Leica DMIRE2

Inverted Research Microscopy

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Leica DM IRE2

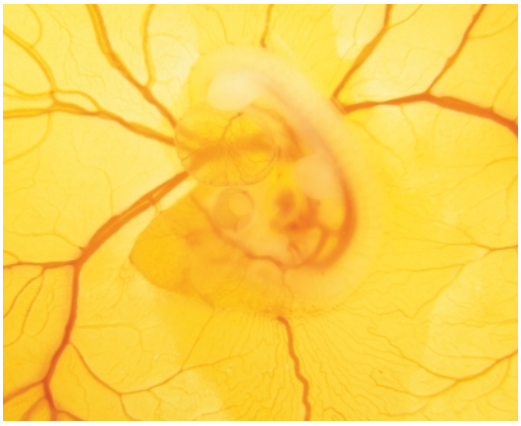
Inverted Research Microscopy
Life on stage

Leica
MICROSYSTEMS

Leica DMIRE2 – The latest generation of inverted research microscopes

Demands on research microscopes are growing at breathtaking speed. Users of inverted microscopes in particular are expecting more and more of their equipment, motivated by rapid advances in medicine and biology where research scientists are continuously breaking through into new dimensions. The increasing complexity of research tasks relies on high measuring accuracy and the processing of large amounts of data.

With our new generation of inverted research microscopes, we at Leica have managed once more to exactly meet our users' needs. The Leica DMIRE2 is the ideal combination of motorization, automation, high stability, optimized system compatibility, ergonomy and user convenience. And yet again, we have proved that Leica is not only keeping pace with progress, but is actually setting the pace.



Chicken embryo - brightfield

Leica design by Christophe Apothéloz

Keystroke operation

Motorization in perfection

Motorized magnification changer
The tube optics are motor-driven to avoid the unnecessary vibrations of manual magnification change. The active position of the magnification changer is indicated by a diode display on the front of the microscope.

Motorized viewing port switchover
The shock-sensitive switchover of the viewing ports is also motor-driven. Diodes on the front of the microscope indicate the currently active ports.

Motorized selection of fluorescence filter cubes
Our customers have already noticed the benefit of the motorized RF4 filter cube wheel with shutter, which we implemented some time ago. The matching control, which used to be situated next to the microscope, has now been integrated into the front of the microscope stand, with diodes informing the user of the filter cube currently in the light path. This makes more room for peripherals in the microscope environment.

Front-Bedienelement für Fluoreszenz-Filter, Shutter, Photo TV-Ports und Vergrößerungswechsler

Motorized objective nosepiece
The required objective is turned into the light path at the press of a key. A display on the front of the microscope indicates the objective's

- magnification
- matching phase ring
- suitable interference prism
- operating mode

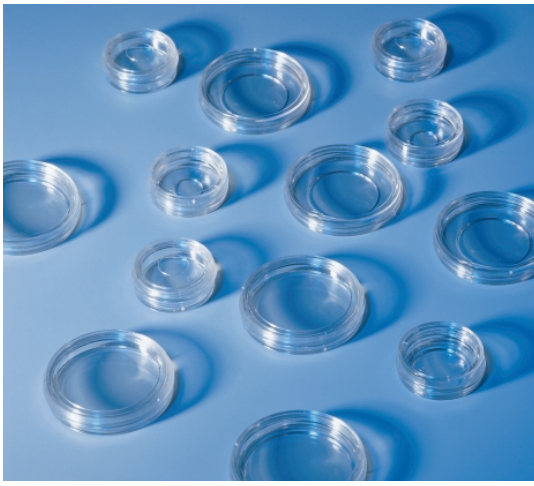
Motorized z drive
The electronic z drive permits fast and convenient use of the microscope. The following functions can be stored for each objective:

- upper threshold
- lower threshold
- parfocality
- z stepwidths

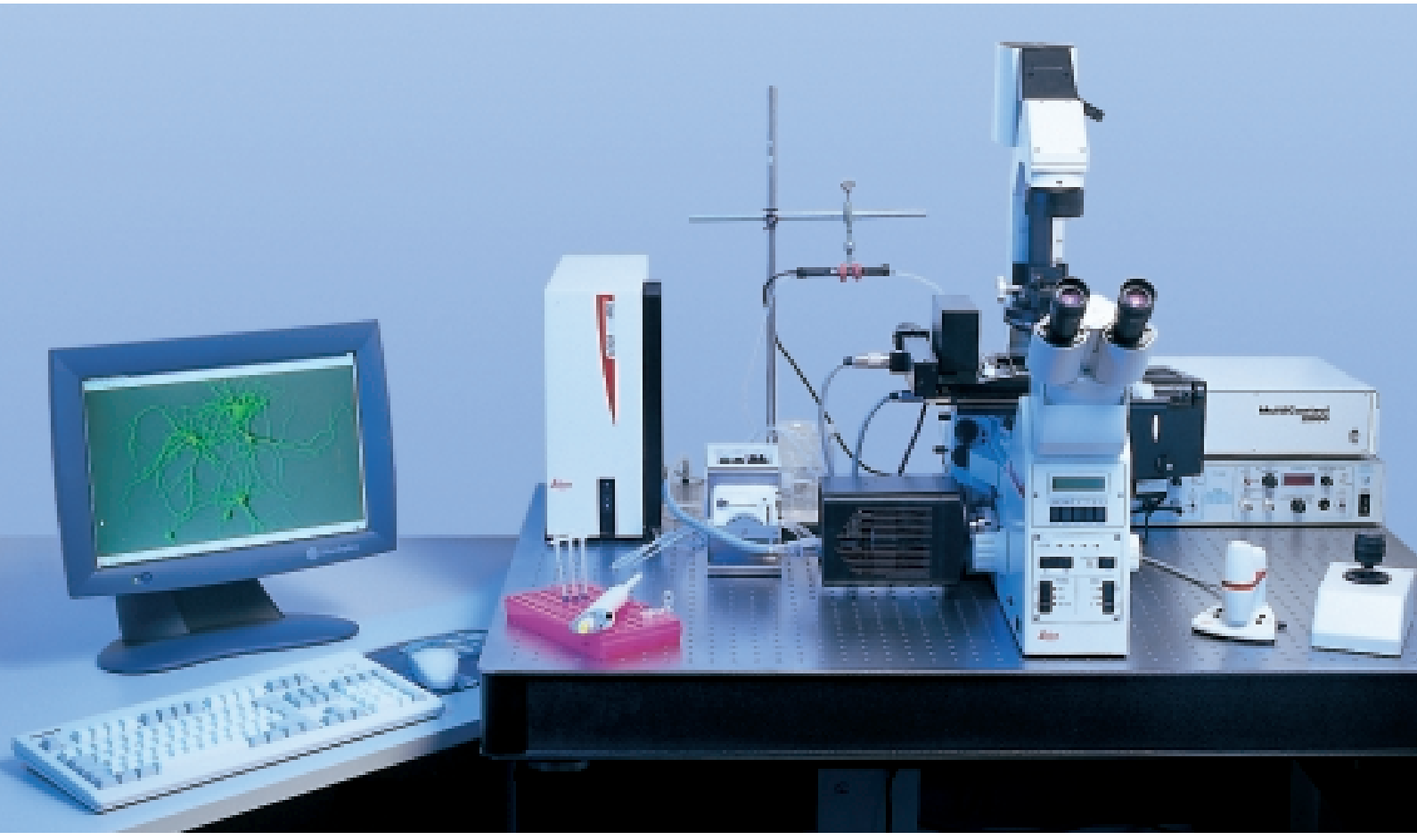
Storing parfocality values will save you from having to refocus after a change of objective. Defining z stepwidths has the advantage that the right focusing speed can be used for each magnification. Front control panel for fluorescence filters, shutter, photo TV ports and magnification changer

Encoded prism wheel for interference contrast
The interference prism that is currently in the light path is indicated in the front display of the microscope. If the objective in the light path does not suit this prism, the display will contain a warning to avoid operation errors.

Separate accommodation of electronics
Almost all the electronics have been moved out of the microscope into the CTR MIC electronics box, effectively suppressing electronic noise, which can easily lead to interpretation errors in electro-physiological examinations.



Glassbottom wells (Willcowells) for DIC applications



DMIRE2 installed on anti-vibration stage

Integration into the systems of today and tomorrow

Accessories for the DMIRE2 (climate chambers, temperature control and various specimen photos)

The growing complexity of the challenges faced by today's research scientists has to be matched by complex examination techniques. The microscope must satisfy this need as part of a system of various accessories and peripherals. Today, intricate examinations or manipulation processes are expected to be computer-controlled to attain a high degree of reproducibility and therefore ensure comparability of results.
Leica has made provision for the exchange of data between microscope and computer by fitting the DMIRE2 with a standardized RS 232 interface. Using the SDK system software, which can be downloaded from the internet free of charge, the data of all motorized or coded elements of the microscope can be called up on the screen. At the same time, it is possible to address all motorized components via the program. The user-friendly software also allows the creation and activation of automated microscope routines.

Living Cell Microscopy makes particularly heavy demands on system integration.
In the special applications IVF (in-vitro fertilization), ET (embryo transfer) or ICSI (intra cytoplasmatic sperm injection) of transgenics, successful micromanipulation and -injection depends on a perfect match of components.
Multidimensional microscopy requires a high degree of microscope automation. Climate chambers and evaluation software are necessary for time-lapse experiments. The microscope must also feature excellent stability.
To be able to measure the extremely small electric signals generated in electrophysiological examinations, microscopes need optimum electric noise suppression..
Finally, confocal laser scanning microscopes satisfy top requirements of resolution in z direction and are used in optimally matched conjunction with a light microscope.

Leica provides the ideal platform for these and other system applications. Not only is the Leica DMIRE2 ideally prepared for its job at the heart of an integrated system - accessories such as heating stages, climate boxes, micromanipulators, high-resolution cameras or evaluation programs work in perfect harmony with the microscope.

Non-contact operation

Remote control operation
The remote control function (z control) permits non-contact operation of the main electronic elements. The following elements can be addressed:
- focus (z drive)
- objective nosepiece and
- illumination intensity.

PC operation
PC control is realized with the SDK software that can be downloaded free of charge from the internet. All electronically available data can then be called up on the screen. At the same time it is possible to drive all motorized microscope elements from the computer.

Elimination of vibrations
The microscope's remote control facility enables the user to eliminate virtually all vibrations from his experiments.
On the DMIRE2, particularly shock-sensitive manual controls such as magnification change or viewing port switchover have been motorized as a further improvement to the stability of the microscope.

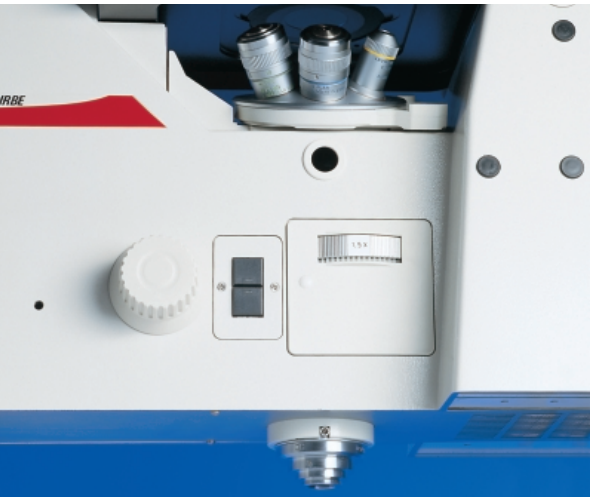
More free space
The microscope's remote control facility also creates space round the microscope that would otherwise have been occupied by manual controls. This is an advantage for users who need to surround the microscope with bulky equipment.

Remote control of the DMIRE2

User convenience

Easy operation due to electronic support

Storage of user settings
Personal preferences of users such as left- or right-handed operation are effectively supported by the DMIRE2. The z drive movement or objective change functions can be optionally assigned to the keys on either the left or right side of the microscope. In addition, the z drive hand wheels can be operated either clockwise or counterclockwise.



Bottom port of DMIRE2

No collisions of the objective with the specimen
Once the upper threshold has been stored, this z position cannot be inadvertently overridden with the electronics.
Empty nosepiece positions are not turned into the light path.
For objective change, only nosepiece positions containing objectives are turned into the light path.

Operating modes
If IMMERSION mode is selected, only immersion objectives will be turned into the light path. This prevents dry objectives from coming into contact with immersion oil or, in DRY mode, an immersion oil being used without oil by mistake.
Combined objectives are available for both modes.

Display and diode indicators
The display and diode indicators are situated on the front of the microscope for easy and immediate viewing.
The display of the currently active components

- objective
- interference prism
- fluorescence filter cube
- tube optics
- viewing port

makes work easier and helps to avoid operation errors.

Front control panel for fluorescence filters, shutter, photo TV ports and magnification changer

Ergonomy

Ergonomically optimized controls

Ergotube
The ergonomic observation tube features stepless height adjustment, allowing the user to adopt a comfortable sitting position and vary it as necessary.

Fatigue-free viewing with fov 22
Eyepieces with this field of view index show an area of the image that can be surveyed without pupil movement, reducing eye fatigue during spells of concentrated observation.

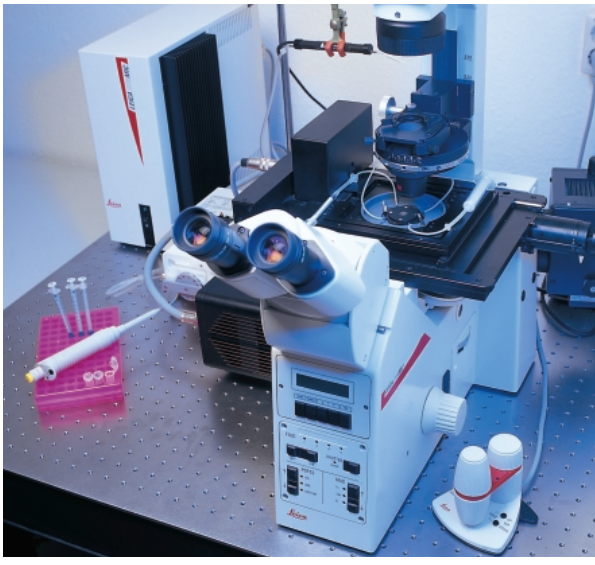
Ergonomic layout of controls
All controls on the side of the microscope are designed to enable you to rest the ball of your thumb against them for relaxed operation.

Easily accessible objectives
The objective nosepiece is mounted at a slant, providing easier access to and convenient handling of objectives.

Angled lamphousing for easier centration
To facilitate centration of the mercury lamp, the lamphousing is angled on the right-hand side and has the centration devices on this side face.

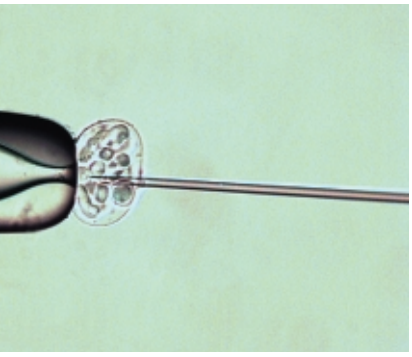
3-plate mechanical stage with extra-long coaxial drive
Extending as far as the desktop, the coaxial drive enables you to adjust the stage, i.e. position the required specimen detail in the field of view, with the ball of your thumb resting on the control.

DMIRE2 and scanning stage

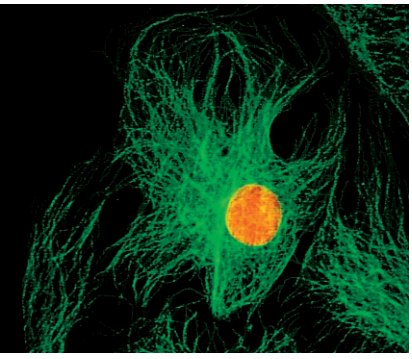


DMIRE2 setup

Contrasting techniques



Microinjection nucleus Acetabularia acetabulum



Fibroblasts Fluorescence cytoskeleton and nucleus stained

3-plate mechanical stage with glass insert

The Leica DMIRE2 will produce brilliant and high-contrast images of all your specimens, providing the right contrasting technique for every application.

Phase contrast
Phase contrast is used for high-contrast imaging of faint, unstained specimens that are typically encountered in fresh samples and cell and tissue cultures.
We have designed special phase contrast objectives for inverted microscopy with long free working distances and magnifications from 5x to 100x.

Differential interference contrast (DIC)
Like phase contrast, interference contrast is used for visualizing unstained transparent specimens in transmitted light. With this method, however, a 3D impression is produced, making it highly suitable for manipulation work.
Leica DIC will prove particularly useful in IVF or ICSI, i.e. micromanipulation or microinjection. The IC prisms on the side of the illumination are inserted into the 6-position condenser disk, while the objective-side prisms are accommodated in a turret on the standard objective nosepiece. The Leica DMIRE2 produces DIC up to a working distance of 70 mm with objectives up to 100x magnification. Fast switching between DIC, brightfield and phase contrast is possible at any time.

Leica Modulation Contrast (LMC)
Based on Hoffman Modulation Contrast, this technique produces relief images similar to those obtained with interference contrast. Unlike DIC however, LMC can be used for viewing specimens through birefringent plastics, and is therefore an excellent alternative to interference contrast.
For this technique, Leica offers objectives that are specially matched for inverted microscopy with long free working distances and magnifications between 10x and 63x.

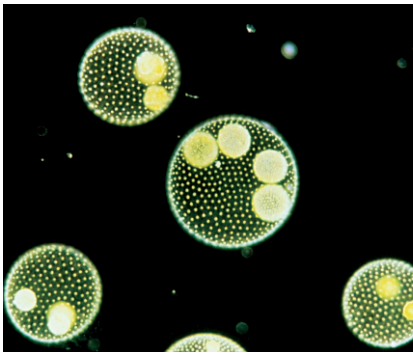
Fluorescence
Fluorescence microscopy produces images of fluorochromed substances or sections of cell or tissue. When irradiated at a specific wavelength, the fluorochrome emits visible light (fluorescence), visualizing the substance under examination.

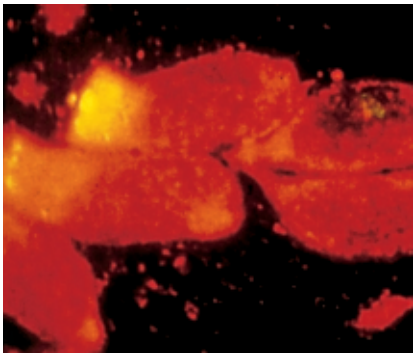
Leica offers fluorescence filter cubes for the excitation wavelengths of all important fluorochromes. The filter turret (RF4) takes up to 4 filter cubes to allow synchronized viewing of more than one fluorochrome in one specimen. The excitation light is conveniently switched off with a motorized switch.

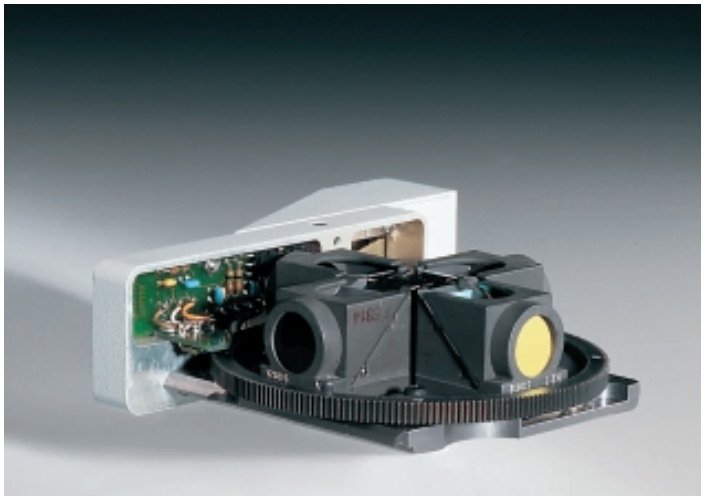
All transmitted light techniques can be used at the same time as incident light fluorescence, permitting the simultaneous observation of non-fluorescing specimen details.

Darkfield contrast
Darkfield contrast is particularly suitable for linear structures such as edges, cracks or flagella. Unlike the brightfield method, the specimen structure is shown up against a dark background in this technique.
We offer a special condenser with darkfield insert for darkfield observation.

Polarization contrast
Birefringent materials such as crystalline objects are viewed in polarization contrast using a polarizer and an analyser. High-contrast images of birefringent samples are produced on the basis of brightness or color differences with this technique.
The whole-wave compensator needed for producing color effects is integrated in the polarizer.


Darkfield Volvox


Chlamydia FITC


RF4 motorized

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Leica, the leading brand for microscopes and scientific instruments, developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Yet Leica symbolizes innovation as well as tradition.

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