



# Teaching and learning made easy

**Leica stereomicroscopes – to make learning an experience**

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*Leica*

MICROSYSTEMS

# Hands-on experience beats memorizing formulas

*“Sense impressions are a deeper soil for growing memories  
than the best systems and analytical methods.”  
Hermann Hesse*

Learning starts with perception. Sensory impressions leave their marks and become the building blocks of knowledge. Increasing young persons’ involvement in their classroom work and offering them more opportunities to gather experiences independently facilitates their learning process. Leica stereomicroscopes are an ideal tool for expanding the repertoire of teaching staff and are outstandingly suited to supplementing and reinforcing conventional classroom instruction. Observing magnified views of whole objects such as plants, microorganisms and minerals opens whole new perspectives that would not otherwise be available to the unaided eye.

## **Fit for the future.**

Independent experimentation, exploration and comparisons are fun and enrich students’ learning experience. Successes motivate them and promote their will to excel. Students not only stand to improve their motor skills, they can also learn to view, observe, describe, classify, compare, identify, investigate, experiment, draw, record their findings and explore habitats. They can learn to approach their tasks methodically and develop sound work habits. Character traits such as precision, reliability, patience and teamwork also benefit. As their instructor, you can accompany their classroom activities and enjoy their excitement, dedication, willingness to learn and surprising results.

## **Leica stereomicroscopes at University Level**

Practical courses and laboratory training are important aspects of study that reinforce the theoretical material provided in lectures. The biology practical training provides students with the practical tools that are necessary to enable them to work on scientific problems independently. The new Leica stereomicroscopes are economically priced laboratory instruments ideal for training students in the observance of biological phenomena, structures and processes. They call for intensive cooperation from students as they practise preparation techniques and carry out experiments as central elements of scientific methodology.



Excursions are an exciting alternative to conventional classroom work.



Nature offers a broad, varied field for experience and learning.

STEP ZOOM DIGITAL



Leica ES2 stereomicroscope with two magnifications



Leica EZ4 stereomicroscope with 4.4:1 zoom



Leica Design by  
Christophe Apothéoz

Leica EZ4 D stereomicroscope  
with integrated digital camera

# And here's how

*“I didn't want to teach, I wanted to learn. I wanted to become a teacher in order to remain a student as long as possible. I wanted to continue absorbing new things – under no circumstances did I want to pass on old things over and over again.”*  
Erich Kästner

School must be fun if young people are to learn. The new Leica stereomicroscopes offer a broad, varied field for experience and learning and are easy to integrate into classroom instruction. Special microscopy or specimen preparation skills are not required in order to observe whole objects found in nature such as plants and insects, or items from around the house such as coins, stamps, pieces of cloth or an old clockwork. The students will soon be able to use the stereomicroscope independently after a brief introduction and a few practical exercises.

### **Students do not need specialized microscopy skills.**

The new Leica educational stereomicroscopes are compact, rugged and designed to be handled by students, without individual parts requiring assembly or that can be removed easily. Simply place it on a solid tabletop, plug in the power cable, and the instrument is ready to use. The stereomicroscope's use is uncomplicated and self-explanatory. After all, we want you and your students to experience the wonders of the microscopic world without long preparatory work.

### **Expensive specimens are not required.**

Stereomicroscopes have the advantage that you do not need to make or purchase microtomed or ground sections or smears in order to experience the variety of nature. Interesting objects are available virtually anywhere – bark, moss, lichen, feathers, grasses, flowers, leaves, seeds, grains or shells. What could therefore be more natural than taking field trips to breathe life into topics covered in the classroom? Forests, meadows, ponds and lakes contain a wealth of suitable objects that students can collect and observe.



Nature is full of interesting objects.



Beetles, worms and larvae can be found in soil samples or decaying leaves.



### What can students explore?

Depending on the curriculum and their personal interests, the students can investigate indigenous plants and insects, record their observations and identify species on the basis of the observed characteristics. With a Leica stereomicroscope, the typical shapes of insect mandibles, hairs and antennae can be distinguished with the same ease as the calyx lobes, petals and stamen of flowers. Things really get exciting when students discover lively microorganisms such as mayfly larvae or daphnia in water samples collected outdoors.

### Leica ETB for instruction

The Leica Education Toolbox contains a cleaning set, a training poster and the "Basic" instruction CD ROM. The purpose of the CD is to help teachers and instructors impart basic information on optical devices and their usage to their students in a simple and comprehensible manner.

A practical padded microscope bag made from black, waterproof Polyester is available for transport and storage of the stereomicroscope.



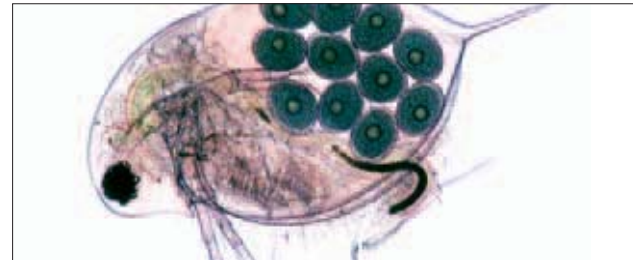
The anemone (*Anemone nemorosa* L.), a member of the dicotyledonous buttercup family, creates true carpets of blossoms in the spring.



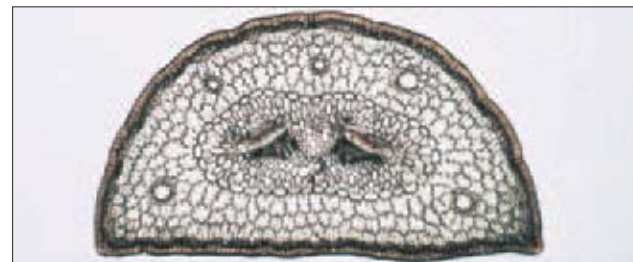
The largest potter wasp in Central Europe – the peaceful and unjustly feared hornet.

### What will the students learn?

- Leica stereomicroscopes sharpen students' observation skills.
- They will be able to examine, compare, describe and identify the structures, functions and development of plants and other organisms.
- They will gain insight into evolution and ethology and will recognize nature's variety and systematic structure.
- They will be able to relate practical experiences in the field and with the stereomicroscope to knowledge gained in classroom instruction.
- They will experience their biological space, recognize the dependencies and relationships between organisms and their surroundings, and will develop an awareness of their environment.
- They will understand the ecological relationships of selected topics and the problems of various ecosystems.



Underwater flea circus – a number of branchiopods fan fresh breathing water and food to a water flea.



Sections provide information about cell structures and are easy to make with a razor blade. Club moss section.



The operation of the stereomicroscope is easy to explain: switch on the illumination, set the interpupillary distance, focus and set the magnification.



And before you know it, the students are exploring independently and gathering their own experiences.



# Leica educational stereomicroscopes still work at the class reunion 20 years later

*“After families, the next most important institution in society is school. Children simply don’t want to sit at home and absorb their learning from a monitor. They need the group, the human aspect. They need teachers.”*  
*Bill Gates, founder of Microsoft*

Their modern, sleek design already says it all – the new Leica Microsystems educational stereomicroscopes aren’t toys, but optical instruments featuring world-renowned Leica quality and precision. Our goal is to equip teachers with a rugged, useful resource that they will be able to put to work successfully for many years to come. We also want to make your students’ first experiences in microscopy and scientific work in general as pleasant and effective as possible.

From the 2-magnification starter model to the digital zoom model with its integrated 3-megapixel CMOS camera, the new Leica educational stereomicroscopes combine superb optical and illumination quality with ease of use and comfort for extended use. The rugged design is completely maintenance-free and is built for rough-and-tumble school environments. Like all our instruments, the quality, lead-free optics and recyclable housing satisfy environmental management requirements.

	Leica ES2	Leica EZ4 10×	Leica EZ4 16×	Leica EZ4 open	Leica EZ4 D Digital 10×
Magnification changer	2-level 3:1	zoom 4.4:1	zoom 4.4:1	zoom 4.4:1	zoom 4.4:1
Eyepieces for spectacle wearers	10×/20 fixed	10×/20 fixed	16×/15 fixed	10×/20, 16×/16, diopter range from +5 to –5, not suitable for spectacles 20×/12	10×/20 fixed
Magnification range	10×/30×	8× to 35×	13× to 56×	depending on eyepiece: 8× to 70×	8× to 35×
LED incident/transmitted-light illuminators	integrated	integrated with dimmer, three incident-light methods	integrated with dimmer, three incident-light methods	integrated with dimmer, three incident-light methods	integrated with dimmer, three incident-light methods
Working distance	100mm	100mm	100mm	100mm	100mm
Digital camera				Leica DC150 for insertion in eyepiece tube (optional)	Integrated 3-megapixel CMOS camera
Software					Leica software for PC and MAC
Accessories for measuring				a variety of graticules for insertion in adjustable eyepieces	

For detailed technical and optical specifications, please refer to the “Technical Information” M1-120-4.

### **Eyepieces for spectacle wearers**

provide optimal viewing conditions, whether you wear eyeglasses or not. They are sealed in place against loss or theft (except for the EZ4 with open eyepiece tubes).

### **Room for expansion: Leica EZ4 for 10×, 16× and 20× eyepieces**

The Leica EZ4 with open eyepiece tubes gives you the option of working with a variety of eyepieces. This permits the use of higher magnifications of up to 70× (with 20× eyepieces) or adjustable eyepieces with a  $\pm 5$  diopter correction range. Graticules can be inserted into the adjustable eyepiece are also supported for length measurements in mm or inches.

### **The 60° viewing angle**

is equally ergonomic for students and teachers with different physical builds.

### **The eyepiece tubes**

adjust simultaneously from 50 to 75mm to provide the correct personal interpupillary distance for all users.

### **The optics carrier**

contains a Greenough optical system. Thanks to the parfocality of the optical system, the image remains in focus from the lowest magnification to the highest.

### **The 10° Greenough optical system has many advantages:**

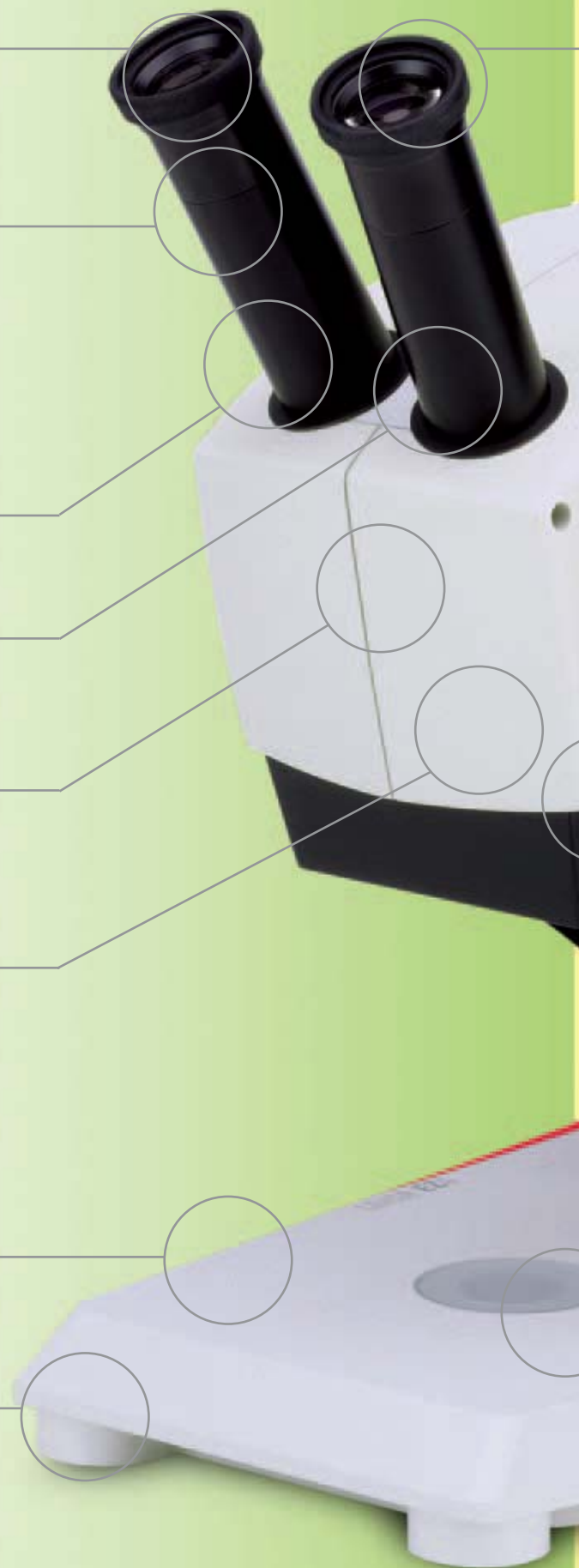
- It corresponds to natural, and thus fatigue-free, eyesight.
- It provides excellent depth of field, thus presenting a greater range of three-dimensional objects in focus and reducing the need to adjust the focus while observing.
- Flat, thin specimens are displayed as truly level, without optical distortion.

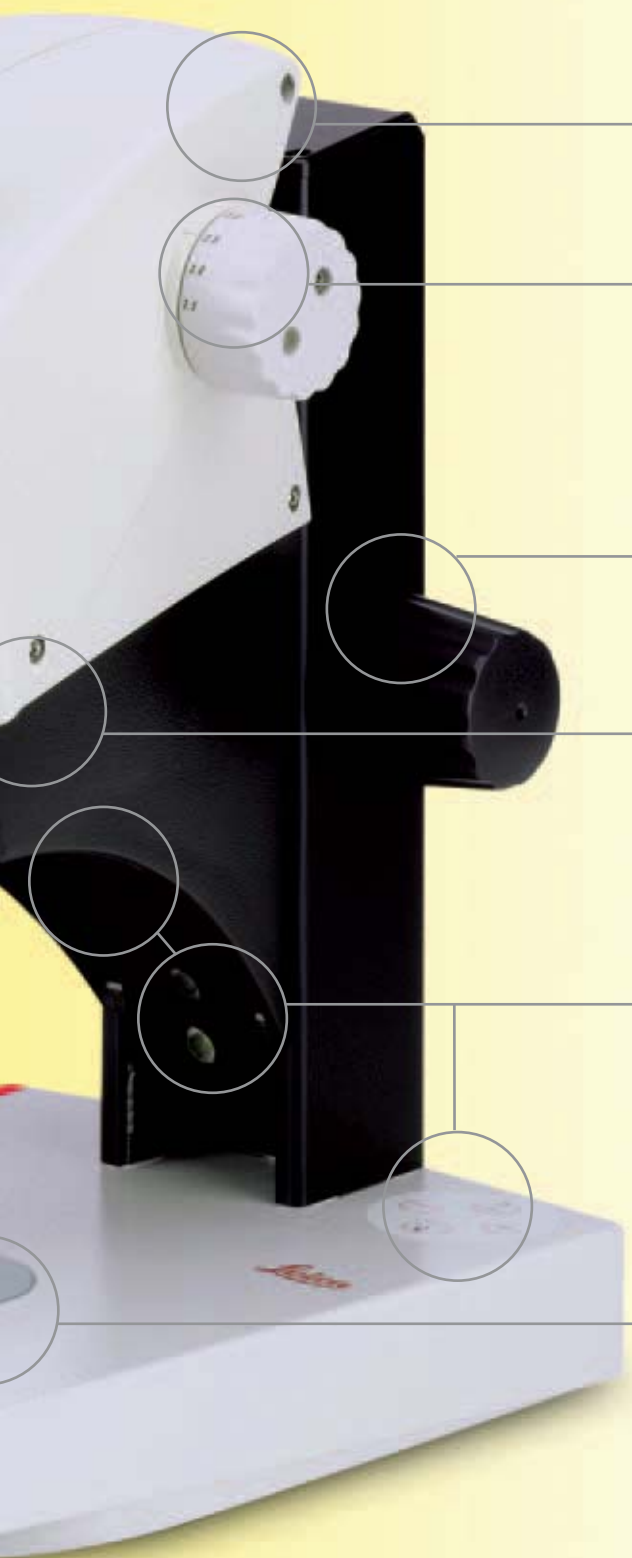
### **The base**

provides excellent stability despite its small footprint, and a pleasantly low handrest for comfortable work.

### **Vibration-resistant feet**

prevent annoying shake while adjusting the instrument and stop it from sliding. The special transparent rubber material does not mark tabletops.





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**The soft eyecups**

protect eyeglasses against scratching. The eyecups can be replaced and cleaned for hygienic reasons.

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**The grip**

is integrated for safe carrying.

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**The magnification changer**

and focusing drive remain responsive, precise and easy to adjust, even after years of use, thanks to their precision design and solid workmanship. The annoying jumps and imprecision typical of cheap stereomicroscopes from other manufacturers do not occur in Leica instruments.

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**The focusing drive**

can be adjusted in its ease of movement for comfortable focusing by students and teachers.

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**The housing**

as well as the membrane switch and glass stage plate can be cleaned easily with a soft cloth and diluted dishwashing liquid. The membrane switch and glass stage plate are sealed into the surface to prevent the accidental entry of liquids that could damage the transmitted-light illuminator.

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**The LED incident-light and transmitted-light illuminators**

can be switched independently or combined, and can be controlled via the membrane switch on the EZ4 models. For a detailed description of the illuminator system, see page 9.

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**The glass stage plate**

is an easy-to-clean object holder.



# Power for bright minds: innovative *LLED* illumination technology



Stage 1 incident light: all five LEDs are lit for maximum intensity.

The light-emitting diode, or LED, is currently revolutionizing the world of illumination. As small as they may be, LEDs are true power packs in every respect: they last longer than incandescent lamps, use less energy, stay cool and require no maintenance. The powerful LEDs in our new educational stereomicroscopes generate intense, homogeneous, color-neutral incident and transmitted light.

## **A Leica exclusive: our special *LLED* incident-light technology**

We developed our completely new Leica LED incident-light technology to provide observers of a wide variety of objects – from strongly structured pine cones to flat stamps – with optimal illumination to obtain a maximum of information from their observation work. The integrated LEDs can be switched individually, dimmed and combined with transmitted light on all EZ4 models.

The membrane switch that controls the illuminator is integrated in the base and has a watertight seal. The color temperature of 6500°K (daylight) remains constant when dimmed and over the entire service life of the illuminator. Colors are rendered faithfully and sensitive microorganisms and plants are not harmed, as the LEDs do not get hot.



Stage 3 incident light: the lower two LEDs light finely structured objects from a low level, increasing contrast.



Stage 2 incident light: the upper three LEDs provide shadow-free light from directly above the object.

## **Practical, reliable and economical for school use**

When used for five hours a day, the power LEDs have a service life of around 25 years and cause no maintenance costs. The LEDs are sealed against dust and water spray in a very compact installation in the new Leica stereomicroscopes. As a result, there is no lamp housing requiring regular alignment or which interferes with focusing or manipulating the objects.

LEDs are not fragile and can handle rough treatment in school settings. The Leica illumination system complies with safety regulations for laboratory equipment. The protective low voltage contributes to user safety, as does the fact that LEDs cannot implode.



Transmitted light can be selected individually, dimmed and combined with incident light without reflections from the glass stage plate.

# Discoveries start with curiosity

*“Why not begin education with the observation of actual things,  
rather than their description with words?  
Once something has been shown, a lecture may follow to explain further.”  
The Great Didactic by the educational reformer Comenius (1592-1670)*

High-performance stereomicroscopes by Leica Microsystems are being used successfully in renowned university institutes and laboratories for a wide variety of scientific and medical research projects. Now, a new range of economical stereomicroscopes featuring proven Leica quality, reliability and longevity is available for practical and laboratory instruction in university and technical college settings. By concentrating on essential functions, the new laboratory instruments help students train practical routine and research skills.

## **Optimal start into a scientific career**

With our new Leica stereomicroscopes, we would like to make students' entry into the world of science as pleasant as possible. The category of training stereomicroscopes includes cheap instruments that quickly become a source of frustration due to their poor performance. The new Leica Microsystems educational stereomicroscopes, however, deliver the same high standards of imaging and illumination quality, longevity and environmental friendliness as our instruments for professional applications. The Leica E Line stands out from the crowd of school and university stereomicroscopes by offering the best value for money and the following features:

- A complete line for training specimen preparation techniques, workflows and experiments including digital documentation (Leica EZ4 D) and measurements (Leica EZ4 with a choice of eyepieces)
- Leica's typical high image quality, color and detail fidelity
- Leica's typical mechanical precision for decades of maintenance-free functionality
- Precise zoom and focusing systems for the finest, most exact control
- Dimmable power LED illumination system for incident and transmitted light
- Unique Leica 3-way incident light technology



Fast, simple work in universities and technical colleges.



Digital images support data exchange between students or faculty in seconds.



Leica EZ4 D with 128MB SD memory card and capture button to record an image

# The clever stereomicroscope for digital photography



When it comes to precisely recording facts and presenting them in a comprehensible manner, microscopy and photography are a natural match. As in other fields of modern imaging, digital photography has become the standard medium for scientific documentation. It's therefore important that students learn digital imaging techniques. The Leica EZ4 D, with its integrated 3-megapixel CMOS camera and Leica application software, provide an ideal introduction in this regard. Students learn to record their observations quickly and easily, archiving, processing and using the resulting image material in a variety of ways – exchanging information by e-mail or posting it to the Internet, using it for dissertations, presentations, articles, etc.

## Direct image transfer

Connection to PC not required: Simply insert an SD card and press the capture button to record an image. The images can then be uploaded to a computer via a card reader.

## Integrated 3-megapixel CMOS camera

- High resolutions of up to 2048 × 1536 pixels
- Direct storage of image data on 128MB SD card for use via card readers, printers, etc.
- Connections for PC/Mac, projector, video recorder, etc.
- PAL/NTSC switching

## Analog video port

Easy connections to a variety of devices (projectors, video recorders) via the analog (composite) video port. Switch between PAL and NTSC with the small button.

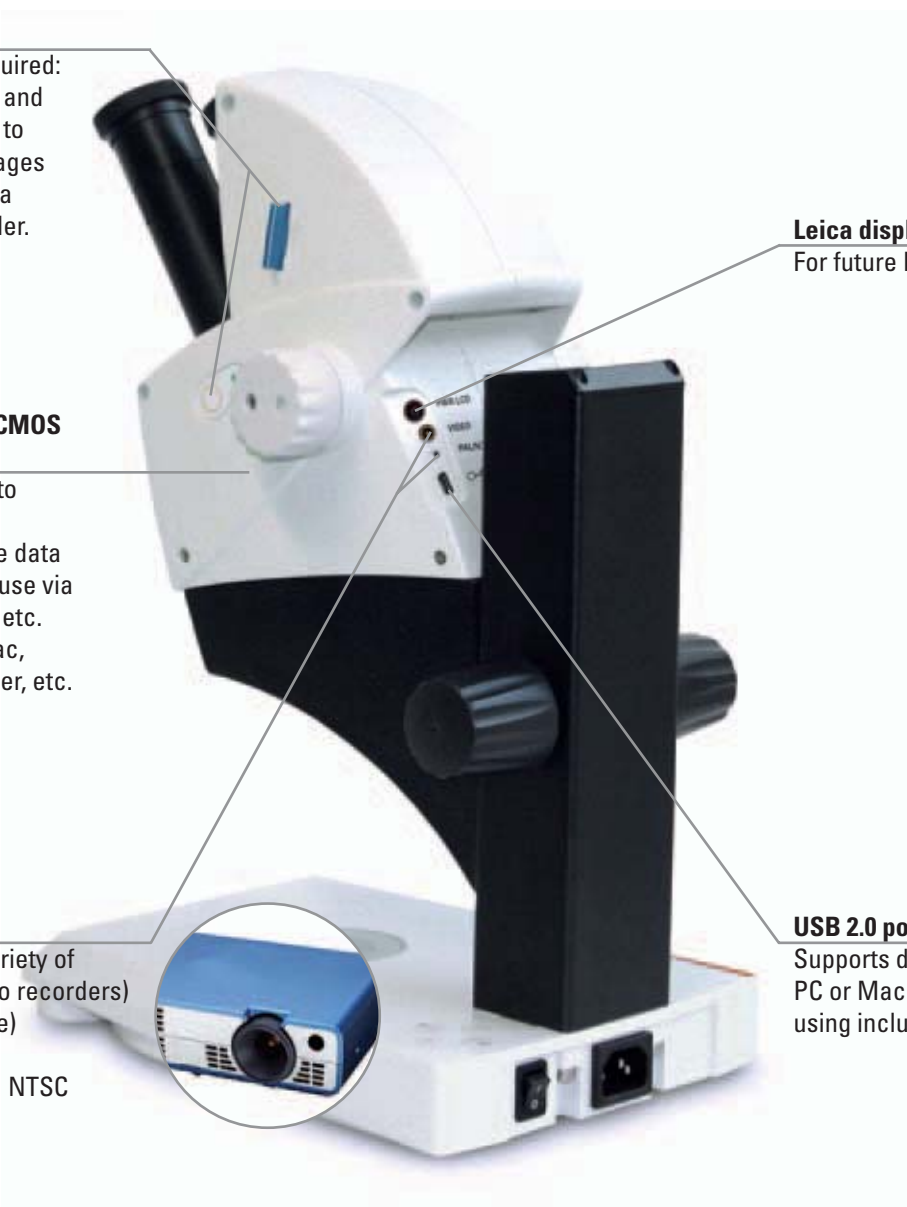
## Leica display power connection

For future Leica LCD displays



## USB 2.0 port

Supports direct connections to PC or Mac via fast USB 2.0 ports using included software.



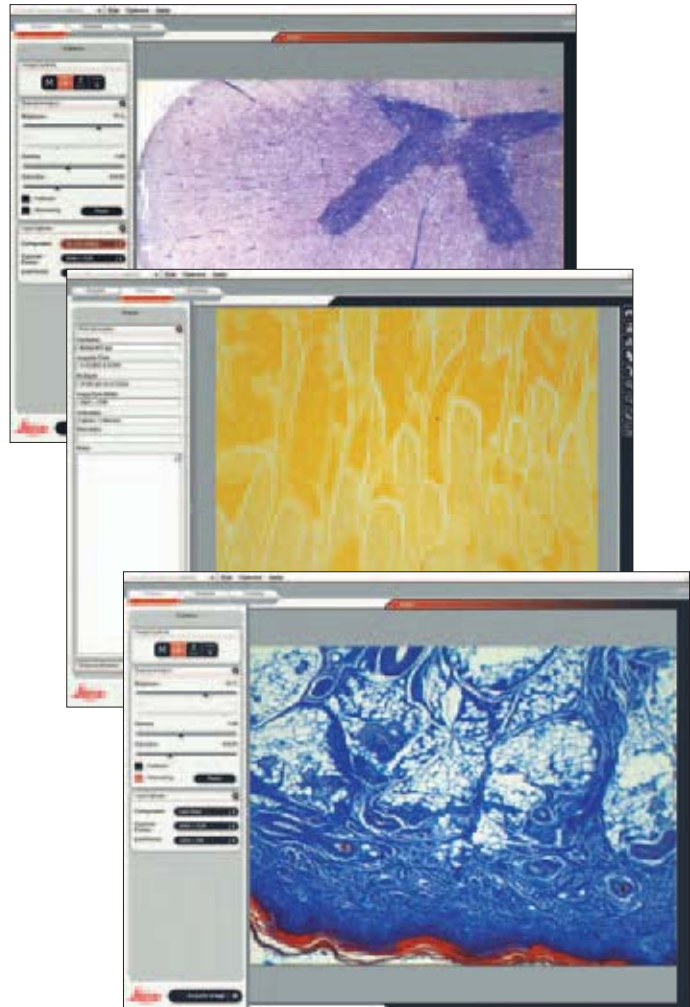


# Pixels say more than 1000 words

Scientific photography and digital image processing have evolved into important scientific tools that have become indispensable in fields such as biology, medicine, forensics or archaeology. Students can learn the basics of digital image capture and editing using the application software included with the Leica EZ4 D. The software is easy to install and use and provides support for English, German, French, Italian, Spanish, Japanese and Chinese. The application controls image capture and storage, live image display on connected PCs or Macs, and the archival and optimization of image data.

## Functions

- Manual and automatic camera control
- PC- and Mac-compatible
- Image gallery
- Supported formats: tif, bmp, jpg
- Two live image resolutions for fast image transfer or high quality
- Color or monochrome
- Simple calibration, measurements and measuring scale display
- Markings with lines, arrows and text
- Predefined image capture parameters for incident and transmitted light
- Storage of custom image capture parameters
- Sharpening function
- Storage of comments and other information (name, date, description, etc.)
- Image data export to other applications
- Online help



*“Understanding cannot intuit, and the sensuous faculty cannot think, In no other way than from the united operation of both, can knowledge arise.” Critique of Pure Reason (1781)  
Immanuel Kant, one of the most important German philosophers.*

## Leica E Series – specifications, features

Stereomicroscope	Leica ES2	Leica EZ4 10×	Leica EZ4 16×	Leica EZ4 open	Leica EZ4 D Digital 10×
Optical system	10° Greenough, parfocal	10° Greenough, parfocal	10° Greenough, parfocal	10° Greenough, parfocal	10° Greenough, parfocal
Magnification changer	2-level, 3:1	zoom 4.4:1	zoom 4.4:1	zoom 4.4:1	zoom 4.4:1
Eyepieces for spectacle wearers	10×/20 fixed	10×/20 fixed	16×/15 fixed	replaceable, fixed or adjustable: 10×/20, 16×/16 20×/12 not suitable for spectacles	10×/20 fixed
Diopter correction				from +5 to –5 (adjustable eyepieces)	
Viewing angle	60°	60°	60°	60°	60°
Working distance	100mm	100mm	100mm	100mm	100mm
Magnification range	10×/30×	8× to 35×	13× to 56×	8× to 70×	8× to 35×
Max. resolution	159 Lp/mm	170 Lp/mm	170 Lp/mm	170 Lp/mm	170 Lp/mm
Max. num. aperture	0.053 nA	0.057 nA	0.057 nA	0.057 nA	0.057 nA
Object field diameter	20mm/6.7mm	5.7 to 25mm	4.3 to 18.8mm	3.4 to 25mm	5.7 to 25mm
Eyecups	replaceable	replaceable	replaceable	replaceable	replaceable
Interpupillary distance	50 to 75mm	50 to 75mm	50 to 75mm	50 to 75mm	50 to 75mm
Beam path	100% visual	100% visual	100% visual	100% visual	50% visual/50% video
Focusing drive torque	individually adjustable, 75mm stroke (all instruments)				
Grip	integrated	integrated	integrated	integrated	integrated
<b>LED illumination system</b>	integrated, independent or combined incident and transmitted light (all instruments)				
Control	On/Off switch	membrane switch	membrane switch	membrane switch	membrane switch
Incident light method	angled incident light with 3 LEDs,	choice of 3 methods: maximum intensity with 5 LEDs, angled incident light side light with 2 LEDs (patent pending)			
Dimmer	–	yes, for incident and transmitted light	yes, for incident and transmitted light	yes, for incident and transmitted light	yes, for incident and transmitted light
Auto OFF	–	after 60 min.	after 60 min.	after 60 min.	after 60 min.
LED service life	approx. 25 000 h	approx. 25 000 h	approx. 25 000 h	approx. 25 000 h	approx. 25 000 h
Light quality	homogeneous daylight (6500° K), free of UV and IR radiation (all instruments)				
Maintenance	maintenance-free				
Power supply	universal from 100V to 240V, voltage-sensitive, integrated (all instruments)				
<b>Digital camera</b>				optional Leica DC150 with adapter	integrated 3.0 megapixel CMOS camera
Digital output					USB 2.0
Analog video port					RCA, video, composite for projector, monitor, video recorder
Integrated slot					SD (Secure Digital) card
Recording					switch for image capture
Software					Leica software for PC/MAC
Graticules, stage micrometer				for length measurements usable in adjustable eyepieces	

Detailed technical specifications and data can be found in the M1-120-4 brochure.