Ø	40 mm
Relief Contrast System (RC)	Yes
Internal shutter/lamp control	Yes
Remote control options	Yes
Integrated filter holder	Yes
Matching of light num. aperture	Yes
Anti-Shock Pads	Yes
Size (W×H×D) in mm	412 × 341 × 46

Accessories

IsoPro cross-stage support	–
Integrated heating stage (optional)	Yes
Integrated slide adapter (optional)	Yes
ErgoRest (optional)	–

Power supply

Input	120–240 VAC 47–63 Hz 3.2 A
Output	38 VDC 3.95 A 150 W max

Connections

CAN	3
USB	1
Power Supply	1

Leica IsoPro Motorized XY Stage

Compatibility	Leica incident light base and TL bases (TL [illegible])
Stage size (L x W x H)	335.5 mm x 370 mm x 41.5 mm
Travel	152 mm x 102 mm (6" x 4")
Speed X,Y	30 mm/s
Motor resolution X,Y	0.25 µm
Repeatability X,Y	±2 µm
Positioning accuracy X,Y	±20 µm over the entire positioning range
Hysteresis X,Y	30 µm
Motor	Direct current (DC) motor with encoder
Backlash	Slack free
Adapter	All adapters for TL bases
Acceleration	S-shaped acceleration
Computer connection	USB
Control options	Leica PSC, Leica Smart Move, Leica SmartTouch, Leica LAS via PC
Power supply	Input: 100–240 VAC 50/60 Hz 1.0 A Output: 15 VDC 2.66 A 40 W max.

Appendix

Calculating the Total Magnification and Field of View Diameter

Parameter

MO	Magnification of the objective
MC	Magnification of the eyepiece
z	Magnification of the changer position
q	Tube factor, e.g. 1.5× for coaxial incident light, 1.6× for 45° Digital Tube
·	Factor 1.25× if the stereomicroscope and stereoscopic metallographic objectives of the MZ125/MZ16 are used on the MS5, MZ6, MZ75 or MZ95
FOV	Field number of the eyepiece. The field numbers are marked on the eyepieces: 10× = 21, 16× = 17, 25× = 9.5, 40× = 6.

Example

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

Calculation example: Magnification in the binocular tube:

$$M_{TOTAL} = MO \times MC \times z \times q \times \cdot$$

or

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

Calculation example: Field of view diameter in the specimen

$$\varnothing\,OT = \frac{FOV}{MO \times z \times q \times \cdot}$$

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 warranty 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 (Switzerland) 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 (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 instructions.
- Remove dust with a pneumatic rubber bulb and with a soft brush.
- Clean objectives and eyepieces with special optical cleaning cloths and with pure alcohol.

Leica

MICROSYSTEMS

CONNECT
WITH US!

Leica Microsystems (Schweiz) AG · Max-Schmidheiny-Strasse 201 · 9435 Heerbrugg, Switzerland
T +41 71 726 34 34 · F +41 71 726 34 44

www.leica-microsystems.com