Leica MZ10 F
User Manual

Leica
MICROSYSTEMS

General Notes

Safety concept

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

Use in clean rooms

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

Cleaning

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

Servicing

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

Responsibilities of person in charge of instrument

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

Important Safety Notes

User Manual

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

This User Manual describes the special functions of the individual modules of the Leica MZ10 F fluorescence stereomicroscope and the Leica fluorescence module for the Leica M stereomicroscopy series and contains important instructions for their operational safety, maintenance, and accessories.

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

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

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

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

Special manuals

Special manuals are provided for a number of accessories:

- User Manual M2-216-1 for lamp housing with high-pressure mercury burner.
- User Manual for ebq 100 isolated supply unit for 100W high-pressure mercury burners.
- User Manual M2-267-1 for the motorized focus system.

Symbols Used

Warning! Safety hazard!

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 are intended to provide clarity.

Explanatory notes

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

Figures

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

Safety Instructions

Description

The individual modules fulfill the highest requirements for observation and documentation with the Leica fluorescence stereomicroscopes.

Intended use

- Refer to "Safety Concept" booklet

Non-intended use

- Refer to "Safety Concept" booklet

Never use fluorescence stereomicroscopes 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 User Manual have been tested for safety and potential hazards. The responsible Leica affiliate must be consulted whenever the instrument is altered, modified or used in conjunction with non-Leica components that are outside of the scope of this manual!

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

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

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

- Direct contact with eyepieces is a potential transmission method for bacterial and viral infections of the eye.

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

Light sources: Safety instructions

Protective measures of the manufacturer:

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

Warning

- UV radiation could damage the eyes. Therefore:

- Never look into the light spot on the specimen plane without a UV protection screen.
- Never look into the eyepieces if no excitation filter is in the beam path.
- Fill empty filter positions with dummy filter carriers.
- Do not select a white, strongly reflective background for the specimen.

Safety Instructions (continued)

Supply unit

Always unplug the supply unit from the power supply:

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

Lamp housing

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

Mercury lamp

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

Table of Contents

Leica MZ10 F

Congratulations!

Congratulations on obtaining your new Leica MZ10 F stereomicroscope. We are convinced it will fully meet your expectations, as never before have we applied our decades of experience in the areas of optics, mechanical engineering and ergonomics in such an uncompromising manner.

The Leica MZ10 F embodies all the qualities you associate with the name Leica Microsystems: excellent objectives, high-quality engineering, and reliability. Furthermore, the modular design ensures that the Leica MZ10 F adapts perfectly to your needs—no matter which accessories you require for your tasks.

The entire imaging system, including the zoom, objective and ErgoTube®, is apochromatically corrected with much technological effort. Contrast, sharpness, richness in detail, resolution, image and color fidelity are optimum. In addition, the patented illumination beam path guarantees at every zoom level that light utilization is at a maximum and that fluorescence images are intensely luminous on a jet black background.

Though the reliability and robustness of Leica stereomicroscopes is world-renowned, the Leica MZ10 F requires a certain degree of care and attention. Therefore, we recommend that you read this manual. It contains all the information you need regarding operation, safety and maintenance. Simply observing a few guidelines will ensure that even after years of intensive use, your stereomicroscope will continue to work as smoothly and reliably as on the very first day.

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

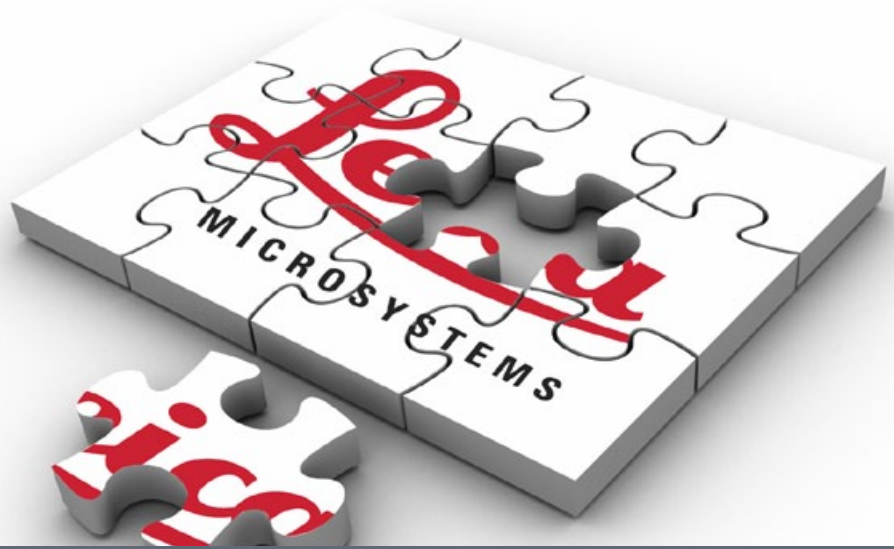
The Modular Design: Everything is Relative

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 control elements 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!

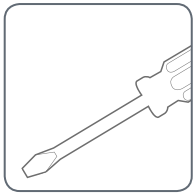
Leica Microsystems enjoys an exceptional reputation when it comes to devising customer-specific solutions. If you have a special request that cannot be met with standard parts, contact your Leica consultant. We have a solution for every problem.



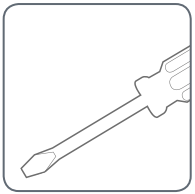
On We Go

If your new Leica microscope has already been assembled and commissioned by your Leica consultant, click here to skip through the installation instructions and go directly to the Quick Start Guide on Page 43.

If, on the other hand, you are assembling the microscope yourself, continue with the "Assembly" chapter, which begins on Page 15.



For everything you need to know about the correct use of fluorescence-related parts, refer to Page 89.



Assembly

Assembling the Focusing Column with a Transmitted Light Base

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

Tools used

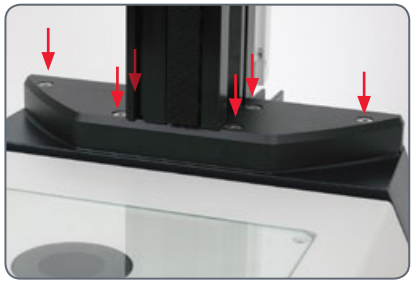
- Hex socket screwdriver, 3 mm

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 plate is required.

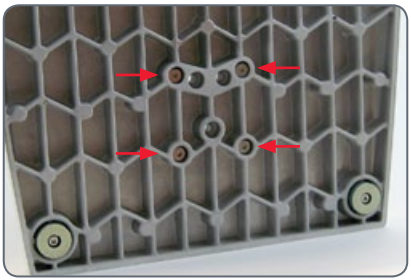
Tools used

- Hex socket screwdriver, 3 mm

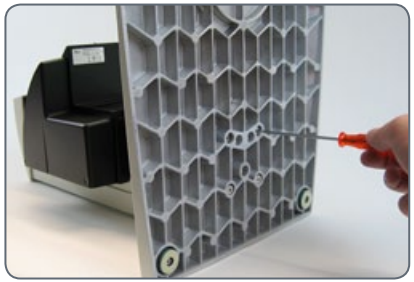
Assembly

1. Place the focusing column on the side.

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 may be necessary to restrict the maximum travel path of the stereomicroscope. This prevents the following:

- Injuries when manipulating the specimen because the fingers or hand get pinched.
- Accidental contact between the objective and the specimen, and potential resulting damage.

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.

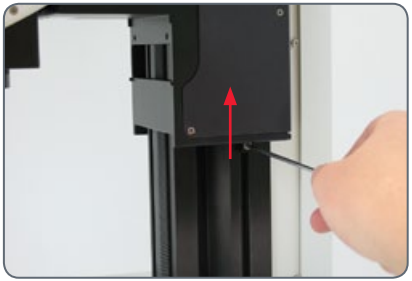
Restricting the bottom travel range

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, 4 mm

Please use the planapochromatic objectives of the M series (article numbers 10 450 027 to 10 450 030) with the microscope carrier. If you have any inquiries regarding compatibility and adaptation of other models, please contact your Leica consultant.

Assembling the Optics Carrier

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

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

3. Insert the optics carrier into the microscope carrier and fasten it with the locking screw.

Iris Diaphragm

The optional iris diaphragm, which can be attached between the optics carrier and tube, fulfills the same purpose as those in a camera: It regulates the available light, which changes the depth of field. The "depth of field" (or "depth of focus") is the area of a specimen that is brought into sharp focus.

Installing the iris diaphragm

1. Place the iris diaphragm on the optics carrier and tighten the locking screw.

Tube

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

Please note that inserting intermediate elements can lead to shading in the border area of the field of view.

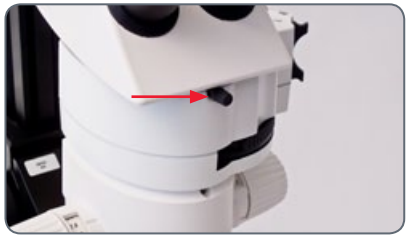
Preparations

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

Assembling the tube

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

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



Eyepieces

Tools used

- No tools required.

Magnification range

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

Preparation

1. If you want to use an optional graticule, insert it now (Page 58).

2. Remove the plastic tube guard.

Inserting the eyepieces

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

4. Securely tighten the clamping screws.

Objective

Tools used

▶ No tools required.

• 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.

Attaching the objective

1. Remove the protective cover on the optics carrier.

2. Screw the objective clockwise into the optics carrier.

UV Protection Screen: Assembly

Tools used

- Allen key

Intended use

The UV protection screen in front of the specimen plane prevents 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 spot.

Assembly

1. Screw the adapter for holding the UV protection screen to the fluorescence axis.

2. Fasten one side of the holder for the UV protection screen on the adapter. The other side holds the protection screen.

3. Bring the holder into the correct position by turning it on its center joint. Tighten the screw on the center joint to fasten the UV protection screen in the selected position in front of the objective.

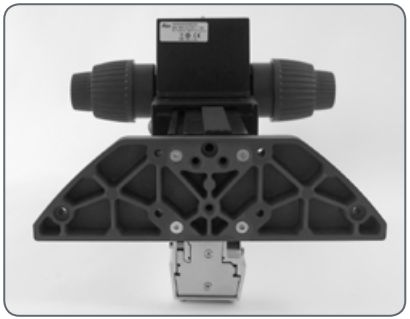
Transmitted Light Base TL ST

Unpacking the base

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

Focusing drive and column

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



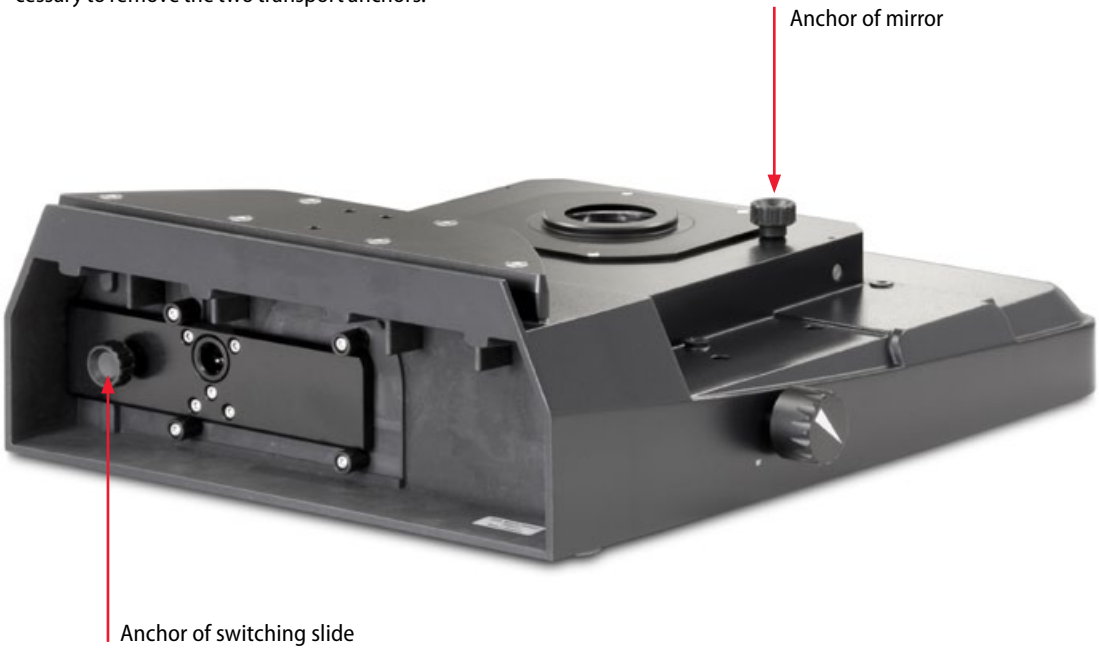
2. Attach your focusing drive column from below using the four hexagon-head screws.

3. Reattach the adapter plate to its original position using the six hexagon-head screws.

Transmitted Light Base 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 TL BFDF

Standard delivery

The base is delivered with the adapter plate installed. The selected stage (Leica IsoPro™ Cross-stage or Leica standard stage 10 447 269), 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 IsoPro™ Manual Cross-stage
- Leica IsoPro™ Automatic Cross-stage
- Leica standard stage 10 447 269

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.

Standard stage

1. Take the glass plate from the rectangular gap in the standard stage.

2. Position 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 standard stage.

TL RC™ / TL RCI™

The base is delivered with the adapter plate installed. The selected stage (Leica IsoPro™ Cross-stage or Leica standard stage 10 447 269) and the focusing drive will have to be mounted later.

Ensure that the instruments are unpacked on a level, adequately sized, and nonskid underlay.

Stage assembly

The Leica TL RC™/ RCI™ transmitted light base can be equipped with three different Leica stages. 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.

Standard stage

1. Take the glass plate from the rectangular gap in the standard stage.

2. Position 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 standard stage.

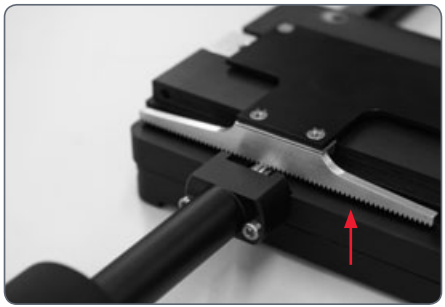
IsoPro™ Manual Mechanical Stage: Assembly

Leica IsoPro™ Cross-stage

Before the Leica IsoPro™ Cross-stage is mounted to the base, the axis containing the control buttons is attached either on the left or the right side of the cross-stage.

Left or right operation

If the controls are to be mounted on the left-hand side, the gear rod on the bottom side of the cross-stage must be unscrewed and reattached in reverse.



The install the operating elements, skip over the first three items of the following description.

Assembly

1. Take the glass plate from the mechanical stage.

2. Turn the mechanical stage around and place it onto a non-slip surface.

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

Leica IsoPro™ Manual Mechanical Stage: Assembly (cont'd.)

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 cross-stage magnetically.

3. Attach the axis with the two supplied hexagon-head screws.

4. Attach the cover rail to the mechanical stage.

Cross-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.

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.

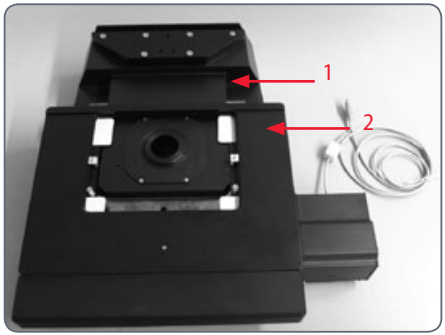
Leica IsoPro™ Motorized Mechanical Stage: Assembly

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™ Cross-stage or standard stage 10 447 269) and the focusing drive will have to be mounted later.

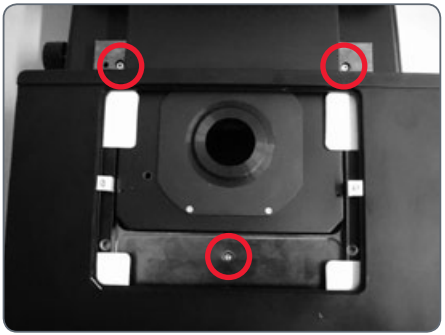
The motorized cross-stage is a sensitive precision instrument. During installation, avoid subjecting the stage to impact or severe vibrations.

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



1 Microscope base
2 Motorized cross-stage

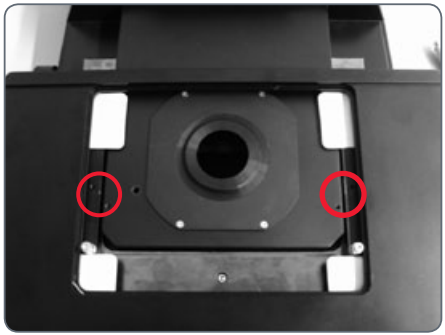
2. Secure the motorized mechanical stage to the base using three M4 screws.



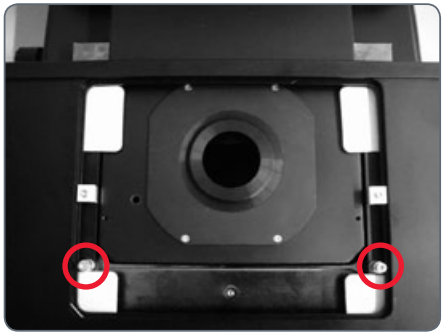
3× M4 screws

Leica IsoPro™ Motorized Mechanical Stage: Assembly (cont'd.)

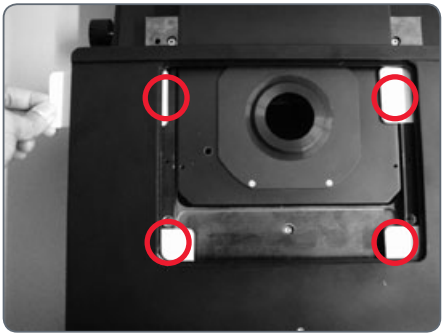
3. Remove the two M4 screws and the holder from the cross-stage.



4. Remove the two M4 screws and the sleeve from the mechanical stage.



5. Remove the four shock-absorbing cartons from the mechanical stage.



After removal, keep all the transport anchors in the plastic bag provided for future transport.

Leica IsoPro™ Motorized Mechanical Stage: Assembly (cont'd.)

The bases

The TL BFDF, TL RC™ and RCI™ 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.

Cross-stage and base

- Never move the sledge of the motorized cross-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 (cont'd.)

Cross-stage for X/Y stage control unit

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

2. Plug the CTL2 plug of the Leica PSC controller 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 (10 446 352).

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

3. Plug a 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 cross-stage initializes and automatically drives to the mid position.

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

Leica EL6000 – Safety Notes

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

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

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

The instruments and accessories described in this manual have been safety-tested and checked for possible 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 alterations to the instrument or noncompliant use shall void all rights to any warranty claims.

- If any safety defects or malfunctions 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 invisible 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 (left limit 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 (gaps, 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 with explosion 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
Ambient temperature	0 – 40 °C
Relative humidity	10%–90%
Overvoltage category	II
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.

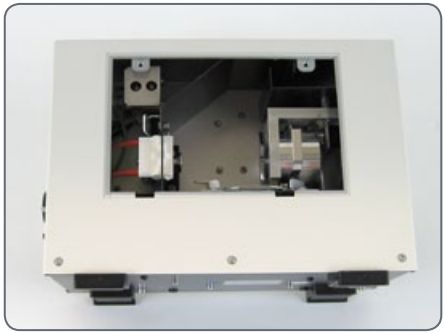
2. Unscrew both screws of the cover using a 3 mm Allen key.

3. Remove the housing cover.

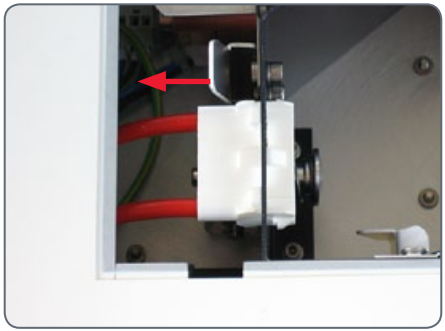
Leica EL6000 – Preparation (continued)

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

This makes it easier to insert the lamp.

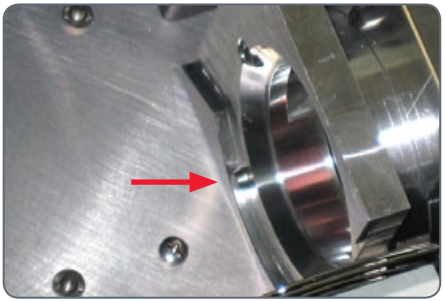


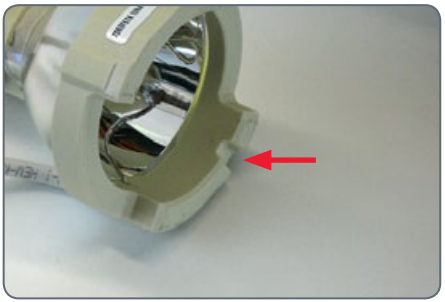
5. Pull the pressure bolt back towards the front plate using the lever.



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.

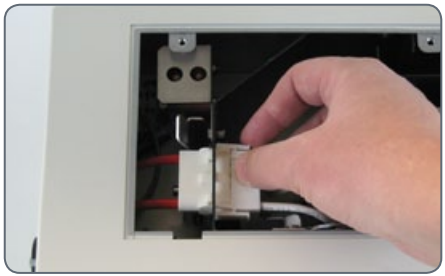




Leica EL6000 – Preparation (continued)

7. When the lamp makes full contact with the lamp mount, release the lever.

8. Connect the plug of the lamp with the coupling in the instrument.



Ensure that no wires are touching the reflector of the lamp.

9. Check to make certain that a heat-absorbing filter has been inserted into the shaft in order to protect the connected light guide.

10. Close the housing cover and insert the screws.

Leica EL6000 – Connection to the Fluorescence Lamp Housing

- Always connect the light guide to the lamp housing of the stereomicroscope in order to prevent danger to the user from the high-energy light.

1. Unscrew the positioning screw and remove the protective cover of the fluorescence lamp housing.

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

3. Unscrew the three red protective caps on the light guide.

4. Insert the short end of the light guide into the lamp housing of the stereomicroscope as far as it will go.

5. Securely tighten the clamping screw.

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

6. Insert the long end of the light guide into the light output of the Leica EL6000. There must be a noticeable click.

- Only use a light guide with a light input of the type "Storz long", as otherwise damage to the instrument and danger to the user can result (risk of being dazzled).

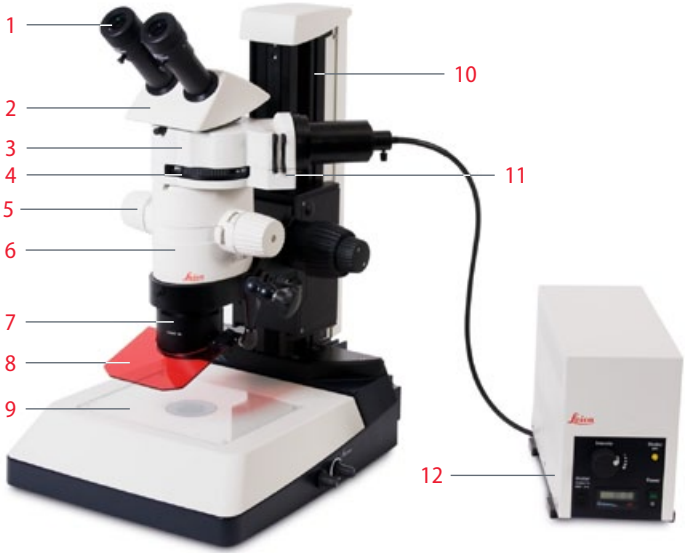
- Before you open the shutter, the light guide must be connected on both sides. Otherwise, the escaping light can cause injury to eyes and skin and damage to furniture. Never look into the light escaping from the light guide!

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

Quick Start Guide

An Overview of the Leica MZ10 F

1 Eyepieces with dioptric correction
2 Binocular tube
3 Fluorescence housing
4 Filter Changer
5 Magnification (zoom)
6 Leica MZ10 F
7 Objective
8 UV protection screen
9 Transmitted light base
10 Focus column
11 UV Shutter
12 System Illumination EL6000



The Correct Interpupillary Distance

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

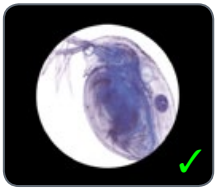
If you are still a novice microscope user, you may need a short time to become accustomed to this. Not to worry—after a little while, it will become automatic.

Reference value

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

Adjusting the interpupillary distance

1. Look into the eyepieces.
2. Hold the eyepieces with both hands. Push the eyepieces together or separate them until you see a circular image.
3. Slowly approach the eyepieces with your eyes until you can see the complete image field without corner cutting.



Using the Eyepieces

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

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

Dioptric Correction

A built-in dioptric correction is available for eyeglass wearers. For more information, refer to Page 56.

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 integ-

rated dioptric correction, turn the value 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.

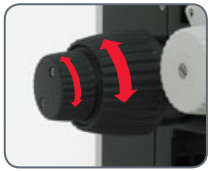
2. If an eyepiece is equipped with the integrated dioptric correction, turn the value to the "0" mark.

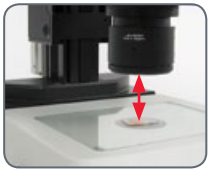
By the way, one benefit of viewing with eyeglasses is a drastically lower risk of bacterial transmission. The soft material of the eyecup also ensures that your glasses will not be scratched, even if they contact the eyepiece.

Focusing

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

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





Focusing

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

Coarse/fine adjustment

The sharpness is adjusted using the coarse/fine adjustment. 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 focusing drive too loose or too tight? Does the equipment tend to slide downwards? The resistance can be adjusted individually depending on the equipment weight and personal preferences as follows:

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

Changing Magnification (Zoom)

All M series microscopes have an integrated zoom. The name indicates the zoom range covered. The MZ10 F covers a zoom range of 10:1.

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

Zooming

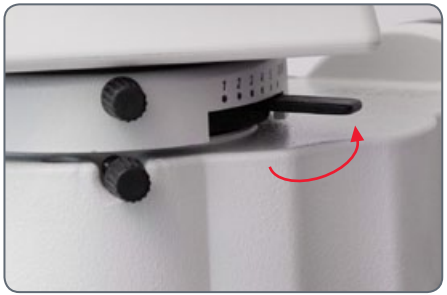
1. Look into the eyepieces.
2. Focus on the specimen.
3. Rotate the magnification changer until the desired magnification is configured.

Double Iris Aperture

The built-in 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.

Iris closed



Iris open

Ratchet Steps and Magnification Levels

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

Enabling and disabling ratchet steps

1. Push the front button backwards to disable the ratchet steps.

2. Push the rear button forwards to enable the ratchet steps.

Magnifications and fields of view

The formula on Page 106 provides additional information about the magnifications and field of view diameters, with consideration given to the position of the magnification changer and the eyepiece and objective combination used.

Parfocality: More Comfort and Convenience for Your Work

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

Requirements for parfocal work

- If you are using an eyepiece with dioptric correction, the procedure differs from this description. For more information, refer to Page 57.

Parfocality

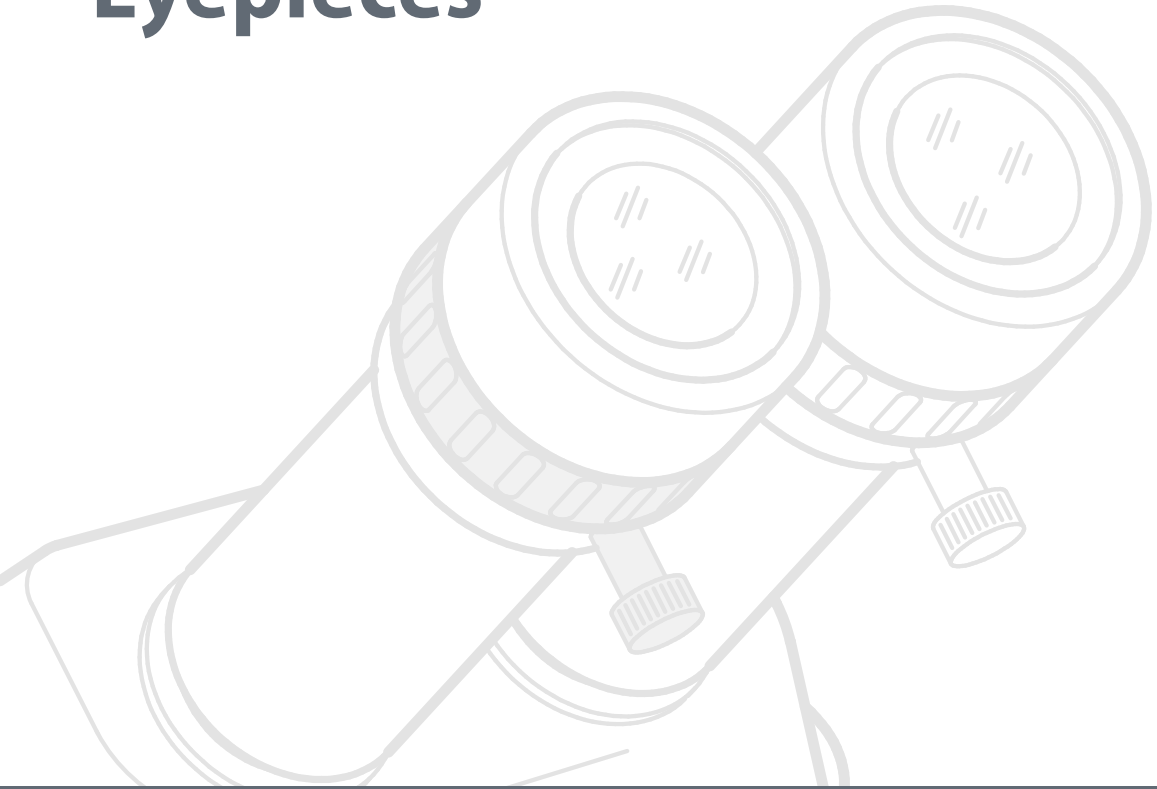
1. Enlarge the view to the maximum level.

2. Focus on the specimen.

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

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

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 10x and 40x.

The following eyepieces are available for the M series:

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

Health Notes

Potential sources of infection

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

Separate eyecups are an effective way of preventing infections.

Dioptric Correction

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

Using the Dioptric Correction

1. Set the dioptric correction of both eyepieces to the mid position ("0" diopter settings).

2. While wearing your glasses, look through the eyepieces and focus on the specimen.

3. Rotate both eyepieces to the maximum value of "+5".

4. Hold one eye closed and rotate the other eyepiece in the "-" direction until the specimen appears sharp.

5. Then, open the other eye and correct the diopter settings until the image is uniformly sharp.

Note that when using dioptric correction, the advantage of parfocality is lost - thus you have to manually refocus each time you change the zoom level. To also use parfocality with dioptric correction, refer to the instructions on Page 57.

Dioptric Correction and Parfocality

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

Preparations

- Move the lever of the video/phototube to the "observation" position and open the diaphragm.
- If you are using the microscope carrier 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 settings).
7. Look into the eyepieces.
8. Slowly rotate each eyepiece individually in the "–" direction until each eye sees the object sharply imaged.
9. Select the highest magnification and refocus if necessary.

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

Graticules

Use

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

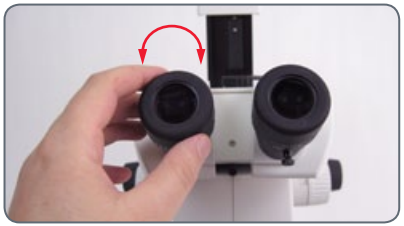
The Leica graticules for length measurements and numbering are fitted in mounts and are inserted into the eyepieces.

1. Screw the insert off of the eyepiece.

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

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

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



Use with the Leica AX carrier

Due to the convergence angle in the stereoscopic image, measurements can provide only approximate values.

Photography & Video

Photography & Video

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

Adapters

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

Leica DFC cameras

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

Leica Application Suite

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

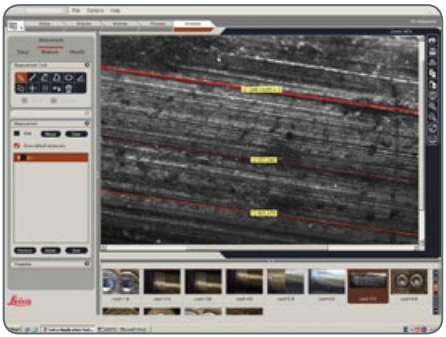


Photo Tubes and C-mounts

Application

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

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

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

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

Camera	optimal (large image field)	suitable (smaller image field)
DFC290	0.5×	0.63×
DFC420	0.5×	0.63×
DFC490	0.63×	0.8×
DFC500	0.63×	0.8×

Cameras from third-party suppliers

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

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

Trinocular Video/Phototube 50%

Use

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

- 50% is available for the two 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 binocular observation tube.

Trinocular Video/Phototube 100%

Use

With its third beam path, the trinocular video/phototube 100% enables you to either view or photograph a specimen. This means that 100% of the light is available to one or the other beam path. The other beam path remains opaque or black.

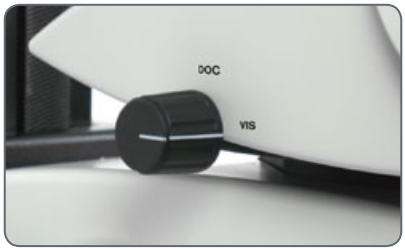
Assembly

Fasten the "trinocular tube 100%" to the optics carrier instead of the binocular observation tube.

Toggle

- Turn the controller on the right side of the tube into the horizontal position in order to guide all available light into the eyepieces. You can now observe the specimen.

- Turn the controller on the right side of the tube into the vertical position in order to guide all available light into the camera. You can now photograph the specimen.



Objectives and Optical Accessories

The Different Types of Objectives

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

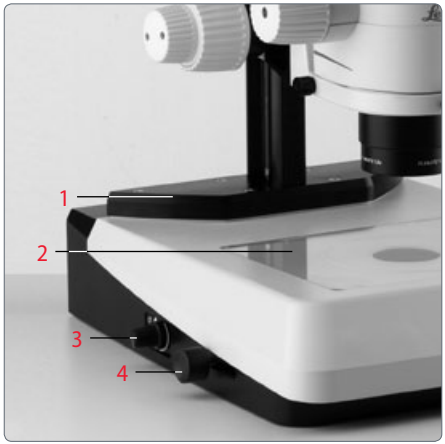
- Achromatic objectives are particularly suited for specimens with high-contrast structures.

- Flat-field (planachromatic) objectives are particularly well suited for studying flat objects such as wafers and thin sections.

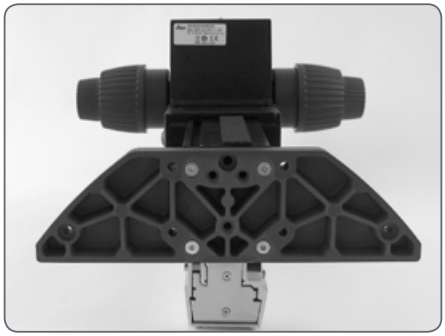
- With planapochromatic objectives, the finest structures are visible with high contrast. The sophisticated apochromatic correction allows these objectives to attain the highest color brilliance and fidelity. We recommend the planapochromatics of the M series (article numbers 10 450 027 to 10 450 030).

Bases

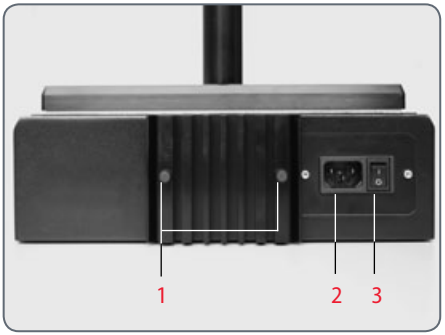
Leica TL ST Transmitted Light Base: Controls



1 Adapter plate for easy assembly of focusing drives
2 Removable glass plate
3 Controller for light intensity
4 Adjustment for path-folding 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

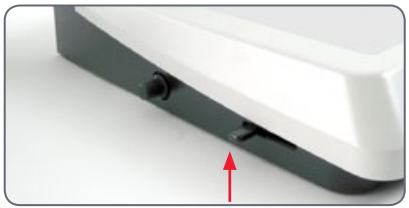
Light intensity control

The left control adjusts the intensity of the 12 V/20 W 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 path-folding 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 opaque 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 will provide additional resolution and information when observing semitransparent, opaque objects.

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

Leica TL ST Transmitted Light Base: Changing lamps

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 lamps

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

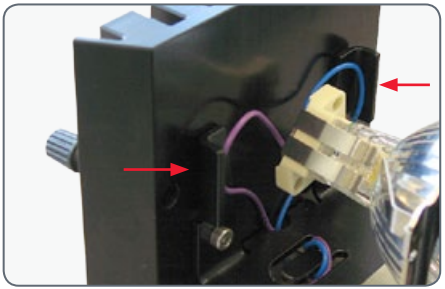
2. Carefully pull out the lamp and mount by pulling them upwards.

3. Disconnect the lamp from the mount.

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

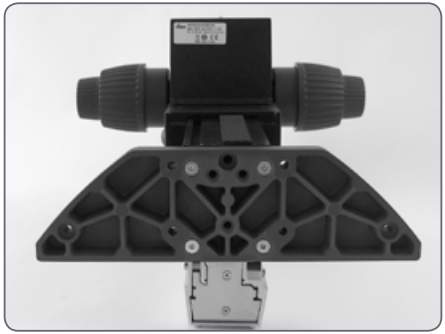
Precautionary measures

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

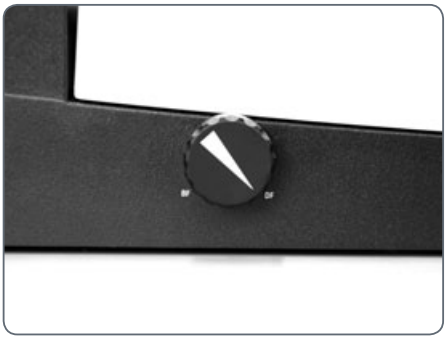


Leica TL BFDF Transmitted Light Base: Controls

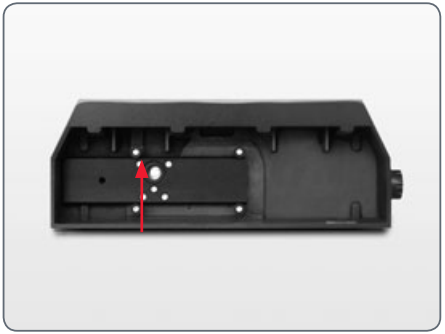
1 Adapter plate for easy assembly of focusing drives
2 Standard stage 10 447 269
3 Button to toggle between bright field and dark field



Extension plate of the Transmitted Light Base TL BFDF



Button to toggle between bright field and dark field



Connector for cold light sources (fiber-optic light guide active f = 10 mm, end tube f = 13 mm)

Leica TL BFDF Transmitted Light Base: Operation

Light intensity control

- Please observe the user manual—in particular, all safety regulations—from the manufacturers of the light guide and cold light source.

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

Transmitted light control

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

Bright field

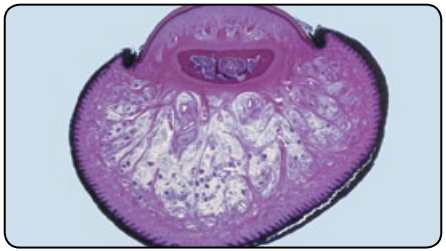
Bright field is suitable for examining translucent objects featuring contrasting structures. The object is directly illuminated from below and is seen in its natural colors against a bright background.

▶ 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 light does not reach the objective without a specimen. Only the structure of semitransparent, opaque objects disperses the light, making the object visible against a dark background.

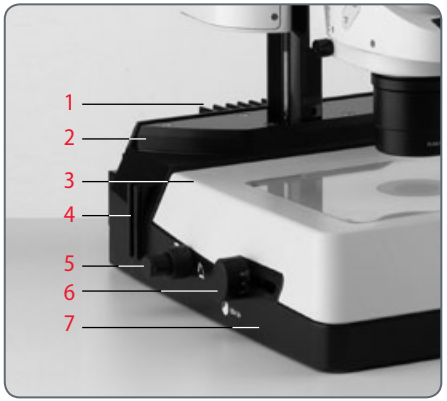
▶ Turn the control as far as it will go towards "DF" ("dark field").



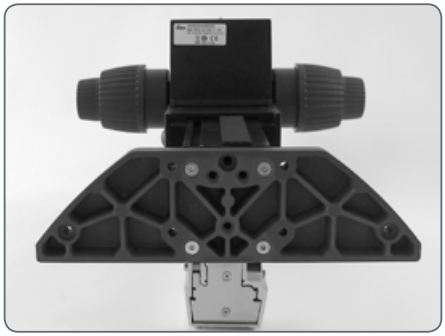
Fingertip with bright field illumination

Identical subject with dark field illumination

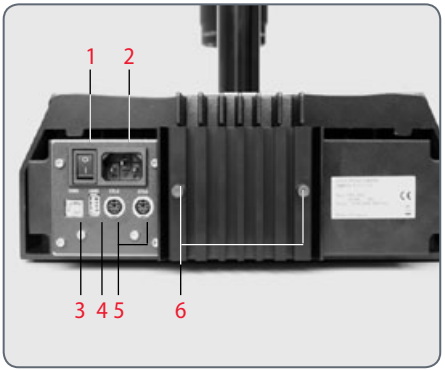
Leica TL RC™ / TL RCI™: Controls



1 Heat sink of the integrated halogen illumination (only TL RCI™)
2 Extension plate for focusing drives
3 Standard stage 10 447 269
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 Path-folding 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 the inverted 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 has been specially designed for the optical requirements of objectives with a high numerical aperture. The black rotary knob on the left side of the transmitted light base can be used to rotate the built-in path-folding 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.

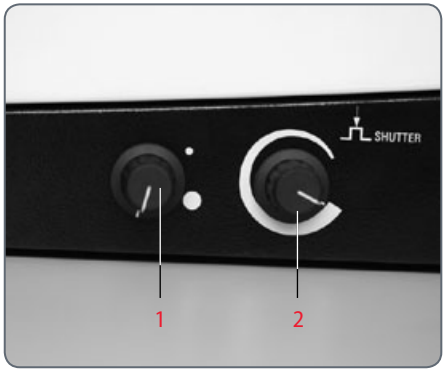
The angle of light incidence in the specimen plane changes depending on the tilt and position of the mirror. As a result, switching between transmitted light bright field, oblique illumination and dark field-like illumination is possible.

Functions of the rotary knob

The rotary knob (1) fulfills the following tasks:

- Turning the path-folding 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 path-folding 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 RCI™ 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 setting.

Using a USB mouse (only TL RCI™)

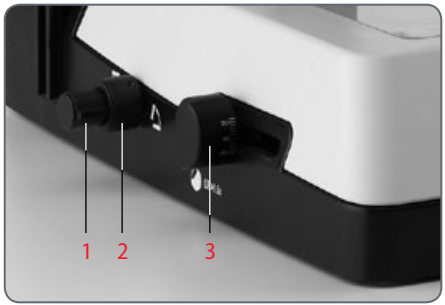
The Leica USB mouse controls the CCIC™ and dimming function of the TL RCI™ base. Connect the mouse to the corresponding USB port of the base.

- 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™ / TL RCI™: Operation

Setting the relief contrast

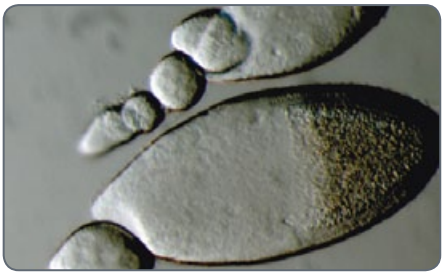
The two switches on the left side of the transmitted light base TL RC™/TL RCI™ activate two built-in flaps. The outer switch (1) controls the inverted relief contrast, and the inner switch (2) adjusts the positive relief contrast.



1 Switch for adjusting the inverted relief contrast
2 Switch for adjusting the positive relief contrast
3 Path-folding 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 like hills, in the inverted relief contrast like valleys.

Increased contrast without relief is attained if both diaphragms are set to 45°. A gap-like illuminated area is created. By tilting the path-folding 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 amplitude specimens with sufficient contrast.

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

Inclined transmitted light

Suitable for semitransparent, opaque specimens such as foraminifera and fish eggs. Move the path-folding mirror until the desired data 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 are 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 path-folding mirror all the way back towards the column.

2. Turn the path-folding mirror into the notch position at an angle of 45°.

Positive relief contrast

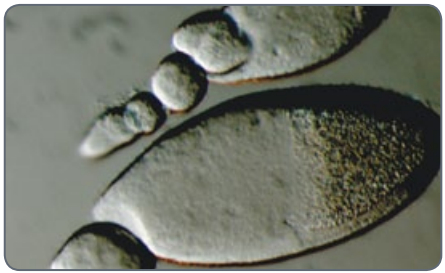
Suitable for semitransparent and transparent specimens. The phase structures look like hills.

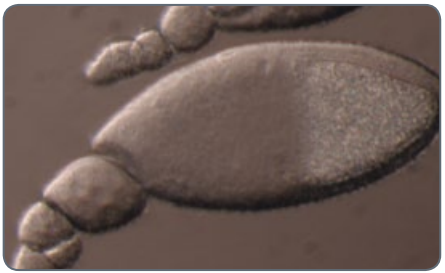
The effect can be strengthened or weakened by gently tilting the path-folding mirror.

Negative relief contrast

Suitable for semitransparent and transparent specimens. These settings result in a negative relief contrast. Phase structures look like valleys.

The effect can be strengthened or weakened by gently tilting the path-folding mirror.





Leica TL RCI™: Relief Images (cont'd.)

Dynamic relief contrast

Suitable for semitransparent and transparent specimens.

By tilting the path-folding 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 phase structures from amplitude 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 half 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 a long focal length.

Using Filters

Filters for Leica TL RC™ and TL RCI™

The transmitted light bases TL RC™ and TL RCI™ 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 (Leica TL RCI™) 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

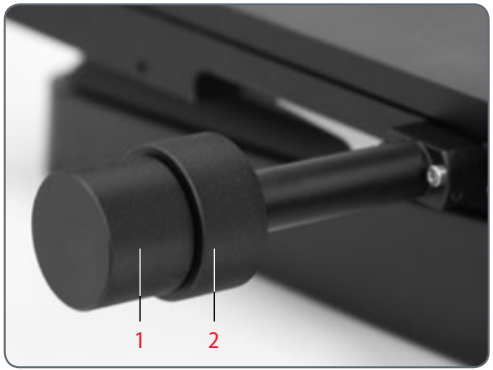
A daylight filter is also available for the Leica TL ST transmitted light base.

Leica IsoPro™ (Non-motorized): Controls

Operating the Leica IsoPro™ Cross-stage

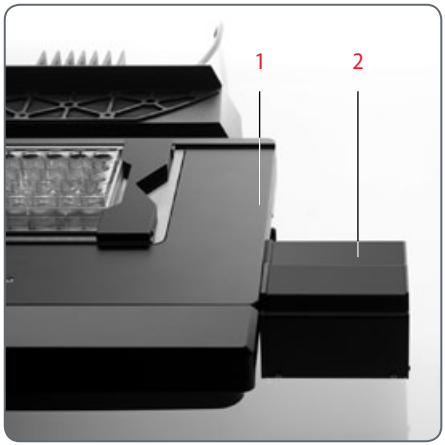
1. To move the stage in the X direction, rotate the outer knob.

2. To move the stage in the Y direction, rotate the inner control ring.



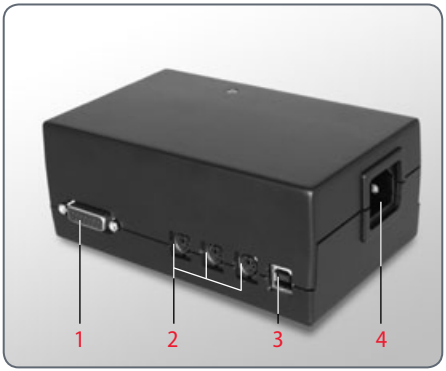
Leica IsoPro™ (Motorized): Controls

IsoPro



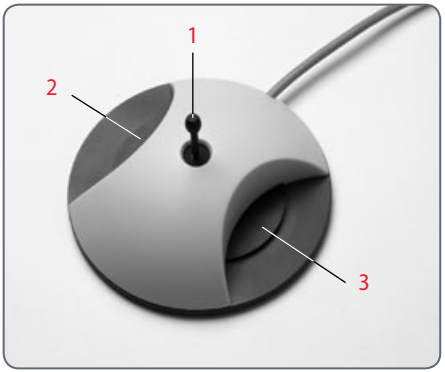
1 Leica IsoPro™ Motorized Cross-stage
2 Housing with motorization

X/Y Stage DCI module



1 Sub-D interface for Leica SmartMove™
2 3 CTL2 interfaces
3 USB interface (type B)
4 Socket for grounded power cable

Leica PSC Controller



1 Quick control/memory function
2 Fine control in X direction
3 Fine control in Y direction

System Illumination Leica EL6000

Leica EL6000 – About the Instrument

The Leica EL6000 compact light source is intended for biological routine and research work, including the examination of specimens from the human body for the purpose of gaining information.

- The Leica EL6000 compact light source is intended exclusively for operating mercury short-arc lamps of type HXP-R120W/45C VIS from OSRAM in conjunction with a suitable light guide for the instrument. Any other use of the instrument shall be considered noncompliant use.

Special features:

The Leica EL6000 compact light source has an automatic beam cover. This ensures that the light beam output of the instrument when the light guide is detached. This prevents the user from being harmed by the intense light beam generated by the instrument.

The Leica EL6000 compact light source has a built-in shutter. It can be operated at the instrument itself by means of a pushbutton or via a remote control input. The shutter is open when the "open" LED is illuminated.

The brightness can be varied in 5 increments (0% – 100%). For this purpose, a mechanical dimming unit that can be operated using a rotary switch on the front of the unit is installed in the device.

Heat-absorbing filter

When the cover is open, the holder for the heat filter can be accessed. Here, (hardened) heat-absorbing filters for protecting the light guide and various conversion filters with a diameter of 32 mm for adapting the spectrum to the application can be inserted.

The Leica EL6000 comes factory-equipped with a heat-absorbing filter.

Leica EL6000 – About the Instrument (continued)

Compatible light guides

The Leica EL6000 compact light source is compatible with liquid light guides that are compatible with a "Storz long" light inlet and whose transmission curve fits the lamp used. Where applicable, refer to the lamp's data sheet for its spectral light distribution.

When connecting the light guide to the light source or the microscope adapter, make sure not to kink or damage the light guide.

Your Leica consultant will be glad to provide additional information about suitable light guides.

Identification of the instrument

The nameplate of the instrument is on its bottom. It includes the necessary information for identifying the instrument.

The Leica EL6000 compact light source complies with Council Directive 98/79/EC concerning *in vitro diagnostics*. It also conforms to the Council Directives 73/23/EEC concerning electrical apparatus and 89/336/EEC concerning electromagnetic compatibility for use in an industrial environment.

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 burning time of the lamp, not the switch-on time of the Leica EL6000 compact light source. The running-time meter displays its current status in this format: hours – minutes.

1. Press the reset button to set the running-time meter of the lamp 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 built-in lamp 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.

- If 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
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 output 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.

- 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 88.

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 input.

3. Replace the instrument fuse.

Permitted replacement fuses	
Fuse: 5×20, 2.5 A, slow-blowing, breaking capacity H	
Wickmann Series 181	www.wickmann.com
Schurter Series SPT 5×20	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.

Leica EL6000 – Replacing the Lamp

The procedure for replacing the lamp does not differ from the installation procedure outlined on Page 38, 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 replace 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 38, beginning with item 6.

Fluorescence

Filter Changer

The patented FLUOIII® 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.

The scope of delivery of the Leica MZ10 F includes four filter holders 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, to the illumination 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 illumination beam path into the available positions. Otherwise, there is a risk of danger to the eyes from direct UV radiation from the third 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 filter sets are labeled.

About Fluorescence Microscopy

Functional principle

Fluorescent substances light up when irradiated 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 stereomicroscopes allow entire fluorescent specimens to be studied, unprepared and in three dimensions. The fully apochromatic optics system and the large zoom range make the Leica M series stereomicroscopes your first choice. The patented TripleBeam® third beam path for fluorescence illumination and the patented FLUOIII® 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 quantity of information for incident light fluorescence.

The filter system

The FLUOIII® 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.

Simple filter holders

Simple filter holders

Three simple filter holders are included with the Leica MZ10 F. These filter holders have two empty openings for the observation beam paths. The third opening, to the illumination 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, it must not block the mercury light for longer than 15 seconds.

Safety Notes

- If you want to block the mercury light for longer than that, activate the UV shutter.
- Use the filter if you want to change to transmitted light or incident light 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 illumination beam path into the available positions. 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 a soft, lint-free cloth and pure alcohol.

Removing the simple filter holder

The Leica MZ10 F is 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 microscope.

2. Rotate the filter changer by hand until it latches 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 arc 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 FLUOIII® 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.

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.

Shutter open

Shutter closed

Commissioning the Fluorescence System

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

- Follow all safety instructions when handling mercury lamps and the lamp housing!

1. Switch on the supply unit (see User Manual M2-216-1).
2. Wait 2–3 minutes.
3. Adjust the arc lamp in accordance with User Manual M2-216-1.

Using the protection screen

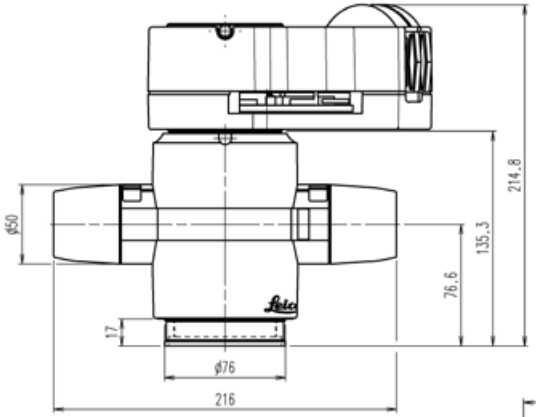
- For observation with fluorescence light, always position the protection screen correctly to protect the observer.

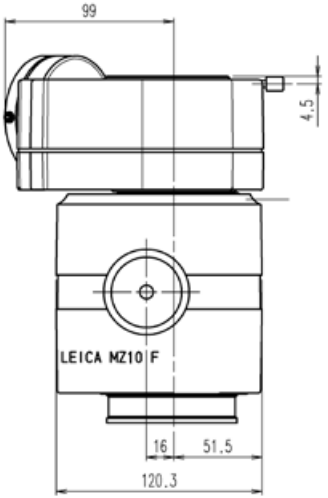
Using the Leica EL6000

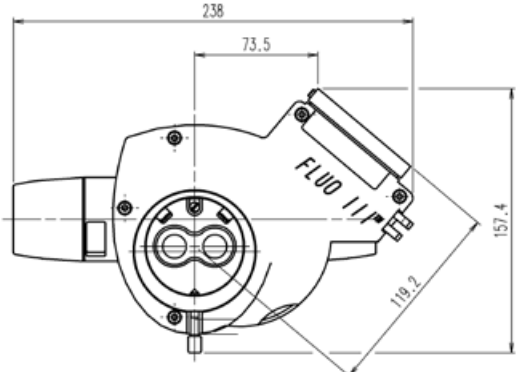
- Be sure to observe the instructions for the Leica EL6000 starting on Page 82.

Dimensional Drawings

MZ10 F - dimensioned drawings in mm







Specifications

Leica MZ10 F – Specifications

Specifications	
Zoom ratio	10:1
Optics carrier magnification	0.8×–8×
Design engineering	CMO (Common Main Objective) optics
Standard magnification	8×–80× (10× eyepiece & 1.0× objective)
Standard objective	Planapochromatic 1.0× (NA = 0.125)
Illumination	TripleBeam™ – Third (separate) illumination beam path with automatic adjustment (via zoom) to the field of view
Filter Changer	FLUOIII™ – 4 positions, manual
Illumination control	Manual excitation shutter
Diameter of the field of view	131–1.31 mm (max./min.)
Maximum resolution	1.33µ (750 lp/mm)
Numerical Aperture	0.25 (max.)
Click stops for	1× / 1.6× / 2× / 2.5× / 3.2× / 4× / 5× / 6.3×

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 40 °C
Permitted relative humidity	10% to 90%, non-condensing
Operational data	
Application area	Enclosed rooms
Altitude for use	max. 2000 m above sea level
Protective class	I
Type of protection	IP20 (EN 60529)
EMC	
Emitted interference	EN 61326 (Class B)
Immunity to interference	EN 61326 Appendix 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	
in accordance with EN 61010-1:2001	
Pollution degree	2
Overvoltage category	II
Power input	
Design	Switched socket IEC320 C13 (EN 60320 C13)
Power supply voltage	100 to 240 VAC (±10%)
Power frequency	50 to 60 Hz
Fuse protection	2x T2.5 A; Breaking capacity H (manufacturer: Wickmann; Series 181)
Power consumption	Max. 210 VA
Lamp	
Type	Mercury short-arc reflector lamp
Designation	OSRAM HXP-R120W/45C VIS
Power consumption	120 W
Service life (manufacturer information)	Average value 2000 h

Leica EL6000 – Specifications (cont'd.)

Light output	
Design	Type: Storz, long
Special feature	Self-locking if no light guide is plugged in
Fan	
Switch-on delay	Approx. 60 s after lighting 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 illuminant change	Yes
Illuminated area	50 mm
Power supply	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 optics for increasing the color temperature	Yes
Matching of high num. aperture	No
Remote control options	No
AntiShock™ Pads	Yes
Dimensions (W×H×D)	340×430×85 mm

Leica TL BFDF Transmitted Light Base

Light source	External via cold light source
Illuminated area	40 mm
Connections	Connection for cold light guide, active f=10 mm, end tube f=13 mm
Weight	5.8 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/lamp control	Yes*
Integrated filter holder	No
Coated optics for increasing the color temperature	No
Matching of high num. aperture	Yes**
Remote control options	Yes***
AntiShock™ Pads	Yes
Dimensions (W×H×D)	340×390×90 mm

*With cold light source Leica CLS150 LS **Concave mirror *** With external light source

Leica TL RC™ / TL RCI™

	Leica TL RC™	Leica TL RCI™
Light source	External via cold light source	Halogen lamp 12 V/20 W
Quick illuminant change	–	Yes
Illuminated area	35 mm	35 mm
Power supply	–	100 – 240 V~, frequency 50 – 60 Hz energy consumption 30 W max., ambient temperature 10–40 °C
Connections	Connection for cold light guide, active f=10 mm, end tube f=13 mm	1×USB type A, 1×USB type B, 2×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 high num. aperture	Yes***	Yes***
Remote control options	Yes****	Yes
AntiShock™ Pads	Yes	Yes
Dimensions of base (W×H×D)	340×390×95 mm	340×440×95 mm

*Single-sided **With cold light source Leica CLS150 LS ***Concave mirror ****With external light source

Appendix

Calculating the Total Magnification and Field of View Diameter

Parameter

MO	Magnification of the objective
ME	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° ErgoTube™
r	Factor 1.25x if the planachromatic and planapochromatic objectives of the MZ125/MZ16 are used on the MS5, MZ6, MZ75 or MZ95
NFOV	Field number of the eyepiece. Field numbers are printed on the eyepieces: 10× = 21, 16× = 14, 25× = 9.5, 40× = 6.

Example

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

Calculation example: Magnification in the binocular tube:

$$MTOT\ VIS = MO \times ME \times z \times q \times r$$

or

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

Calculation example: Field of view diameter in the specimen

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

Care, Maintenance, Contact Persons

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

Warranty benefits

The 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 (Schweiz) AG, CH-9435 Heerbrugg.

E-mail contact:

stereo.service@leica-microsystems.com

Care

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

Care, Maintenance, Contact Persons (continued)

Protection from dirt

Dust and dirt will affect the quality of your results.

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

Cleaning polymer components

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

Permitted measures

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