



LED2000/LED2500 User Manual

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General Instructions

Symbols Used in this User Manual

WARNING! Safety hazard!

Failure to comply with the following warnings can cause the following:

- Personal injury!
- Device malfunctions and damage.



WARNING

Serious injuries caused by...

This warning label warns of general hazards that can cause serious or fatal injuries.



WARNING

Electric shock.

This warning label warns of dangerous electrical voltage. The instructions must be followed without fail, otherwise there is a risk of serious or fatal injury.

NOTICE

This warning label warns of damage to the device and other equipment.

IMPORTANT INFORMATION



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



► Read and understand this user manual before using this device.

UK RESPONSIBLE PERSON

Leica Microsystems (UK) Limited
Larch House, Woodlands Business Park, Milton
Keynes, England, United Kingdom, MK14 6FG



FCC Information

This product is considered an exempted device according to FCC Title 47 §15.103(c). In case of questions, please contact the Leica United States sales representative.

General Instructions

Safety concept

Before using your Leica stand for the first time, please read the "Safety Concept" booklet included with your instrument. It contains additional information on handling and care.



Use in clean rooms

The LED2000/LED2500 stand can be used in cleanrooms. The user has to evaluate the final suitability within the required cleanroom class. There is no special certification for specific cleanroom categories or applications.

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.

Repairs, service work

- ▶ Refer to "Safety Concept" booklet.
- ▶ Use only original Leica Microsystems spare parts.
- ▶ Repairs only by Leica Microsystems-trained service technicians.

Responsibilities of person in charge of instrument

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

Safety Instructions

Instructions for use

The LED2000/LED2500 can be configured in a variety of ways in the Leica product range.

User manuals are available for you to download and print from our website at www.leica-microsystems.com. This User Manual describes the special functions of the LED2000/LED2500 stand and contains important instructions for its operational safety, maintenance, and accessories.

The “Safety Concept” booklet contains additional safety information regarding the service work, requirements and the handling of the stands, 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 instructions from the supplier.



► Before installing, operating or using the instruments, read this User Manual. In particular, please follow all safety instructions.

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

Safety Instructions (Continued)

Description

The LED2000/LED2500 stands are designed for use in routine stereomicroscopes (M50, M60, M80), Ivesta 3 and Emspira 3.

User Manual

This User Manual includes important instructions related to operating safety, maintenance and accessories.

Your LED2000/LED2500 User Manual is available on our website at www.leica-microsystems.com with all relevant user information. Download and keep it in a safe place, and readily accessible to the user.

Intended use

- ▶ Refer to "Safety Concept" booklet.

Microscopes and macrosopes from Leica Microsystems are optical instruments and are used to make objects or specimens more easily visible using magnification. Optical accessories,

stands, illumination units and cameras are among the accessories available for these instruments.

The LED2000/LED2500 is such a stand.

Non-intended use

- ▶ Refer to "Safety Concept" booklet.
- ▶ Never use the LED2000/LED2500 stand and its components for IvD/IvF and/or medical applications, since they are not intended for these.



The devices 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.
- ▶ You can combine individual system articles with articles from external suppliers. Please read the user manual and the safety requirements of the supplier.
- ▶ Place electrical components at least 10 cm away from the wall and from flammable substances.
- ▶ Avoid large temperature fluctuations, direct sunlight and vibrations. These conditions can distort the functionality of the stand.
- ▶ In warm and damp climates, give the individual components special care in order to prevent the build-up of fungus.

Safety Instructions (Continued)

Responsibilities of person in charge of instrument

- ▶ Refer to "Safety Concept" booklet
 - ▶ Ensure that the LED2000/LED2500 is used only by qualified personnel.
 - ▶ Ensure that this User Manual is always available at the LED2000/LED2500.
 - ▶ Carry out regular inspections to make certain that the authorized users are adhering to safety requirements.
 - ▶ When instructing new users, do so thoroughly and explain the meanings of the warning signs and messages.
 - ▶ Assign individual responsibilities for starting, operating and servicing the instrument and monitor the observance of these responsibilities.
 - ▶ Do not use the LED2000/LED2500 unless it is in perfect condition.
- ▶ Inform your Leica representative or Leica Microsystems (Schweiz) AG, 9435 Heerbrugg, Switzerland, immediately of any product defect that could potentially cause injury or harm.
 - ▶ If you use accessories made by third-party manufacturers with the LED2000/LED2500, be sure that each such manufacturer confirms the safety-engineering, harmless usability of the product and observe the product's User Manual.
 - ▶ Modifications and maintenance of the LED2000/LED2500 may only be performed by professionals expressly authorized by Leica.
 - ▶ Only original Leica replacement parts may be used in servicing the product.
 - ▶ After service work or technical modifications, the unit must be reconfigured with observance to our technical requirements.

Safety Instructions (Continued)

- ▶ If the unit is modified or serviced by unauthorized persons, is improperly maintained (as long as maintenance was not carried out by us), or is handled improperly, Leica will not accept any liability.
- ▶ The electric installation in the building must conform to the national standard, e.g. current-operated ground leakage protection (fault-current protection) is suggested.
- ▶ All operators have read, understood and observe this User Manual, and particularly the safety regulations.
- ▶ Always position the microscope so that you can disconnect it from the power supply at any time. The power cable is provided as the power disconnect device.
- ▶ By definition, the main circuit breaker of this instrument is the connection between the power cable and device port. The user must ensure unobstructed access to the main circuit breaker at all times.

Handling electrical components

- ▶ Never install any other plug (NEMA 5-15P) or unscrew any mechanical components unless expressly instructed to do so in the instructions.
- ▶ Connect the microscope to a grounded outlet.

Maintenance

The LED2000/LED2500 is basically maintenance-free. To ensure that it always operates safely and reliably, we recommend that you take the precaution of contacting the responsible service organization.



You can arrange for periodic inspections or, if appropriate, conclude a maintenance contract with them.

- ▶ It is advisable to enter a service agreement with Leica Service.

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.
- ▶ Avoid contact with powered electrical circuits, which can lead to injury.

Safety Instructions (Continued)

Transport

- ▶ Use the original packaging for shipping or transporting the individual modules of the LED2000/LED2500 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.
- ▶ You can combine individual system articles with articles from external suppliers. Please read the User Manual and the safety requirements of the supplier.

Disposal

- ▶ Once the product has reached the end of its service life, please contact Leica Service or Sales about disposal.

Like all electronic devices its components and accessories may not be disposed of as general household waste.



Please observe the national laws and ordinances which, for example, implement and ensure compliance with EU directive WEEE 2012/19/EU.

Legal regulations

- ▶ Adhere to general and local regulations relating to accident prevention and environmental protection.

EC Declaration of Conformity

- ▶ Refer to "Safety Concept" booklet.
- ▶ Electrically operated accessories are constructed based on the state of the art of technology and are provided with an EC Declaration of Conformity.

Safety Instructions (Continued)

Health risks



Workplaces with microscopes and cameras facilitate and improve the viewing task, but they also impose high demands on the eyes and muscles of the user.

Depending on the duration of uninterrupted work, asthenopia and musculoskeletal problems may occur. For this reason, appropriate measures for reduction of the workload must be taken:

- Optimal arrangement of workplace, work assignments and work flow (changing tasks frequently).
- Thorough training of the personnel, giving consideration to ergonomic and organizational aspects.

The ergonomic design of the LED2000/LED2500 aims to limit the strain on the user to the lowest possible Level.



WARNING

Eye infection.

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

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

Dangers during use

- ▶ The LED2000/LED2500 may only be connected to a grounded socket.
- ▶ The LED2000/LED2500 microscope may not be operated unless it is in proper functioning condition.

The stand illumination is in the exempt group (risk group 0) according to EN 62471 when used according to its intended use.



WARNING

Eye injury.

Looking directly into the LED beam of the illumination equipment – either with or without optical instruments – poses a risk of eye injury.

- ▶ Never look directly into the LED beam of the illumination equipment – either with or without optical instruments – as this increases the risk class. Failure to observe this notice poses a risk of eye injury.

Safety Instructions (Continued)

Technical safety

To connect the LED2000/LED2500 to power, use a power cable that meets the power cable specifications in your country. The power socket used has to be equipped with a 16 A or 10 A fuse. Only connect the instrument to a grounded power socket that has been installed according to regulations. The power supply voltage has to correspond to the voltage specified on the identification label. Make sure that the ground connection is neither defective nor interrupted, since otherwise a malfunction poses a risk of fatal injury. Never unplug the power plug with moist or wet hands. There is danger of an electric shock.

Instrument safety and EMC

Our device has been designed, produced and tested in compliance with:

- IEC EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements (for microscope)
- Radio interference suppression in compliance with EN 55011 Class B
- EN 61326-1: Electrical equipment for measurement, control and laboratory use – EMC requirements

The device meets the requirements of EU directives:

- 2014/35/EU Low voltage directive
- 2014/30/EU EMC directive
- 2011/65/EU RoHS directive
- 2014/53/EU Radio equipment directive (only EZ4W)
- 2009/125/EC + VO EU 2019/1782
Ecodesign requirements for energy-related products only applicable for external power supply

and carries the CE mark.



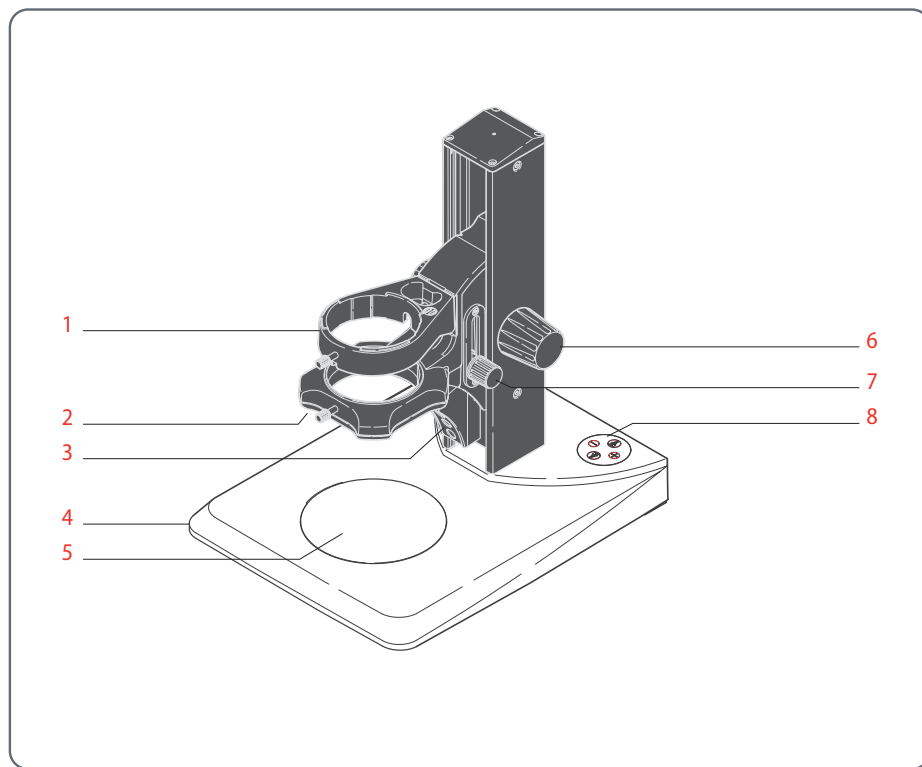
The device must be disposed of in accordance with EU directive WEEE 2012/19/EU.

Intended for indoor use only in all EU member states, EFTA states and Switzerland.

Introduction

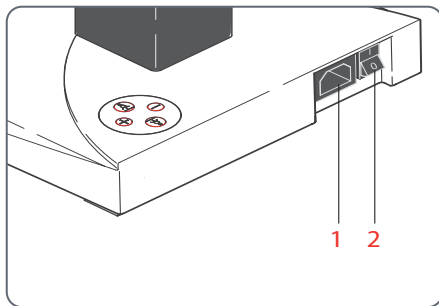
Control Elements

1. *Adapter for holding the optics carrier*
2. *Integrated ring illuminator with 4 power LEDs*
3. *Movable arc illuminator with 3 power LEDs*
4. *Base*
5. *Stage plate black/white; 120 mm Ø (LED2000) or glass insert plate 120 mm Ø (LED2500)*
6. *Focusing drive*
7. *Locking screw for the arc illuminator*
8. *Membrane keyboard for selecting the illumination option and brightness adjustment*



Control Elements (Continued)

Rear side of the LED2000/LED2500



1. *Power socket*
2. *Power switch*

Installation

Installation of LED2000/LED2500

Unpacking the base

The stand is supplied completely assembled.

NOTICE

- Unpack the instruments on a sufficiently large, level, non-slip surface.

Connecting to AC power



WARNING

Electric shock.

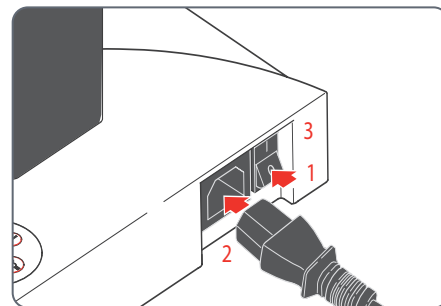
- Never install any other plug (NEMA 5-15P) or unscrew any mechanical components unless expressly instructed to do so in the instructions.



WARNING

Electric shock.

- Connect the microscope to a grounded outlet.



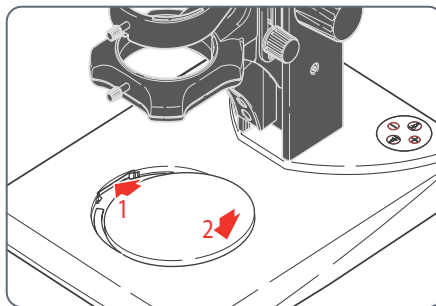
1. Ensure that the power switch on the base is set to "0".
2. Insert the power cable into its socket and connect it to a grounded power outlet.
3. Switch the Leica LED2000/LED2500 on using the main switch on the rear side of the base.

Installation of LED2000/LED2500 (Continued)

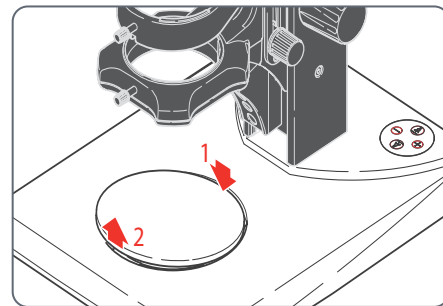
Inserting the stage plate or glass insert plate



The LED2000 is supplied with a stage plate (black/white, 120 mm Ø). It may be used with the black or white side facing up, depending on the required contrast. For the LED2500, please use the provided glass insert plate.



- Insert the stage plate by gently pressing against the tension spring.

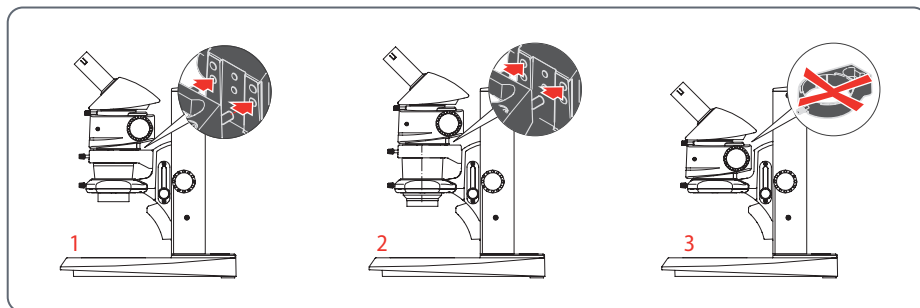
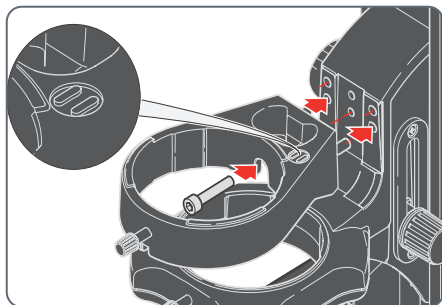


- Remove the stage plate by gently pressing on the rear part.

Assembly

Assembling the Optics Carrier

Adapter position on the LED2000/LED2500



Installing an optics carrier on the LED2000/LED2500 stand requires that an adapter be installed at a different height, depending on the specific optics carrier. The marking  has to be on the top of the carrier if the carrier is required.

Depending on the configured microscope and the used objectives the adapter is positioned differently. There exist 3 possibilities:

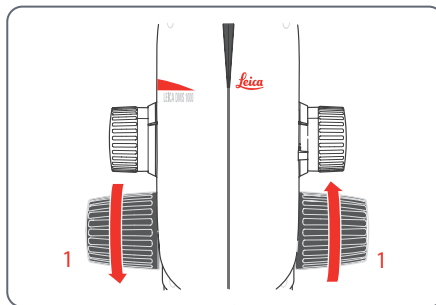
1. Mounting in **lower position**
2. Mounting in **upper position**
3. Mounting **without adapter**

Regulating the Resistance of the Focusing Drive



The focusing drive is used to set the sharpness by regulating the working distance between the microscope and the product. You can find an overview of the various objectives and their working distances in the Technical Data for the applicable microscopes.

Is the focus movement too loose or too tight? Does the outfit tend to slide downwards? No problem – the resistance can be adjusted to suit the weight of your equipment and personal preferences:



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

Safety when focusing



WARNING

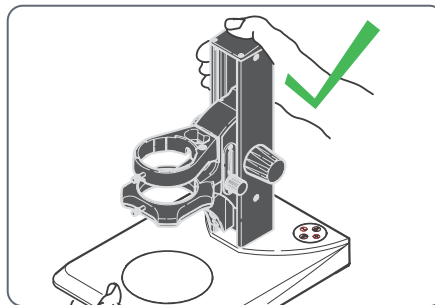
Crushing the fingers.

- When using the focusing drive, do not insert fingers between the optics carrier and stand.

Transporting the LED2000/LED2500

Mobility was a primary consideration for us in developing the LED2000/LED2500.

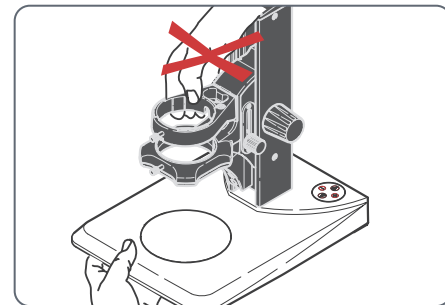
Proper transport



To transport the stand safely:

1. Remove all cables and ensure that the microscope and all accessories are attached firmly.
2. Use both hands to lift the stand (see figure).

Incorrect transport



NOTICE

- ▶ Do not lift the stand by the cover of the column.
- ▶ Do not lift the stand by the microscope.

Operation

Controlling the Illumination

Via the power LEDs



The LED2000 and LED2500 stands feature power LEDs. The high-performance LEDs provide uniform illumination at a daylight-like light temperature. At the same time, they use considerably less power and generate considerably less warmth than conventional illumination systems.

The LED2000 uses power LEDs in the ring and arc illuminators. They also provide transmitted illumination in the base of the LED2500.

Switching the illumination on and selecting the illumination type

1. Turn on the power switch on the rear of the LED2000/LED2500.
2. Press the button  to switch on the illumination.
3. Continue pressing the  button to cycle through the various illumination combinations.
4. Press the  and  buttons to adjust the illumination intensity in 10 steps. To switch the illumination off completely, press the  button or use the power switch.

The LED2000/LED2500 remembers the last illumination combination, restoring it the next time you switch the instrument on.

The microscope illumination is in the exempt group (risk group 0) according to EN 62471 when used according to its intended use.



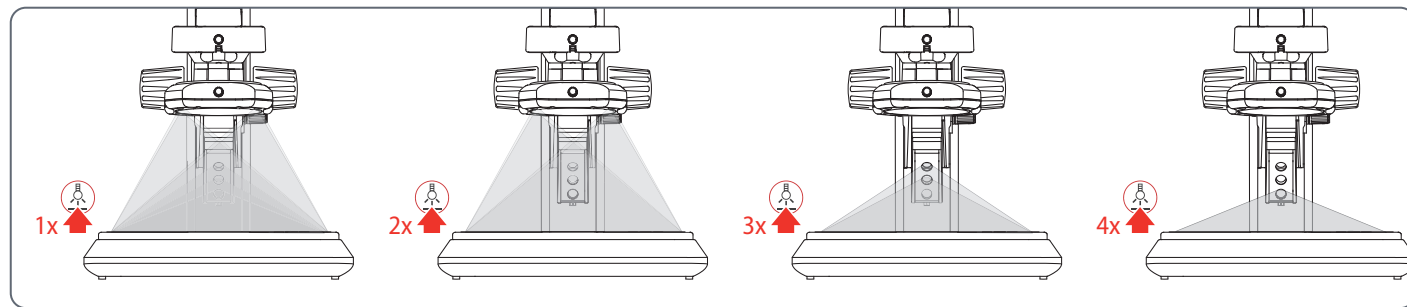
WARNING

Eye injury.

- ▶ Never look directly into the LED beam of the illumination equipment – either with or without optical instruments – as this increases the risk class.

Illumination Levels and Brightness

The illumination combinations



Each time the  button is pressed, the illumination combination changes in this sequence:

- 1x  everything ON (ring illuminator & arc illuminator)
- 2x  ring illuminator only ON
- 3x  the upper two power LEDs of the arc illuminator ON
- 4x  the lowest power LED of the arc illuminator ON
- 5x  everything OFF

Illumination Levels and Brightness (Continued)

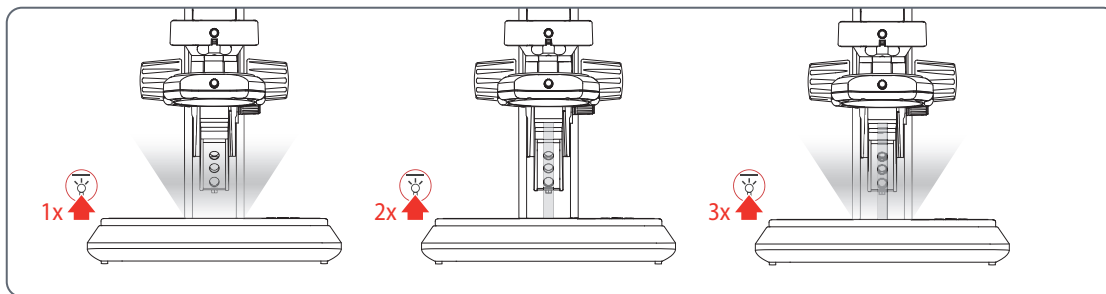
Special features of the LED2500

The brightness of the transmitted light unit cannot be adjusted separately – it is set together with the arc illumination and the ring light. There are three scenarios for transmitted light from the LED2500:

1. A diffuse variant of the transmitted light illumination for generating a large area of uniform transmitted light. This enables effective illumination of large samples that already have a high contrast.
2. Centrally directed transmitted light illumination, which generates a defined contrast. The illumination function is particularly recommended if the sample has low intrinsic contrast. The contrast and brightness in the outer area of the illumination decrease along with this.
3. All LEDs are switched on. This generates the maximum brightness of the transmitted light illumination.

Illumination Levels and Brightness (Continued)

The illumination combinations of the transmitted light unit (LED2500)



The LED2500 is equipped with a transmitted-light unit that can be turned on and off with the  button.

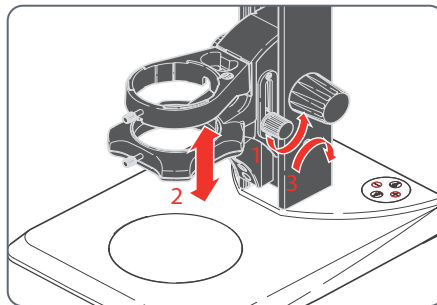
- 1x  diffuse transmitted light ON (for a large, high-contrast samples requiring uniform illumination)
- 2x  directed, central transmitted light illumination ON (suitable for low-contrast samples; the contrast and brightness decrease in the outer area)
- 3x  combination of diffuse and directed transmitted light illumination (maximum brightness of the transmitted light)
- 4x  transmitted light OFF

The Correct Height for the Arc Illuminator



Depending on the situation, it is advisable to adjust the height of the arc illumination. To do so, first focus the sample and then optimize the height of the arc illumination until the corresponding result is attained.

Adjusting the arc illuminator



The height of the arc illuminator can be adjusted independently of the focus to ensure the best possible illumination for your requirements.

1. Loosen the screw of the arc illuminator so that the illuminator is free to move.
2. Move the arc illumination up and check the result through the eyepiece of the microscope.
3. Retighten the screw.

Illumination Types and Results

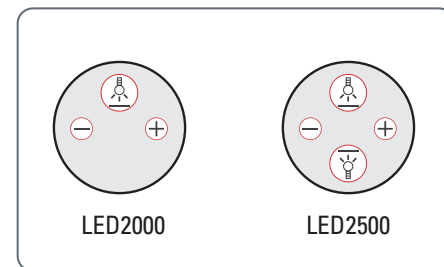
Take advantage of the options!

The combination of ring light, arc illumination and transmitted light illumination (only LED2500) provides you with a broad range of different illuminations. Take advantage of this flexibility to provide the best possible illumination for your specimens. You will be surprised at how you can improve your results.

We would like to use a few examples to inspire you to find the best kind of illumination for your specific requirements through testing. Depending on the application and specimen, each of the four illumination types provides new information. As there is no such thing as an „ideal illumination setting“, we recommend cycling through the sequences until you find the setting best suited to your specimen.

Feel free to experiment – it's worth it!

Use the buttons of the LED2000 and LED2500 to change the illumination scenarios and to adjust the brightness.



Illumination Types and Results (Continued)

All power LEDs are on



This setting achieves the greatest brightness, while the effects of highlights and shadows are reduced by the dominant ring illuminator. This setting is ideal for observing dark, flat, non-reflective specimens.

Ring illuminator on



This illumination type results in very bright, homogeneous lighting virtually without shadows. The ring illuminator is often used when observing specimens with strongly fissured or porous surfaces.

Illumination Types and Results (Continued)

Only the upper two power LEDs of the arc illuminator are on



The resulting side light results in images with pronounced light/shadow effects not unlike those of a swan-neck light guide. Scratches and other recesses become easier to identify.

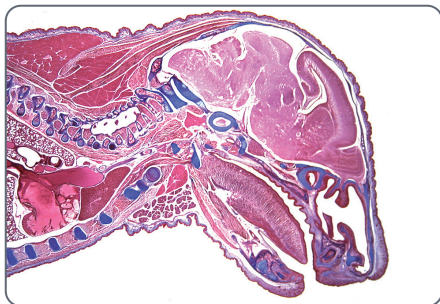
Only the lowest power LED of the arc illuminator is on



This illumination results in a pseudo-darkfield effect. The image becomes darker and exhibits extreme contrasts. The 3D effect of flat specimens is enhanced. Dirt and dust particles become very easy to identify.

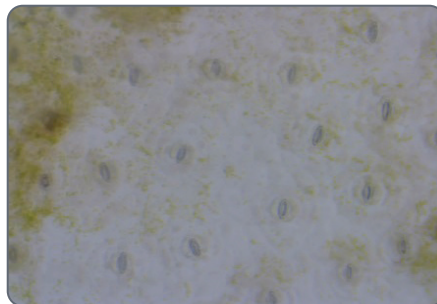
Illumination Types and Results (Continued)

The diffuse transmitted light illumination is switched on



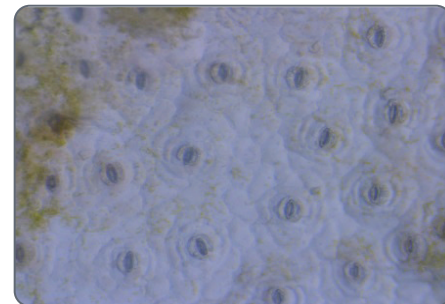
The transmitted light of the LED2500 can be used to examine transparent samples. The uniform transmitted light is ideally suited for colored, high-contrast samples. With a large diameter of 60 mm, it is also suitable for over-view observations at low magnifications. The results can be optimized using different brightness levels.

Only the central LED of the transmitted light illumination is switched on



diffuse transmitted light

Semi-transparent samples are optimally contrasted with the optimized transmitted light. The centrally positioned LED, which emits directed light onto the sample, enables clear visualization even of structures that have very low contrast. Can be used ideally for high magnification levels.



only directed transmitted light

The images clarify how the directed transmitted light improves the contrast of the sample. As a result, the structures and differences within the sample are brought out significantly better.

Service

Care, Contact Persons

Care

- ▶ Keeping all optical components clean is important for maintaining good optical performance.
- ▶ If any optical surface becomes badly coated with dust or dirt, flush the surface using a syringe or by brushing it off with a camel hair brush before attempting to wipe it clean.
- ▶ Optical surfaces should be cleaned using a lint-free cloth, lens cloth or cotton swab soaked in ethanol or a commercially available glass cleaner. Do not use alcohol.
- ▶ Avoid excessive use of solvents. The lint-free cloth, lens cloth or cotton swab should be soaked with solvent, but not so wet that solvent runs over the lens.
- ▶ Protect your stand 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 stand from oil and grease.
- ▶ Do not grease guide surfaces or mechanical parts.

Protection from dirt

Dust and dirt will affect the quality of your results.

- ▶ Put an optionally available dust cover over the stand when it will not be used for a long time.
- ▶ Keep accessories in a dust-free place when not in use.

Care, Contact Persons (Continued)

General information

The LED2000/LED2500 can be cleaned easily with a soap solution and water.

- ▶ Do not use caustic or abrasive cleansers.

Special notes on the LED2000

The base of the LED2000 features openings through which spilled liquids can drain.

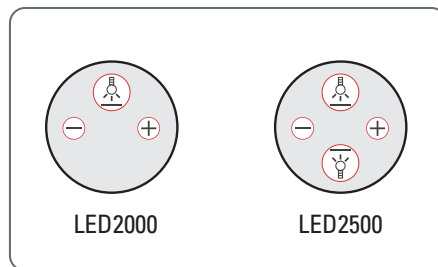
- ▶ Simply remove the stage plate and clean the base with a soap solution.
- ▶ Wipe it dry with a clean cloth.

Special notes on the LED2500

The transmitted illumination unit of the LED2500 is sealed and thus waterproof.

- ▶ Remove the glass plate and clean the base with soap solution. Wipe it dry with a clean cloth.

The buttons



The buttons of the illumination are waterproof.

- ▶ Clean the membrane switches with soap solution.
- ▶ Wipe then dry with a clean cloth.
- ▶ Do not use abrasive cleansers!

Servicing

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



WARNING

Electric shock.

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



WARNING

Electric shock.

Removing the cover of the LED2000/LED2500 exposes electrically live parts, which, if touched, can cause potentially fatal injuries.

- ▶ Have technical service carried out by a Leica Microsystems authorized dealer.

Specifications

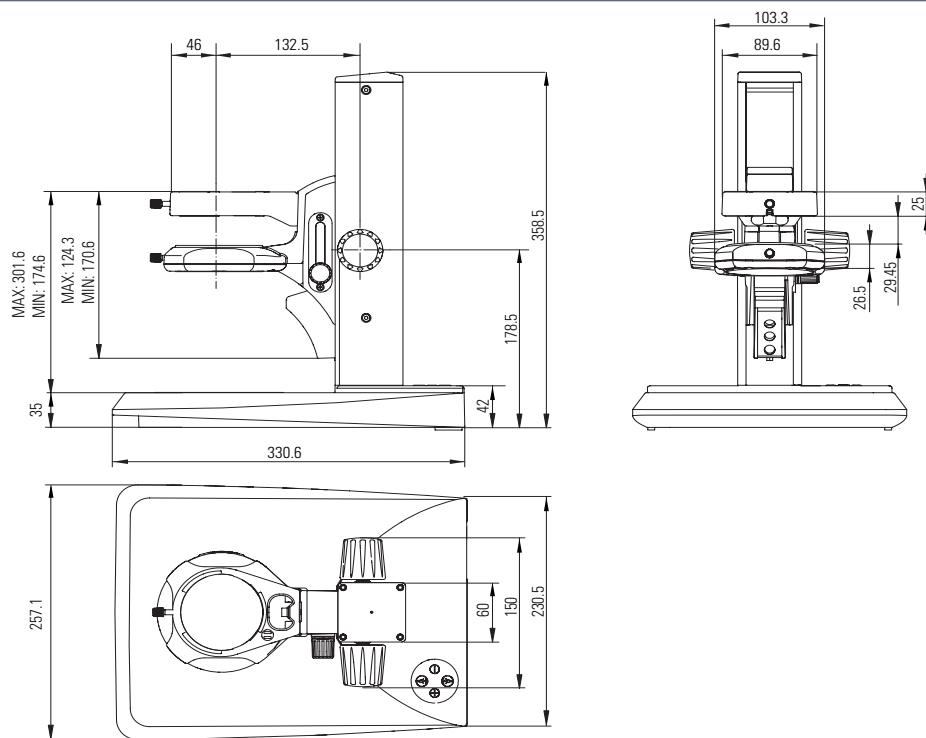
Technical Data

	LED2000/LED2500
Light sources	Power LEDs, 1.2 Watt (4 LEDs for the ring illuminator, 3 for the arc illuminator)
Illumination	Incident light (4-point ring illumination) Oblique light (3-point arc illumination) 4 switchable scenarios
	Transmitted light (5 LEDs with central LED for high contrast) 3 switchable scenarios
Average LED life	approx. 25 000 hours
Color temperature	5 600 K (Incident light) 5 500 K (Transmitted light LED2500 only)
Cooling	Thermo-management for the LEDs, silent and vibration-free
Illumination control	Incident light and transmitted light can be controlled separately
Intensity setting	10 steps
Integrated power supply	100 V – 240 V ~ 50 / 60 Hz Automatic adjustment to local voltage
Power consumption	max. 30 W

Technical Data (Continued)

	LED2000/LED2500
Place of use	Indoor use
Operating temperature	10° to 40° (50° F to 104° F)
Storage / Transport temperature	-10° to 50° (14° F to 122° F)
Relative humidity	10% to 90% (non-condensing)
Pollution degree	2
Weight	4.2 kg
Altitude operation	0 m to 2 000 m (0 ft to 6 561 ft)
Standards compliance	CE, NRTL

Dimensional Drawings LED2000/LED2500



Dimensions in mm



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