



Teaching and learning made easy

Leica stereomicroscopes – to make learning an experience

Living up to Life

ryf ag



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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 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

FULLHD



Leica ES2 stereomicroscope with two magnifications



Leica E4 stereomicroscope with 4.4:1 zoom



Leica Design by
Christophe Apothéloz

Leica E4 HD 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 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 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.



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.

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.



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.



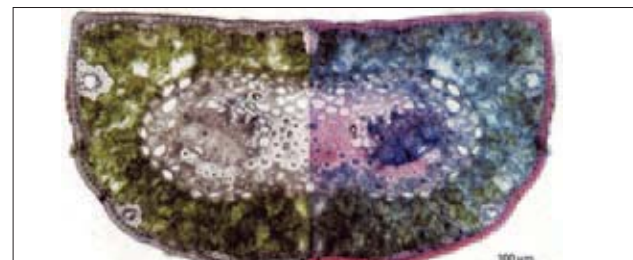
The anemone (*Anemone nemorosa* L.), a member of the dicotyledonous buttercup family, creates true carpets of blossoms in the spring.



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



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.

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 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 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 HD 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 | 100 mm | 100 mm | 100 mm | 100 mm | 100 mm |
| Digital camera | | | | | Integrated 3-megapixel CMOS camera High Definition output |
| Software | | | | | Leica software for PC and MAC |
| Accessories for measuring | | | | a variety of graticules for insertion in adjustable eyepieces | |

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 ±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 75 mm 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:

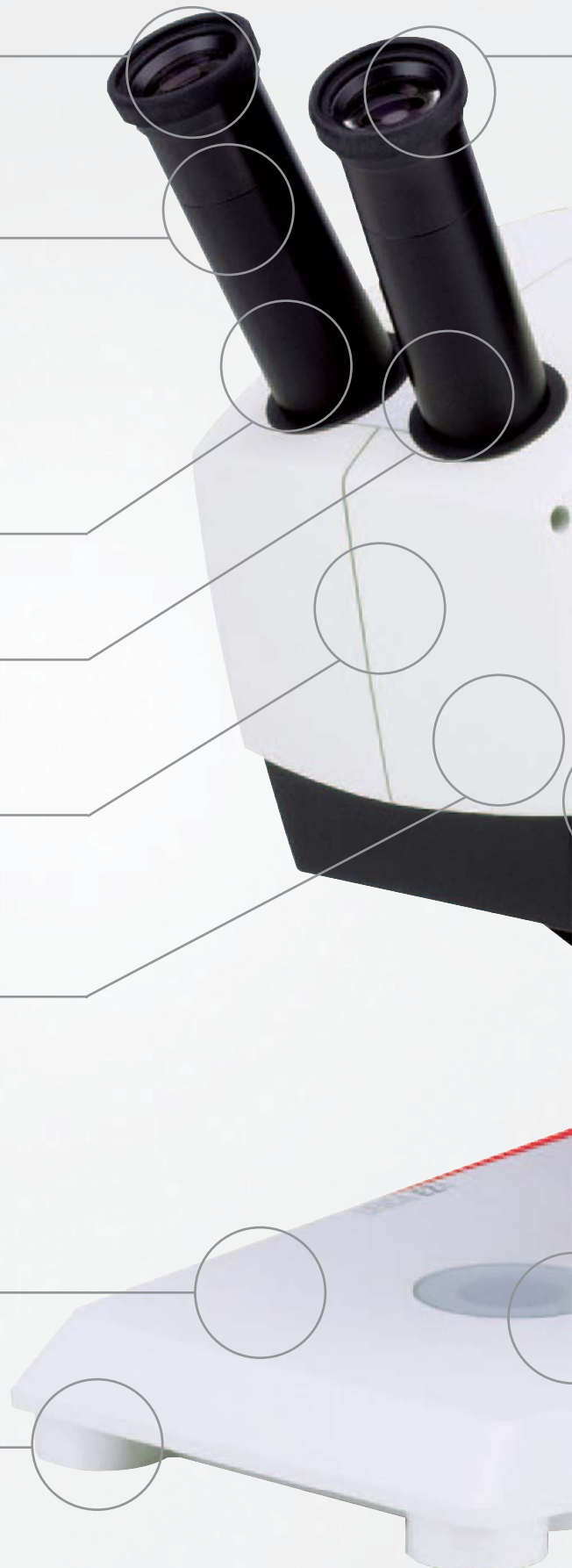
- It corresponds to natural, and thus fatigue-free, eyesight.
- It provides excellent depth of field, thus presenting a greater range of three-dimensional objects in focus and reducing the need to adjust the focus while observing.
- Flat, thin specimens are displayed as truly level, without optical distortion.

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.





The soft eyecups

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

The grip

is integrated for safe carrying.

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.

The focusing drive

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

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.

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.

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.



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

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 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 daylight color temperature 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.

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 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 explode.



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



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 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 laboratory instruments help students train practical routine and research skills.

Optimal start into a scientific career

With our 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 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 HD) 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 HD with SD memory card and capture button to record an image

Go High Definition!

Fast High Resolution Live Imaging

The highest quality, live Microscopy imaging is critical for displaying fine microstructures. The NEW Leica EZ4 HD camera offers an economical, integrated solution for viewing fast live images in High Definition (HD). The complete system allows the user to view specimens on the display and through the eyepieces, with or without a computer connection for versatile workstation possibilities.

Leica EZ4 HD Advantages

Use Stand Alone

- Fast, high-resolution (up to 1920×1080) live image on an HD display for sample manipulation, observing moving specimens, and viewing the finest details on large screens
- Direct connection to an HD display
- Capture images and movie clips on an SD card for easy portability of the system
- Control the camera functions via two onboard buttons for easy access
- Optional handheld remote for fine tuning the image, customizing camera settings, and viewing a gallery of images and movie clips from the SD Card for easy playback



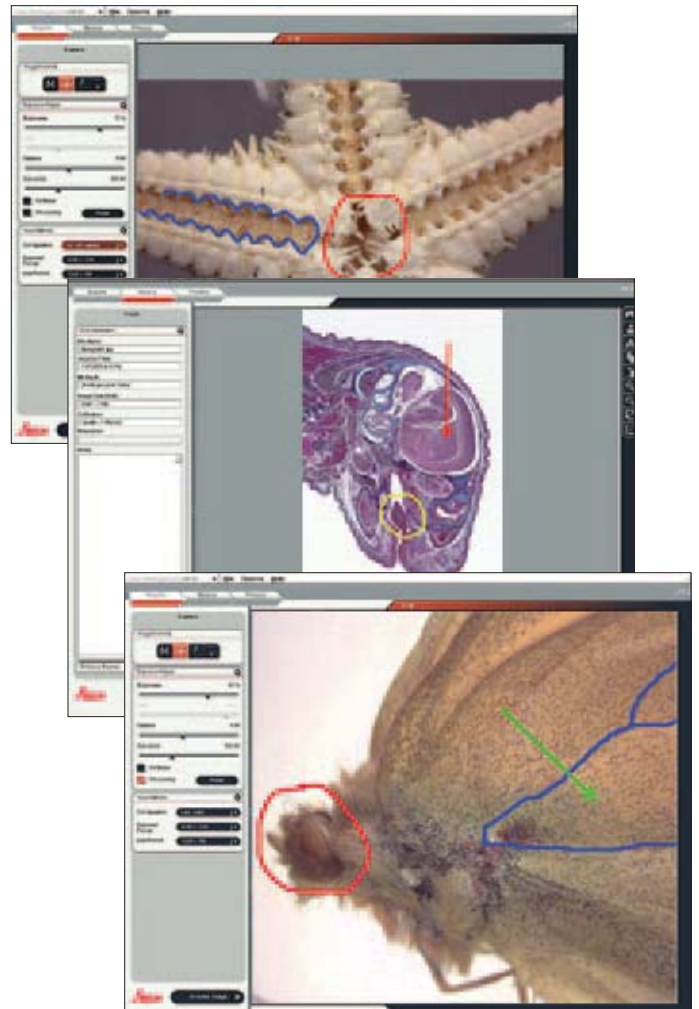
Pixels say more than 1000 words

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 HD. The software is easy to install and use. The application controls image capture and storage, live image display on connected PCs or Macs, and the archival and optimization of image data.

Use with Computer and Leica LAS EZ Software:

- NEW – FREE HAND ANNOTATION IS NOW AVAILABLE FOR BOTH LIVE AND STORED IMAGES!
- Capture, archive, and perform image processing for future viewing and analysis
- Intuitive workflow-style user interface minimizes time for imaging tasks
- Add basic measurements and annotations to the stored image
- Define image acquisition preferences such as exposure, gain and gamma for optimum image results
- Image related data and calibration are stored with the image for later reference
- Save and open images directly into any other software application for preparing reports and presentations
- Compatibility with the full range of Leica Microsystems Imaging Software Modules opens the door to more advanced use

Note: Leica Acquire Software with basic functions is available for the Macintosh Operating System



*“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 HD Digital 10x |
|---------------------------------|--|--|---|---|---|
| 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 | 100 mm | 100 mm | 100 mm | 100 mm | 100 mm |
| 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 | 20 mm/6.7 mm | 5.7 to 25 mm | 4.3 to 18.8 mm | 3.4 to 25 mm | 5.7 to 25 mm |
| Eyecups | replaceable | replaceable | replaceable | replaceable | replaceable |
| Interpupillary distance | 50 to 75 mm | 50 to 75 mm | 50 to 75 mm | 50 to 75 mm | 50 to 75 mm |
| Beam path | 100% visual | 100% visual | 100% visual | 100% visual | 50% visual/50% video |
| Focusing drive torque | individually adjustable, 75 mm stroke (all instruments) | | | | |
| Grip | integrated | integrated | integrated | integrated | integrated |
| LED illumination system | 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 | | | |
| 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 2 hours | after 2 hours | after 2 hours | after 2 hours |
| 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° reflected, 4500° transmitted, free of UV and IR radiation (all instruments) | | | | |
| Maintenance | maintenance-free | maintenance-free | maintenance-free | maintenance-free | maintenance-free |
| Power supply | universal from 100V to 240V, voltage-sensitive, integrated (all instruments) | | | | |
| Digital camera | | | | | integrated 3.0× mega-pixel CMOS camera |
| Digital output | | | | | USB 2.0 |
| HDMI port | | | | | High Definition output for desktop or large HD displays |
| Integrated slot | | | | | SD (Secure Digital) |
| Recording | | | | | switch for image capture |
| Software | | | | | Leica software for PC/MAC |
| Graticules, stage micrometers | | | | for length stage micrometer usable in adjustable eyepieces | |

Detailed technical specifications and data can be found in the 13IDE17020EN brochure.