

Living up to Life

*Leica*  
MICROSYSTEMS

# Leica DMI4000 B Leica DMI6000 B

Automated Inverted Microscopes for Life Sciences





Leica Design by Christophe Apothéloz

# Intelligent Imaging – At the Touch of a Button

## Let there be light

Change the objective, and readjust the brightness and diaphragms. How many times a day do you do that? As of now, it's history! The Leica DMI Illumination Manager handles it for you reliably. When changing magnification or contrast technique, it automatically sets the brightness, aperture, and field diaphragm to their optimal values. And if you have special requirements regarding the settings, then simply adjust them and the microscope will adopt them immediately.

## Less for more

What's more, the light intensity control can also be used for fluorescence. The Leica FIM (Fluorescence Intensity Manager) regulates light intensity at five fixed levels – and remembers the setting for each filter cube.

## Like a rock

Microscope stands are made of metal. When metal warms up, it expands and that's a law of physics that can't be circumvented. But it doesn't have to interfere with your work. Long-term measurements can take hours or even days, and it's important that the selected focal plane remains in the same place during the entire experiment. The expansion of a metal stand can affect this adversely. The Leica DMI6000 B is equipped with Stability Manager temperature drift optimization that reduces drift in the z axis to a minimum.

## Intelligence



### Illumination Manager

The Leica Illumination Manager for custom diaphragm and light settings is located on the left side of the instrument. Switching between transmitted light and the fluorescence axes is simply a matter of touching a button. Each change is automatically stored and displayed.



### Fluorescence Intensity Manager (FIM)

The FIM disk is located in the aperture diaphragm plane of the fluorescence axis. It features stop plates of varying transmissivity for improved homogeneity and excitation brightness control. The regulation takes place in five fixed steps: 100%, 55%, 30%, 17% and 10%.

# Intelligent Imaging – At the Touch of a Button

## MYcroscopy

The Leica DMI series offers seven to eleven freely programmable buttons to operate the functions most important to you. Use them to create your own microscope – put the functions you need wherever you want them.

## Once in focus – always in focus

The Leica DMI6000 B's motorized z focus and parfocality function are special highlights. Objective sets are designed to ensure that the focal planes of individual objectives always lie in the same z plane. If minor deviations arise due to production tolerances, it may be necessary to correct the focus after changing objectives. In this case, the parfocality function compensates for different focal planes. In addition, the focal plane and an additional lower plane can be saved and restored automatically.

## A clear view, wherever you look

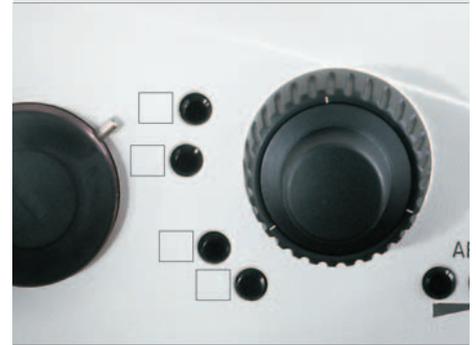
The graphical display has been structured so that you can view it with a quick glance. It cannot be obscured, even when using large climate chambers. The current status of the microscope is always visible.



### Status display

All microscope settings at a glance: the current contrast method, selected magnification, illumination parameters and camera ports, as well as information on the focal plane are all available.

## Intelligence



### Free programming

Four of the freely programmable buttons are located on the left side of the microscope. Three additional buttons on the right side of the microscope and four on the SmartMove\* remote control complete the selection. Each of these buttons can be programmed without restrictions to perfectly configure the microscope to your requirements.



### Focus Manager\*

The Focus Manager, which stores, deletes, and travels to two focal planes, is located on the right side of the microscope. In addition to storing the focal plane, a further, lower level can be stored to ensure reliable objective changing, even with complex stage setups.

\* Available for the Leica DMI6000 B.

# Experience and Innovation – The Art of Creating Brilliant Images

## **Contrast and resolution for every specimen –**

### **Leica's new DIC (Differential Interference Contrast)**

It's a familiar phenomenon when using DIC: improved contrast results in lower resolution and vice versa. This effect is more pronounced when observing specimens that are unusually thick or thin. Leica offers special prism combinations for such cases: Prism C for regular thickness, C1 for especially thick, and C2 for especially thin specimens.

The unique Leica DIC is the first and only DIC to be fully motorized and completely automated. After choosing the objective, the microscope automatically activates the correct compound prism, polarizer and analyzer.

Even the DIC's bias adjustment is motorized. The microscope stores the fine adjustment for each objective and restores it automatically. It's simply the fastest, most reliable way to set up DIC.

## **Take the optics into your own hands –**

### **New integrated Modulation Contrast (IMC)**

Leica optics experts have created an integrated interpupillary interface. Leica's IMC provides modulation contrast in complete perfection, with brightfield objectives – an optical stroke of genius that's easy on the budget.

## **Why settle for less? –**

### **New integrated Phase Contrast (IPH)**

If you can realize modulation contrast with bright-field objectives, you shouldn't have to buy special objectives for phase contrast. Leica has applied the integrated interpupillary interface to another revolutionary phase contrast method, IPH. It's the first phase contrast in which you can influence the contrast yourself – also with bright-field objectives.



*C. elegans* recorded with DIC and Wollaston prisms with different splitting angles.

Image source: IGBMC, Strasbourg (F)

**Seeing with different eyes – the new fluorescence**

How can you improve on something that’s already outstanding? By studying the smallest details. That’s precisely how Leica optical experts perfected the fluorescence axis of the Leica DMI microscopes. Every single optical component of the fluorescence axis was studied and optimized with regard to transmission, image flattening and light flux qualities. The result is a fluorescence axis of peerless optical quality.

**Another helping?**

The Leica DMI series can accommodate up to six fluorescence filter cubes at a time – more than enough for most studies. And if another filter cube is needed? Replacement is easy: Simply press a button to swing out the filter disk and replace the filter cube with a click. What’s more, the filter disk positions a filter cube into the beam path in less than 0.2 seconds – unparalleled convenience.

**Everything at a glance**

The most important fluorescence functions – filter cube change-over and shutter function – can be monitored at a glance and controlled at the front panel. Feedback is displayed immediately.

**Open for partners**

The diameter of the new fluorescence axis is one inch. It’s therefore ideally suited for peripherals such as shutters or external filter wheels. And, this equipment can be controlled via Leica software solutions.



**Fast filter changing**

Shown is the open drawer of the 6-position filter holder for fluorescence filter cubes. The cover opens at the touch of a button and automatically moves the filter cube into the beam path to the opening. Filter cubes can be replaced in seconds.



**Clearly designed controls**

The most important fluorescence functions are grouped on the front panel. Each filter cube can be controlled directly. The shutter opens or closes at the touch of a button. Feedback is immediately displayed.



**Leica EL6000**

New external light source for fluorescence excitation. The adjustment-free metal-halogenide lamp with its long bulb life saves time, money and energy.

# Imaging System for Observing Living Cells

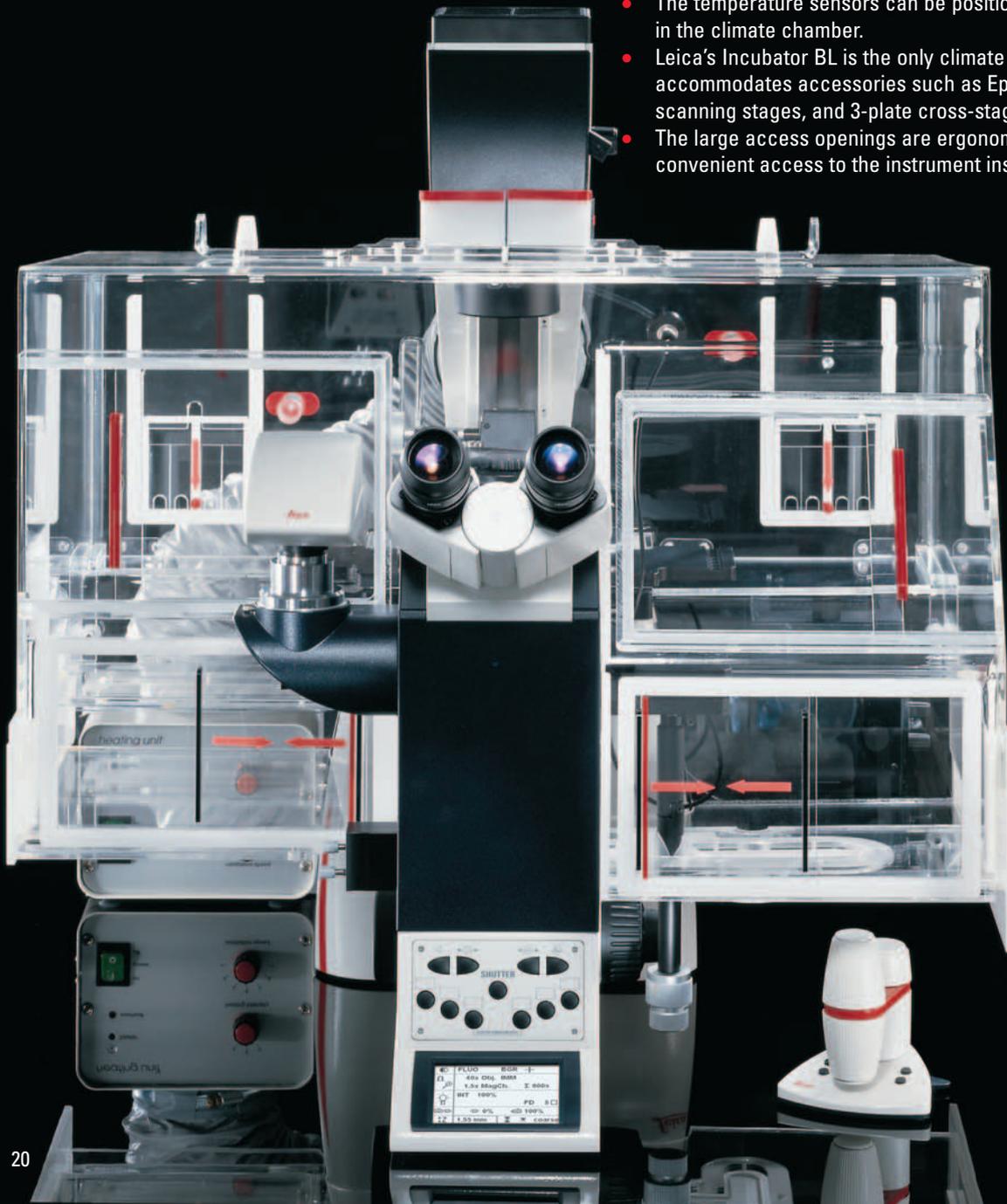
Imaging systems are fundamental for recording, processing, and archiving images – ease of use and suitability for universal deployment are essential. The system below consists of a Leica DMI6000 B, Incubator BL and heating unit. Leica recommends the Leica DFC FX camera range, such as the Leica DFC310FX for colour imaging or the monochrome DFC360FX, specifically designed for fluorescence applications. The Leica AF6000 software has been developed especially for fluorescence applications. Users with a wide range of applications are well served by Leica QWIN, with its macro editing capability.

## Leica DMI6000 B:

- The fully automated fluorescence and transmitted-light axes can be fully remote controlled from the PC. Accessing the climate chamber to operate the microscope is not necessary.
- Remote control via Leica SmartMove provides vibration-free conditions.
- The display is located outside the climate chamber and can be read clearly at all times.

## Incubator BL:

- The temperature in the sealed chamber can be held constant at up to 17°C above room temperature.
- Fresh air availability has been optimized with generously-sized ventilation hoses.
- The temperature sensors can be positioned and attached anywhere in the climate chamber.
- Leica's Incubator BL is the only climate chamber that completely accommodates accessories such as Eppendorf manipulators, scanning stages, and 3-plate cross-stages.
- The large access openings are ergonomically shaped and allow convenient access to the instrument inside the chamber.



### From refrigerator to sauna

Stage inserts for all types of vessels, combined with temperature control units, ensure correct temperatures for your experiments. From below freezing to +60°C, any temperature is possible. Simply choose the components that best suit your requirements.

### Everything under control

A comprehensive range of control equipment is available for the Leica DMI series. Carbon dioxide control units maintain constant pH values. Oxygen controllers regulate the O<sub>2</sub> concentration required by your cells. Temperature regulators are also available to maintain any required physiological temperature.

### Perfect climate

Your specimens require defined environmental conditions for your experiments. The Leica DMI series offers everything you need in this respect. Leica climate chambers are available in a variety of sizes – from models designed to accommodate a single Petri dish, to one that encloses the entire microscope.



#### Incubators

Shown is an incubator, designed for use with Petri dishes and glass slides. The transparent incubator housing is placed on a heating insert or heating stage. Glass inserts are integrated in the covers to allow observation in DIC contrast.

For detailed descriptions of the various stages, heating and cooling inserts and control instruments, please refer to Leica's separate brochure, "Live on Stage". Order number: 914 352



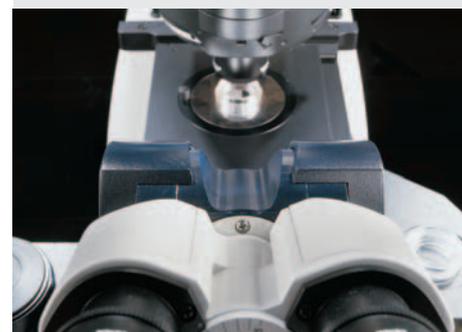
#### Heating and cooling inserts

Leica's wide range of heating and cooling inserts covers the needs of virtually any user. Inserts for Petri dishes, coverslips, multi-well dishes, and other vessels can be integrated in the stage of your Leica DMI microscope. An M24 multi-well dish heating insert is shown.



#### Controllers

The CTI Controller 3700 is used to control temperatures and carbon dioxide.



#### Unobstructed view of the specimen

The "viewing channel" integrated in the tube provides a clear view of your specimen, and lets you switch from microscopic to visual observation of your specimens at any time without changing the tube setting.

		<b>Leica DMI4000 B</b>	<b>Leica DMI6000 B</b>
<b>Stand</b>	<b>Power supply</b>	• in CTR4000 electronics box* <sup>1</sup>	• in CTR6000 electronics box* <sup>2</sup>
	<b>Display</b>	• information display 77 x 49 cm (W/H)	
	<b>Interfaces</b>	• RS232 • 2 x USB	
<b>Focus</b>	<b>General</b>	• manual • coarse and fine drive	• motorized • 5 electronic speeds • switching between coarse and fine mode
<b>Objective turret</b>		• 6x M25 • manual, absolute coded	• motorized, absolute coded
<b>Controls</b>	<b>Stand</b>	• 7 freely programmable buttons • buttons with fixed functions for – illumination manager, focus functions, camera ports, subsequent magnification, fluorescence functions	
	<b>SmartMove (remote control)</b>		• buttons with fixed functions for – focus threshold values, quick focus • control element for focus (z) and stage movement (x, y) • 4 freely programmable buttons
<b>Stages</b>	<b>Mechanical stages</b>	• fixed stages – various sizes – ceramic-coated – over 20 different inserts available – can be equipped with heating and cooling inserts • 3-plate cross-stages, manual (also slim form for micromanipulator)	
	<b>Motorized stages</b>	• 3-plate cross-stages, motorized (also slim form for micromanipulator) • spindle stage	
<b>Transmitted-light axes</b>	<b>Illumination arm</b>	• 12 V/100 W halogen lamp • field diaphragm (motorized or mechanical) • filter magazine for 2 filters /motorized or mechanical) • shutter (motorized or mechanical)	
<b>Condensers</b>	<b>General</b>	• condenser disk for optical elements with – 4 large openings for prisms, DF stop, BF, PH rings, IMC modulators – 3 small openings for BF, PH rings, IMC modulators • suitable for magnifications from 1.25x to 100x • integrated aperture diaphragm (motorized or mechanical) • separate polarizer (motorized or mechanical)	
	<b>S1–28</b>	• condenser disk (motorized or coded) • flip-top condenser head (motorized or mechanical)	
	<b>S70</b>	• condenser disk (motorized or coded) • fixed condenser head • mechanical lens for low magnifications	
<b>Fluorescence axis</b>	<b>Filter disk</b>	• motorized • for up to 6 filter cubes	
	<b>Illumination</b>	• 100 W Hg lamp	
<b>Automation</b>	<b>Focus</b>		• including parfocality function • positioning memory slots for fast travel to 2 z-positions
	<b>Illumination Manager, transmitted light</b>	• adjustment of brightness, aperture and field diaphragms to the objective and contrast technique currently in use	
	<b>Contrast Manager</b>	• adaptation of optical elements such as prisms or light rings to the objective and contrast technique currently in use	
	<b>Illumination Manager, fluorescence</b>	• FIM (Fluorescence Intensity Manager) – adaptation of brightness in 5 fixed levels • adjustment of field diaphragm to the eyepieces or camera chips (round or rectangular diaphragms) • IFW (Integrated Fast Filter Wheel) – very fast switching of excitation with changeover times of less than 0.05 seconds • Leica Excitation Manager – red-green attenuation in 8 levels	

\*<sup>1</sup> CTR6000 or CTR6500 boxes are used in conjunction with motorized and scanning stages.

\*<sup>2</sup> The CTR6500 box is used with scanning stages.