

Living up to Life

Leica
MICROSYSTEMS



Leica DM4000–6000

Brilliant, Easy Imaging at the Speed of Light!

The New Generation of Leica DigitalMicroscopes
for Biomedical and Industrial Research

Brilliant, Easy Imaging at the Speed of Light!

Innovative design and technological excellence

At first glance: a clear, attractive design. Looking through the microscope for the first time: fascinating insights. The Leica DigitalMicroscope family. Unrivalled image brilliance and image contrast in this class of microscope – the Leica DM4000 B LED through DM6000 B for life science and clinical research and the Leica DM4000 M LED and DM6000 M for industrial research.

New standards for ease of use

Work quickly and effortlessly with Leica's new generation of DigitalMicroscopes. Complex analysis sequences at the microscope are easily automated. All microscope and camera parameters are quickly and easily saved, which makes the microscope easy to reset to exactly the same status at any time.

Work the way you choose

The new, external Leica STP6000 SmartTouch Panel offers a new level of operational freedom. All automated microscope functions can be set from the SmartTouch external control panel. The panel provides the same graphical user interface as Leica Application Suite (LAS) software.

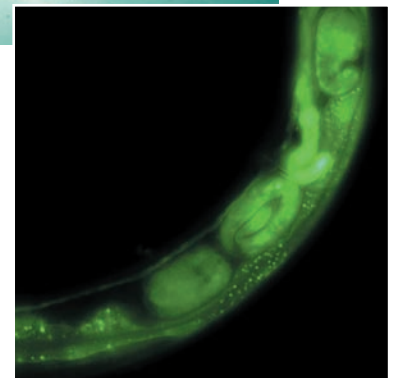
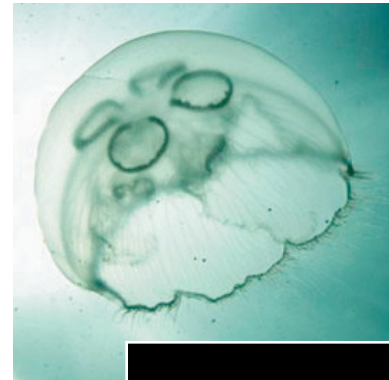
User-friendly through ergonomics

Ergonomics is a word often heard to describe ease of use. With Leica DigitalMicroscopes, ergonomic design means a user-friendly microscope system that you can actually feel. Working closely with the Fraunhofer Institute*, Leica designed these microscopes to not only exceed the latest technical standards, but also to meet the highest standards of ergonomic design.

Software seamlessly integrates the entire microscope system

Leica Application Suite (LAS) software completely integrates the camera and microscope controls. With its modular design, LAS consists of various modules that can be added at any time to meet future research requirements. LAS allows the user to evaluate data quickly and reproducibly, and to easily archive data. Future Leica microscope software and hardware components will also be controlled using the intuitive LAS user interface.

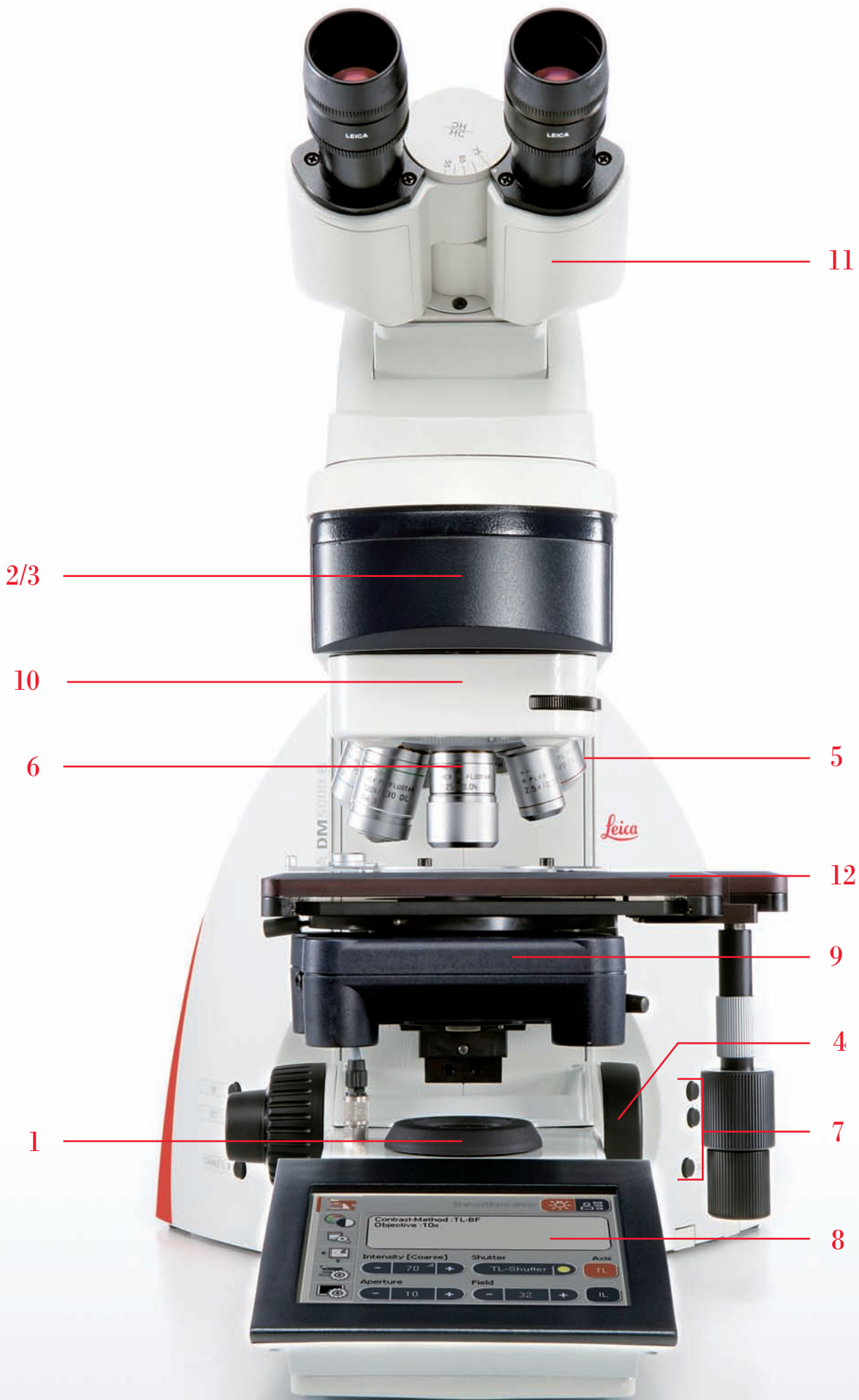
* The Fraunhofer Institute IAO (Stuttgart, Germany) investigates ergonomic aspects of various products. The institute works with partners in industry to develop industrial designs that meet the most demanding ergonomic requirements.



GFP expression in *C. elegans*.
Courtesy of Dr. M. Morcos, Heidelberg, Germany



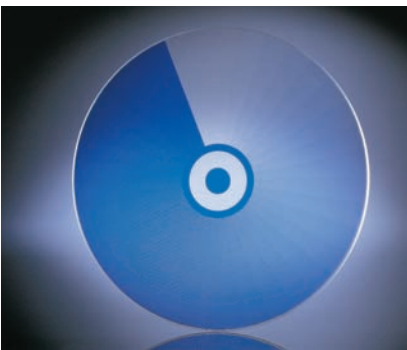
Leica DM4000 B LED with BT25+ basic tube, fluorescence device, and the new, easy-to-use information display.



Automated transmitted light axis 1



The light manager is conveniently accessed on the left side of the microscope. It can be used to modify the Köhler settings for light intensity, aperture, and field diaphragm individually.



The CCIC module, integrated with the transmitted light axis, consists of a glass disk with an infinitely adjustable blue filter. The module generates a constant color temperature via rotation, even at a low lamp voltage.

Automated fluorescence axis 2



Leica's fluorescence intensity manager (FIM), fast shutter, motorized excitation manager, and fast internal filter wheel (IFW) are integrated on a small disk.

1. Automated transmitted light axis

Excellent results with ease

Obtain reliable results faster with Leica's intelligent, automated transmitted light axis:

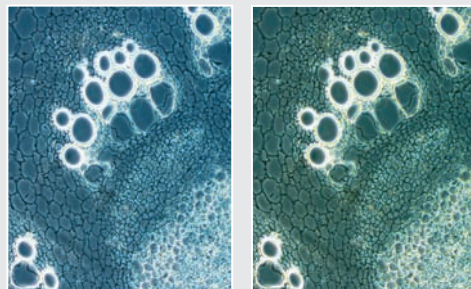
- motorized aperture and field diaphragm
- motorized shutter
- Constant Color Intensity Control (CCIC)

Light manager

The Leica DigitalMicroscopes are outfit with automatic Köhler light management. The microscope detects the objective and the contrast method, and then automatically sets the best values for aperture, field diaphragm, and light intensity. The user can adjust these values at any time. Modified settings are automatically stored and imported as the microscope's new default values.

Constant Color Intensity Control (CCIC)

Leica's CCIC module (DM5000-6000) filters out red and orange hues at low lamp voltages and runs (unnoticeably) in the background. CCIC main-tains the color temperature at a constant 3200 K. The white balance that is normally required for digital camera use is now a thing of the past. With the new Leica DM4000 LED microscopes, the transmitted light LED illumination provides constant color temperature at all light intensity levels.



Filter magazine

Almost completely unnecessary with CCIC: the mechanical filter magazine for two filters that is inserted into the beam path manually.

2. Automated fluorescence axis

Brilliant fluorescence at the press of a button

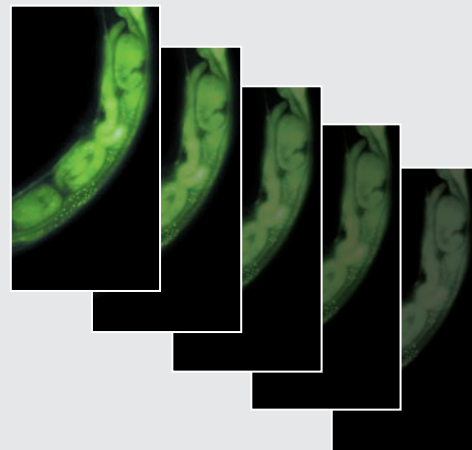
Leica's fluorescence axis reveals brilliantly-colored specimens at the press of a button.

- motorized fluorescence filter changer, field diaphragm and shutter.
- fluorescence intensity management (FIM)
- fast internal filter wheel (IFW)

Leica FIM

(Fluorescence Intensity Management)

Leica FIM, a unique innovation, provides fast, accurate, and reproducible adaptation of the fluorescence intensity. Pinhole diaphragms of varying translucence are placed on the FIM aperture disk. The intensity of the excitation light can be reduced in five stages: from 100% to 55%, 30%, 17%, to a low of 10%. Advantages include absolute reproducibility, faster intensity change, and reduced specimen bleaching. A separate FIM level can be saved in order to adjust different fluorescence intensities for each fluorescent filter.

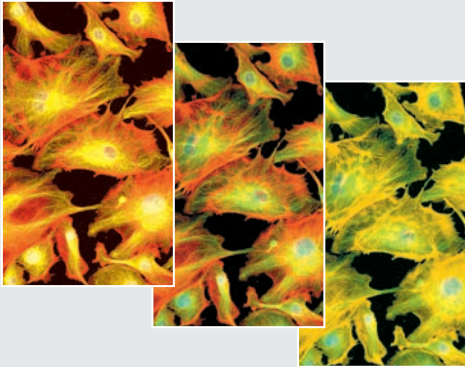


Motorized shutter

The FIM disk also features a fast shutter that stops fluorescence excitation in less than 0.1 seconds.

Motorized Excitation Manager

The Excitation Manager is used to balance fluorescence when viewing multiple probes simultaneously. It offers sixteen steps for reproducible attenuation of red or green-emitting fluorescence.



Fast Internal Filter Wheel (IFW)

Leica's IFW controls single excitation channels when using a dual or triple fluorescence cube. This allows much faster color changes for almost all fluorescence proteins.

Motorized field diaphragm

The motorized disk in the field diaphragm level features six round and square field stops of various sizes, which can be saved separately for every filter cube. When using a digital camera, the square field stops best match the image section to the chip size of the camera. Advantages: Leica's motorized disk prevents bleaching of prepared sections that have not yet been imaged and improves the signal-to-noise ratio.

Motorized fluorescence turret

The fluorescence turret is available as a 5-cube or 8-cube model. Both work with the same filter cube size for easy switching between instruments. The switch between filter positions takes less than 0.5 seconds. The user can select continuous change, move directly to an individual cube, or a combination of both.

Booster lens

If more fluorescence light is needed, simply switch the fluo booster into the beam path. The booster lens immediately increases the fluorescence by 30%.

3. Automated industrial axis

Every industrial sample is viewed in the correct light

Experience the comfort of using Leica's industrial axis, which makes work at the microscope much easier:

- motorized reflector disk accommodates up to four reflector or fluorescence cubes
- motorized pinhole disks in the aperture stops and illuminated field diaphragm level

Motorized aperture diaphragm

The aperture diaphragm features a motorized disk with eleven stops of various sizes that can be saved separately for every objective. The aperture openings can be varied between 5% and 100% – and reproduced at any time.

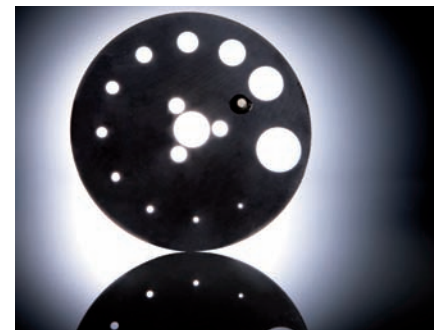
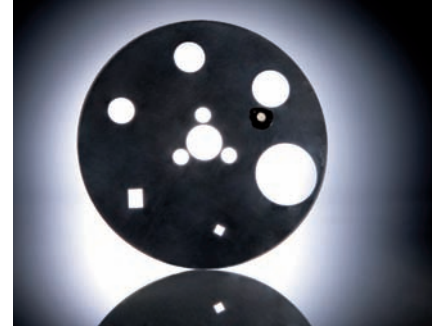
Motorized field diaphragm

The field diaphragm features a motorized disk with four round and two square field stops of various sizes that can be saved separately for every objective. Similar to the fluorescence axis, square field stops are recommended for work with digital cameras to match the image section to the camera's chip size.

Motorized reflector turret

The reflector turret is available as a 4-cube model. Two positions are reserved for a Smith reflector and DF (darkfield) cubes; the remaining positions can be used as desired. Switching between two filter cubes takes less than 0.5 seconds.

3 Automated industrial axis

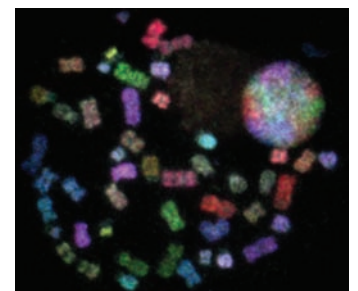


Top:

The motorized field diaphragm adjusts illumination when switching between different objective positions.

Bottom:

With the motorized aperture diaphragm, eleven positions can be set, saved, and reproduced.



Metaphase chromosomes, FISH staining
Photo: Dr. Yumiko Suto,
Laboratory for Human Evolution
Graduate College for Limit Sciences at the
University of Tokyo

Focus drive 4



The arrangement of the focus and stage drive controls provides easy, one-handed operation of the x, y and z settings.

Objective nosepiece 5



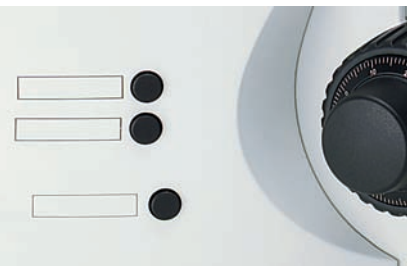
Coded M25 thread objective nosepiece; shown here on the Leica DM5000 B.

1.25x panorama objective 6



Leica's new 1.25x panorama objective with high depth of field and excellent contrast is ideal for reflective and transmitted light overviews.

Variable function buttons 7



Intuitive operation: the variable function buttons can be individually programmed by the user

4. Focus drive

Sharp images – focus adjustments are perfectly simple

The manual Leica DM4000* and DM5000 Microscopes both feature a mechanical, 2-speed gear system. The left side of the stand has a conventional focus knob for coarse and fine focus adjustment. The flat focus knob on the right side of the stand for fine focus adjustment ensures comfortable operation:

- single-handed operation of the focus and stage drives
- work ergonomically with a symmetrical body position

* The Leica DM4000 M LED is optionally available with motorized focus drive

Focus once – always in focus

The automated Leica DM5500 and DM6000 Microscopes are both outfit with a motorized focus drive for fast focus, which does not require additional, manual adjustment. The electronically-controlled focus drive has five speeds, and a different speed can be set for every objective. For individual, manual focusing, a coarse focus mode is available. Parfocal compensation can be saved for all objectives. For a higher degree of user safety and comfort, the user can define a bottom z-threshold and save the focus position.

5. Objective nosepiece

Fast microscope adjustments

Each Leica DigitalMicroscope stand features a coded objective nosepiece that allows the microscope to respond quickly to adjustments.

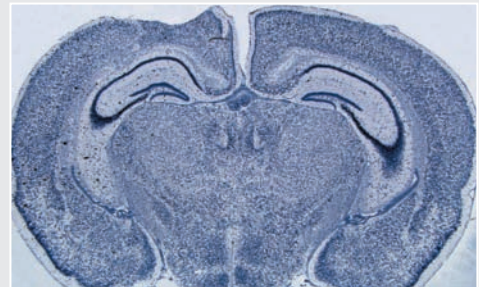
Manually operated objective nosepieces:

- Leica DM4000 B LED: 6x or 7x; M25 thread
- Leica DM5000 B: 7x; M25 thread
- Leica DM5500 B: 7x; M25 thread
- Leica DM4000 M LED: 6x; M32 thread

Motorized objective nosepieces

- Leica DM6000 B: 7x; M25 thread
- Leica DM6000 M: 6x; M32 thread

With Leica's motorized nosepieces, the objectives can be used in two modes: dry or immersion. Activation of a mode automatically prevents the use of objectives of the other mode. This effectively stops dry objectives from coming into contact with immersion oil.



6. Overview objective 1.25x

The best panorama view

New overview objective 1.25x. Available in a pure reflected light version for material sciences and as a reflective/transmission version for biological applications.

7. Variable function buttons

All microscope functions under control

Conveniently located, intuitive operation: three separate function buttons are located behind the right and left manual focus knobs. The user can program these buttons to perform any desired function. Additional programmable function buttons are located on the Leica SmartMove remote control and on the external Leica STP6000 SmartTouch Panel control.

Contrast manager

Leica DigitalMicroscopes make changing contrast methods easier than ever before. Simply press a pre-programmed function button, and the selected contrast method is automatically set. The appropriate light rings, prisms or darkfield stops are automatically set. Also, the aperture diaphragm, field diaphragm, and light intensity are set.

8 Displays

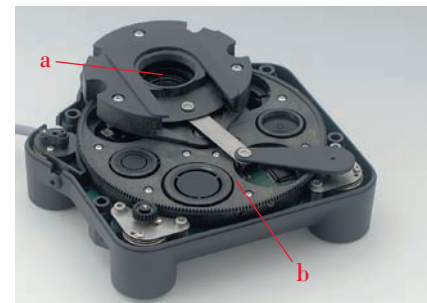
	TL_BF	±	±
	10x Obj.		
	1.25x MagCh.		Σ 125x
	INT 100%		
	AP 33		FD 30
	50%		50%

Shown here: the Leica DM4000 Microscope, information on contrast method, magnification, and Köhler settings can be read at a glance.



The contrast side of the Leica SmartTouch. A press of the button is enough to change the contrast method.

9 Condensers



The open PH condenser with an area to connect the condenser button (9a) and with motorized condenser disk (9b).

The DIC (differential interference contrast) is also completely automated. Press one button and the objective prism, condenser prism, analyzer, and polarizer automatically swivel into place.

8. Displays

Everything in view

The new generation Leica DigitalMicroscopes are outfit with an easy-to-read LCD.

New: status display

The Leica DM4000 Microscope features a large, clear display that shows all of the settings at a glance – a unique feature in this class of microscope.

New: Leica SmartTouch

All automated components of the Leica DM5000 through DM6000 models can be quickly and intuitively controlled via the new Leica SmartTouch which is integrated into the stand.

9. Condensers

Never touch phase rings again

Leica DigitalMicroscopes automatically activate the correct light ring for the selected objective. The aperture diaphragm for the perfect phase contrast image is also automatically opened. All condensers feature automated condenser buttons and are fully effective from 1.25x to 100x magnification.

BF (Brightfield) Condenser

Leica's BF condenser has been specially developed for brightfield applications and is particularly useful for materials analysis.

PH (Phase Contrast) Condenser

Leica's PH condenser is ideal for phase contrast and is also suitable for brightfield and darkfield. New: a separate light ring can be used for every objective, which makes centering unnecessary when changing objectives.

DIC (Differential Interference Contrast) Condenser

Leica's DIC condenser enables operation of fully automated DIC with an integrated, motorized polarizer. The DIC condenser can also be used for brightfield, darkfield, and phase contrast methods in materials science and biomedical applications.

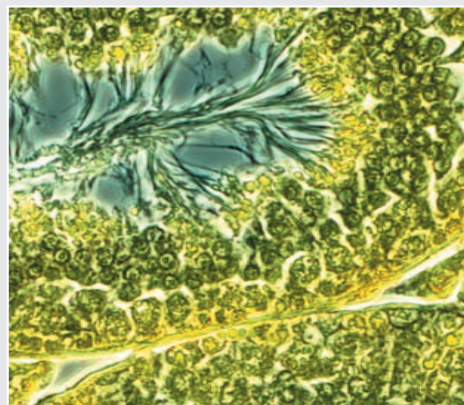
10. DIC concept

Semi-automated, or

The Leica DM4000 M LED Microscope for materials sciences is outfit with a manual turret for objective prisms. Together with a motorized polarizer and analyzer, the system enables semi-automated reflective interference contrast.

... Fully automated

The Leica DM5000 through DM6000 DigitalMicroscopes feature unique fully automated DIC. The Electronically-controlled prism disk has up to three objective prisms. The correct objective, and if applicable – condenser prisms, automatically move into the beam path. The polarizer and analyzer adjust also. The fine adjustments for objective prisms are saved for every objective and are reproducible at any time.



Tubes 11



MBDT25+ V100/50/0, motorized documentation tube with three settings (100/50/0) and optionally, one or two camera outputs; also available as a manual model (BDT25+ V100/50/0).



AET22, ergonomic tube with variable tube optics (5°–32°) and a 30 mm eyepiece extension. Also available as a documentation tube without eyepiece extension (EDT22 F50/50).

11. Tubes

The optimum view

Leica's family of tubes have been specifically designed to offer a variety of options to Leica DigitalMicroscope users:

BT25+, basic binocular tube – the entry-level model

AET22, ergonomic tube for demanding work in the laboratory

EDT22 F50/50, ergonomic tube for documentation

BDT25+ V100/50/0, documentation tube specifically for reflective and fluorescence methods

MBDT25+ V100/50/0, motorized version of the BDT25+ V100/50/0

12. Stages and specimen holders

The best stage movement

The Leica DigitalMicroscope line features stages and specimen holders that meet the highest ergonomic standards. All microscope stages are ceramic-coated and are outfit with telescopic stage controls. The stage drive torque can be adjusted separately for x and y. Leica's 6" stages for materials analysis feature an additional fast adjustment mechanism. The rack in the x-direction has been replaced by a belt drive for working at the microscope in comfort.

The motorized stage operates with a stepper motor and features a working range of 76 x 50 mm. The stage movement adjusts to the magnification of the objective. Similar to the focus drive, the motorized stage can be switched to a "fast mode." A number of stage positions can be saved to re-locate an area of interest on the specimen, quickly and accurately.

13. Leica SmartMove

Quickly select the correct settings

The microscope user can control all three axes of the microscope (x,y; stage; z; focus) with the Leica SmartMove remote control. Additional microscope functions can also be assigned to four function buttons.

14. Leica STP6000 SmartTouch Panel

Control the microscope from any position

The new Leica STP6000 SmartTouch Panel can be used to completely and conveniently control the microscope from any position at the laboratory workstation. All automated functions can be set intuitively from the external control panel. The SmartTouch Panel provides the same graphical user interface as LAS (Leica Application Suite) software. The SmartTouch Panel also offers a focus wheel for fine and coarse adjustment, controls for x,y stage adjustments, and eleven programmable function buttons. This provides easy, convenient control of all functions with just one module.



SmartMove 13



Leica SmartMove remote control is used to control the x, y, and z settings.

Specifications

			DM4000 B LED	DM5000 B	DM5500 B	DM6000 B	DM4000 M LED	DM6000 M
Stand	Power supply	– integrated in stand – in electronics box	x				x	
	Display	– display – Leica SmartTouch	x	CTR5000	CTR5500	CTR6000	x	CTR6000
Operation	Ports	– USB 2.0 + I ² C	x	x	x	x	x	x
	Focus	– mechanical – 2-ratio gearbox	x	x			x	
		– motorized – 5 electronic ratios – incl. parfocal function – switch between coarse and fine mode – memory location for 2 z-positions			x	x		x
	Obj. nosepiece	– absolute coded	x	x	x	x	x	x
		– motorized – incl. dry and immersion mode				x		x
		– 6x M25 thread – 7x M25 thread – 6x M32 thread	x	x	x	x		
	Stage	– motorized – stepper motor – switch between fast and precision mode – incl. memory location for 6 stage positions			x	x		x
		– mechanical – ceramic-coated – y-drive with cable – telescopic stage drive – adjustable torque – 110° rotation – optional left-handed version	x	x	x	(x)	x	(x)
	Controls	– 6 programmable function buttons	x	x	x	x	x	x
		SmartMove – controls for z (focus) movement and x,y (stage) movement – 4 programmable function buttons			x	x		x
		Leica STP6000 – controls for z (coarse and fine focus) and x,y (stage) movement – 11 programmable function buttons – touch panel with information and control panels			x	x		x
TL-axis	Illumination	– LED – 12 V 100 W halogen lamp	x				x	
	Automation	– light manager (brightness, field and aperture stop) – contrast manager – constant color intensity control	x	x	x	x	x	x
	Contrast method	– BF – PH, DF, POL – DIC (semi automated) – DIC (automated)	x	x	x	x	x (x) (x)	x (x) (x)
Fluo axis	Mot. filter disk	– 5x – 8x	x	x	x	x		
	Illumination	– 100 W Hg lamp, EL6000, SFL100/4000/7000*	x	x	x	x		
	Automation	– fluorescence intensity manager (FIM) – contrast manager – round and square illuminated field diaphragms for ocular and camera observation	x	x	x	x		
RL axis	Mot. filter disk	– 4x – 2 fixed positions – 2 adjustable positions					x	x
	Illumination	– 12 V 100 W halogen lamp or LED (only Leica DM4000 M LED) – 100 W Hg lamp – 50 W Hg lamp					x x x	x x x
	Automation	– light manager (brightness, field and aperture stop) – contrast manager – round and square illuminated field diaphragms for ocular and camera observation					x x	x x
	Contrast method	– BF, DF, POL – DIC (semi automated) – DIC (automated)					x (x)	x (x)
Condenser	Automation	– condenser head, mot. – 7x condenser disk, mot. (optional) – polarizer, mot. (optional)	x	x	x	x	x	x
			x	x	x	x	(x)	(x)
			x	x	x	x	(x)	(x)

*SFL7000 (for DM5000-6000 B)

