



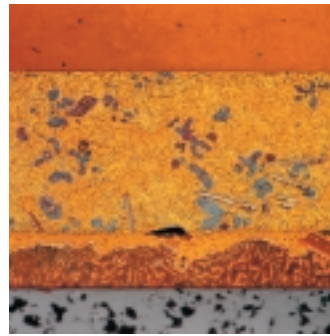
# Leica DM IRM

Inverted Research Microscope  
for Materials Testing

*Leica*

# Leica DM IRM

The Leica DM IRM is part of the Leica DMR/L microscope series and the new Leica HC infinity optics concept. This makes it system-compatible with Leica incident light materials microscopes which will be of interest to you from the point of view of both application technology and economics.



Spray coating, colour-contrasted

As it is task-orientated, economical and can be equipped for specific or universal use, it is the ideal microscope for specifically-defined and calculated routine tasks in quality control and for materials research.

It can be used universally, handling large sample dimensions and loads accurately and ergonomically while taking up very little space on the work-bench.

With its direct V-beam path and the principle of infinity image distance correction, the Leica DM IRM follows on from the well-known Leica MM5/6 range, its design continuing the qualities of that range.

The high-performance optics of the Leica HC family guarantee maximum image resolution and image contrast.



# Performance characteristics

## 6 stand types to choose from

Even when choosing the base stand, you can take advantage of the modular, system-compatible concept and target equipment to your specific tasks and budget.

The solid, useful and attractive base stand with its smooth, clean surfaces guarantees quality images operating stability and operating convenience right up to maximum final magnifications.

## Direct V-beam path

The V-beam path takes the image to the observer or into the documentation level with the shortest possible route with few glass/air surfaces. Brilliant, highly-contrasting sharp images are the result.

## Tube lens system 1x

### Magnification changer 1x/1.5x

### Magnification changer 1x/1.5x/Bertrand lens

The base stand offers you these 3 alternative options for equipping the tube lens system. The magnification changer allows better resolution of the details of a workpiece quickly and without changing the objective and exploits to the fullest, the "useful magnification" of the objectives. The Bertrand lens is advantageous for rapid overview observations and, above all, as an auxiliary telescope for transmitted light observation.

## Photographic/CCD side port

All stands are fitted with a photographic/CCD output at the side immediately underneath the objective nosepiece. C- and B-mount CCD cameras or photomicrographic devices can be adapted here. The light path to this output can be switched as follows:

20 % visual/80 % side port

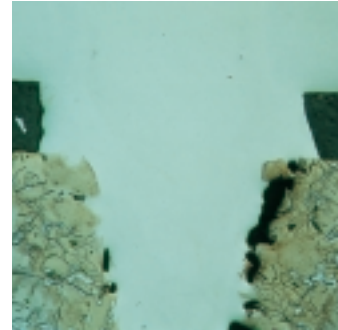
100 % visual/ 0 % side port

A beam split 100 % visual/100 % side port is also available on request.

## Built-in power supply

The built-in stabilized power supply for 12V 100 W halogen lamps has automatic voltage switching. It adapts automatically to the prevailing mains voltage in the range from 90 V – 250 V.

Stabilization suppresses spontaneous fluctuations in brightness and thus prevents color temperature changes in the light which is of particular advantage when taking reproducible color photographs.



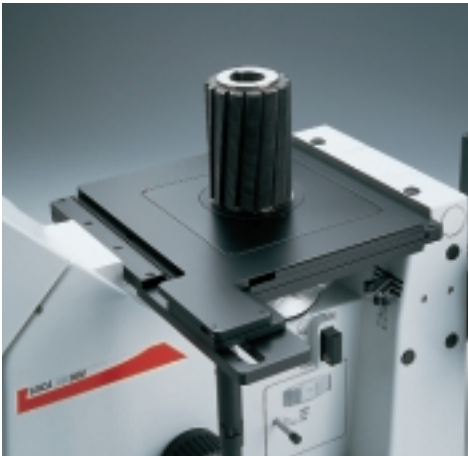
Leica DM IRM, side view



Leica DM IRM, central part of microscope with side photo/TV exit



High alloy steel with interference colour layer



3-plate mechanical stage



Quintuple objective nosepiece

### **Interchangeable lamphousings**

Large lamphousings with 12 V 100 W halogen lamps can be used either with user-friendly precentering or with reflector and lamp centering.

Using Hg 100 W or Xe 75 W gas discharge lamps for very high light intensities or fluorescence examinations, is not a problem. Externally supplied lamphousings can easily be attached using the bayonet for changing lamphousings.

The lamphousings can be simultaneously mounted via an optional mirror housing.

The adjustment knobs face the operator in a user-friendly manner.

### **3-plate x/y stage**

#### **Universal for all sizes and shapes of sample**

Whether your sample is small or large, the capacity of the 3-plate x/y stage is almost unlimited, and allows destruction-free microscopic examination of even large components.

Broad and tall components can easily be accommodated on the large stage area measuring 247 x 230 mm. For large parts, the inner, square stage insert measuring 150 x 150 mm can be removed completely.

Small samples are placed on the inner inserts with openings of 80 mm, 40 mm, 30 mm and 20 mm. Some have knobs to facilitate removal or turning of the sample.

#### **High sample load – large adjustment range**

The double-sided, large-area stage support of the base stand makes it possible to accommodate high sample loads up to 8 kg. The large adjustment range of 60 x 40 mm in the x/y direction allows rapid scanning and rapid access to the interesting and important parts of the workpiece.

Other workpiece stages are available on request, such as plane and scanning stages.

#### **Nosepiece focusing – reliable and accurate**

Samples are focused by the quintuple objective nosepiece with the result that precision of focusing is unaffected by stage and sample load. The objective nosepiece is equipped with the universal M32 x 0.75 mm thread to accommodate all types of objectives in the Leica range.

# The new incident light system

## Incident light system with new illumination principle

The new design of the illumination axis takes the different sizes of light source into account, regardless of whether bulb filament or discharge arc. This ensures a perfect flow of light with maximum brightness and homogeneity.

In addition, you benefit from the strong 100 W illumination.

The 12 V 100 W halogen lamp displays and records even light-critical contrast methods like darkfield, polarized light and interference contrast methods brightly and with high contrast.

The field and aperture stop are arranged in accordance with the tried and tested Köhler principle and can be used effectively to optimize resolution, contrast and depth of sharpness.

Both stops can be centered and are located within comfortable reach of a seated user.

## Incident light reflectors

The incident light reflectors are arranged in the triple reflector disk protecting them from dust. If a change in contrast method is desired (e. g. brightfield or darkfield), they can be quickly changed over by rotating the reflector turret. Here too, you benefit from Leica system compatibility and the broad range of application-optimized reflectors from the Leica range.

## 7 spaces for light filters

Light filters help fine-tune image contrast. They are essential for observation and for tailoring illumination for photographic and electronic image documentation. A built-in, permanently-loaded filter magazine with 3 light filters plus 2 spaces for an individual choice of filter is available. In addition, an external filter holder with 2 filter slots can be utilized.

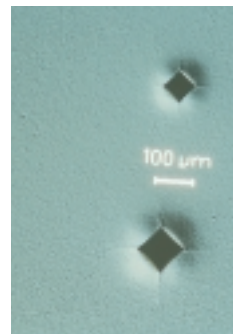
## Dimensions:

### Viewing height:

with HCI B 22 tubes	460 mm
with HCI BV 22 tubes	400 – 480 mm
with HCI 3T 22 tubes	460 mm
with HC FSA 25 tubes	430 mm

### Stand size:

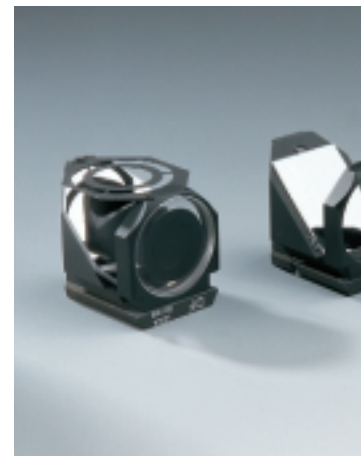
Depth incl. lamphousing, side	660 mm
Front-to-back incl. lamphousing, rear	810 mm
Width (max.)	360 mm
Stage height	270 mm



Microhardness indentations  
with µm mark overlay



Hardened spring steel,  
interference contrast

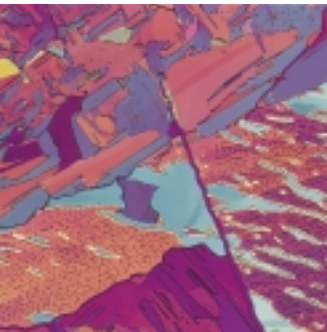


BF and BD reflectors

# The optics



Selection of N PLAN and PL FLUOTAR objectives



Ore mineral, polarisation contrast

## HC objectives with infinity distance correction

In incident light microscopy, Leica has always used and continued developing the principle of infinity distance correction. The new HC optics concept further increases optical performance and optimizes it for contrast methods in incident and transmitted light. You can choose from over 120 individual objectives to best fit your imaging needs.

## Universal for all contrast methods

The HC objectives for the Leica DM IRM microscope facilitate the following contrast methods in incident or transmitted light:

- brightfield/darkfield
- polarization contrast
- interference contrast
- fluorescence

For transmitted light examinations, phase contrast is also possible. Interferometric measurements can also be performed in incident light.

The Leica DM IRM is compatible with all infinity corrected high-performance objectives in the Leica range.

## Eyepieces

For imaging and standard magnification with sharp edges, eyepieces with 20 or 22 mm fields of view are provided. All eyepieces are designed for observation with or without eye glasses. Eyepieces with adjustable eye lenses (M type) like the HC PLAN 10x/20  $\infty$  or 10x/22  $\infty$  (M) eyepieces have slots for reticules. Outside standard magnifications, further eyepieces like 12.5x, 16x and 25x are available.

## N PLAN range of objectives

for brightfield and brightfield/darkfield (BD). Brightfield objectives can be adapted using an intermediate ring.

N PLAN	2.5x/0.07	11.2 mm
N PLAN	5x/0.12 (BD)	14.0 mm
N PLAN	10x/0.25 (BD)	5.80 mm
N PLAN	20x/0.40 (BD)	1.10 mm
N PLAN	50x/0.75 (BD)	0.37 mm
N PLAN	100x/0.90 (BD)	0.27 mm

## PL APO range of objectives

PL APO	50x/0.90 (BD)	0.28 mm
PL APO	100x/0.95 (BD)	0.16 mm
PL APO	150x/0.95 (BD)	0.20 mm
PL APO	250x/0.95	0.24 mm

## PL FLUOTAR range of objectives

for brightfield or brightfield/darkfield (BD)

PL FLUOTAR	1.6x/0.05	1.54 mm
PL FLUOTAR	2.5x/0.07	9.20 mm
HC PL FLUOTAR	5x/0.15 (BD)	12.00 mm
HC PL FLUOTAR	10x/0.30 (BD)	11.00 mm
HC PL FLUOTAR	20x/0.50 (BD)	1.27 mm
HC PL FLUOTAR	50x/0.80 (BD)	0.50 mm
HC PL FLUOTAR	100x/0.90 (BD)	0.30 mm
HC PL FLUOTAR	100x/1.30 (OIL)	0.13 mm

## Objectives with a long working distance

PL FLUOTAR	L 20x/0.40 (BD)	11.10 mm
PL FLUOTAR	L 50x/0.55 (BD)	8.00 mm
PL FLUOTAR	L 100x/0.75	4.70 mm
PLAN H	20x/0.40	12.60 mm
PLAN H	40x/0.60	7.10 mm



# Contrast methods

## **The new brightfield/darkfield concept (BD) for incident light**

Brightfield and darkfield are changed rapidly and straightforwardly by rotating the reflector turret.

Independent reflectors for both methods ensure separation of the light paths, provide high light intensity and brilliant image contrast.

The Köhler illumination principle is ensured in both brightfield and darkfield conditions and even in darkfield mode, the illumination aperture can be controlled with the aperture stop. This leads to an increase in darkfield contrast, especially at high magnifications.

## **New interference contrast concept for incident light**

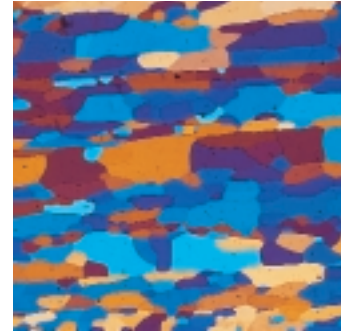
The ICR prisms are arranged separately from the objectives on a rotating turret. This allows the ICR prisms to be switched on and off in the beam path quickly and conveniently. Exit pupils of the incident light objectives, which are as uniform as possible, mean that fewer ICR prisms are required than before. The PL FLUOTAR range of objectives, for example, requires a single objective prism (D). ICR prisms no longer need to be switched over when the objective is changed.

The detection sensitivity of the interference contrast and the detailed resolution of structures can additionally be varied and optimized by selecting prisms (prism types D or D1) with differing beam splitting characteristics (shearing).

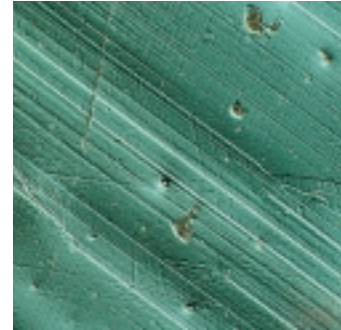
## **Polarization contrast**

The system compatibility of the Leica DM IRM microscope is also an advantage in polarization contrast.

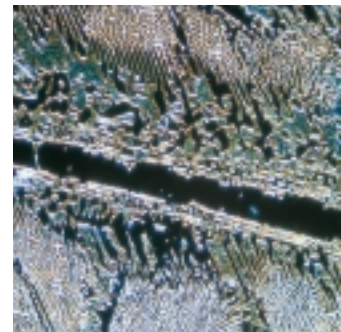
A large selection of polarizers from the Pol research program is available for the microscope. Fixed and rotating polarizers with fixed and rotating lambda plates make specific color contrasting of anisotropic structures and surfaces possible.



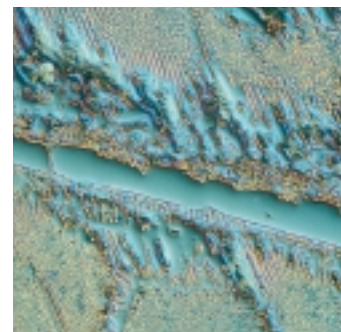
Aluminium, polarisation contrast



Polished steel surface, interference contrast

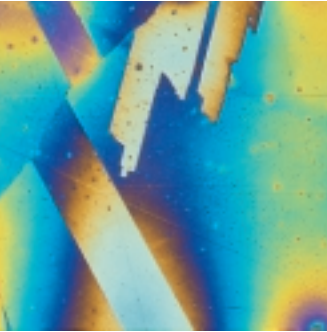


Pig iron, darkfield



Pig iron, interference contrast

# Contrast methods



Austenitic steel,  
interference contrast

## Transmitted light method

The Leica DM IRM is a microscope that can be extended to cover all transmitted light methods. It enables the following contrast methods to be performed on transparent objects:

- c brightfield
- c darkfield
- c phase contrast
- c polarization contrast
- c interference contrast ICT

The ability to accommodate the transmitted light illumination arm are integrated in the stand. The illumination and condenser accessories for transmitted light can be found in our special brochure for the Leica DM IRB.

## Incident light fluorescence

Up to 3 fluorescence filter systems can be accommodated in the reflector nosepiece.

An extensive range of these systems, including excitation filters, splitting mirrors and barrier filters, is also available for materials testing.

Other fluorescence and illumination accessories like Hg 100 W and Xe 75 W gas discharge lamps can be adapted directly or via the mirror housing.



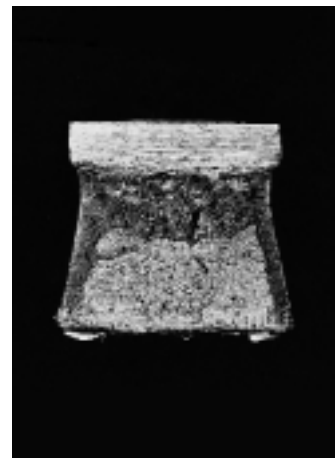
Leica DM IRM with transmitted light illumination



Leica DM IRM  
with macrodual zoom facility



Micro image of fracture



Macro image of fracture



# The tubes

## Observation and photographic/CCD tubes

3 binocular and trinocular tubes from the Leica DM IRM range are available to choose from, including an ergonomic tube with a variable viewing angle of 15° – 55° to allow the user to adopt a relaxed posture at the microscope.

### HCI B 22 binocular tube

- 45° viewing angle
- Siedentopf design
- 22 mm field of view

### HCI BV 22 ergo binocular tube

- 15° – 55° variable viewing angle
- Siedentopf design
- 22 mm field of view

### HCI 3T 22 trinocular tube

- 45° viewing angle
- Siedentopf design with HC photographic/CCD output
- 22 mm field of view
- variable light path
  - 100 % vis / 0 % photographic/CCD
  - 50 % vis / 50 % photographic/CCD
  - 0 % vis / 100 % photographic/CCD

Other tubes from the Leica DM R range of incident light research microscopes can also be adapted using the DM R/IR HC tube adapter. These tubes make it possible to expand the microscope further, e.g. for two photographic/CCD outputs or also for macro and slide overlay.

### Leica DM R HC tubes

- HC BSA 25 binocular tube
- HC FSA 25 P trinocular tube
  - light path 100 % vis / 100 % photographic – 50 %/50 %
- HC FSA 25 PE trinocular tube
  - light path 100 % vis / 100 % photographic – 50 %/50 %

### MACRODUAL ZOOM

The macrozoom system can be adapted in conjunction with tube HC FSA 25 PE. It allows samples and components in image scales from below 1:1 to 10:1 to be recorded.

This means that the microscope and its photographic/CCD accessories can be used in both the micro and the macro range. This is particularly interesting if the overall view and the micro-structure of components are to be examined and documented (damage investigations, damage prevention).

### Slide overlay

Measurement scales,  $\mu\text{m}$  marks, marker arrow or grain size grids can be superimposed on the microscope image using the same tube, the HC FSA 25 PE.

The grids are on framed slides and can be moved to any position on the image of the sample. Grid illumination can be controlled and can be adapted on an individual basis to suit the workpiece in the case of photography or CCD documentation.



Trinocular tube HCI 3T22



Ergo binocular tube HCI BV 22



Trinocular tube HC FSA 25 PE  
with slide overlay

# Image documentation



HCl 3T22 tube with TV camera



HCl 3T22 tube with MPS30 camera system



DMLD camera system with large format attachment 9 x 12 cm/4 x 5"

## CCD adapter

(For output at the side of the stand and on all photographic tubes)

A selection of CCD adapters is available for analog and digital documentation for electronic imaging.

Their reduction/magnification factors suit the chip sizes of the specific CCD cameras. These result in the greatest possible variation of electronic image size on the monitor.

For 1-chip cameras:

c-mount 0.35x HC	1/3"
c-mount 0.5x HC	1/2" (+ 1/3")
c-mount 0.63x HC	2/3" (+ 1/2")
c-mount 1x HC	1" (+ 2/3" + 1/2")

For 1 – 3 chip cameras:

Vario c-mount 0.33x – 1.6x	1/3" (+ 1/2" + 2/3" + 1")
Vario B-mount 0.5x – 2.4x	1/2" (Sony ENGmount)
c-mount 1x*	
B-mount 1x*	
B-mount 1.25x*	
F-mount 1x*	
F-mount 1.25x*	

\* 0.5x HC TV adapter required in this case

## Photomicrography

with the Leica microscope camera systems

Leica MPS 30

Leica MPS 60

Leica DM LD

These microscope camera systems are flexible in use and easily master the imaging of critical structures. Numerous automatic functions and storage facilities simplify operation and save valuable time when creating perfect photomicrographs.

Their modular structure means that microscope camera systems can be converted at any time from 24 mm x 36 mm to 4 x 5" film sizes. Separate brochures provide full details.

## Leica DC 100/DC 200

Digitized pictures can be shown and processed directly on the monitor. They can be printed out and imported into multi-media applications or into the Internet.

The quality of the new HC optics combined with the newly designed HC camera adapter is particularly obvious in digital documentation. The new Leica DC 100 and DC 200 digital cameras, including optics and software developed especially for microscopy, is compatible with PC, TWAIN drivers and Leica Qwin image analysis software and its design matches the functional elegance of Leica microscopes.

**Leica Q550 IW image analysis system and  
Leica Qwin image analysis software,  
Leica image database and archiving systems**

Microscope, digital image processing, image archiving and image analysis – the system for materials analysis from a single source – Leica.

**Extra systems**

**Incident light interference device**

The incident light interference device allows the topography of surfaces to be measured by interferometer without contact by phase shift of interference fringes. The device, which works in accordance with the Michelson or Mirau principles, is designed for 4 objective magnifications:

Michelson 5x/Mirau 10x, 20x, 40x.

**Measure and compare**

Eyepiece reticules with fine and highly accurate graduations serve for measuring length and determining grain and particle size. These are standard features in a test microscope.

Eyepieces with adjustable eye lens (M type) can be fitted on request or retrofitted at any time with the following eyepiece reticules:

- reticule with 10 mm graduations = 100 sections
- reticule with orienting circle and measurement section for grain and particle sizes
- reticule with ASTM-E112 grain size pattern
- reticule with 10 x 10 mm network with 100 squares
- format reticules for photomicrography
- a stage micrometer is also available for calibrating graduations in the eyepiece reticules.

**Leica DM MFK2**

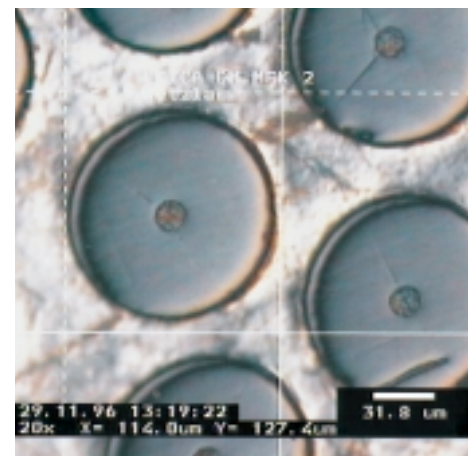
The video measurement cross-hair serves for measuring length, angle and circle measurements. By superimposing measurement marks and structures which can be displayed on the video monitor in conjunction with CCTV equipment, the above-mentioned measurements can be performed accurately and easily.

**Paar MHT 10 microhardness tester**

Microhardness tests in the load range from 0.5 to 400 ponds can also be easily carried out using inverted microscopes. Microscopic hardness testing is particularly suitable if measurements are to be made in components of fine structures or in thin layers.



Weld structure with measurement scale overlay



MFK2 measurement crosslines with display of magnification and length values

# Leica Microsystems – the brand for outstanding products

Leica Microsystems' Mission is to be the world's first-choice provider of innovative solutions to our customers' needs for vision, measurement, lithography and analysis of microstructures.

Leica, the leading brand for microscopes and scientific instruments, has developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Leica symbolizes not only tradition, but also innovation.

## Leica Microsystems – an international company with a strong network of customer services

Australia:	North Ryde/NSW	Tel. +61 2 9879 9700	Fax +61 2 9817 8358
Austria:	Vienna	Tel. +43 1 495 44 160	Fax +43 1 495 44 1630
Canada:	Willowdale/Ontario	Tel. +1 416 497 2860	Fax +1 416 497 8516
Denmark:	Herlev	Tel. +45 4454 0101	Fax +45 4454 0111
Finland:	Espoo	Tel. +358 9 6153 555	Fax +358 9 5022 398
France:	Rueil-Malmaison Cedex	Tel. +33 1 473 285 85	Fax +33 1 473 285 86
Germany:	Bensheim	Tel. +49 6251 136 0	Fax +49 6251 136 155
Italy:	Milan	Tel. +39 0257 486.1	Fax +39 0257 40 3273
Japan:	Tokyo	Tel. +81 3 5435 9600	Fax +81 3 5435 9618
Korea:	Seoul	Tel. +82 2 514 65 43	Fax +82 2 514 65 48
Netherlands:	Rijswijk	Tel. +31 70 4132 100	Fax +31 70 4132 109
Portugal:	Lisbon	Tel. +351 1 388 9112	Fax +351 1 385 4668
Republic of China:	Hong Kong	Tel. +852 2564 6699	Fax +852 2503 4826
Singapore:		Tel. +65 779 7823	Fax +65 773 0628
Spain:	Barcelona	Tel. +34 93 494 95 30	Fax +34 93 494 95 32
Sweden:	Sollentuna	Tel. +46 8 625 45 45	Fax +46 8 625 45 10
Switzerland:	Glattbrugg	Tel. +41 1 809 34 34	Fax +41 1 809 34 44
United Kingdom:	Milton Keynes	Tel. +44 1908 246 246	Fax +44 1908 609 992
USA:	Deerfield/Illinois	Tel. +1 847 405 0123	Fax +1 847 405 0030

and representatives of Leica  
in more than 100 countries.

## Microscopes

Compound  
Stereo  
Surgical  
Laser Scanning  
Photomicrography  
Video Microscopy  
Measuring Microscopes

## Advanced Systems

Image Analysis  
Spectral Photometry  
Automated Inspection Stations  
Measurement Systems  
Electron Beam Lithography

## Laboratory equipment

Tissue Processors  
Embedding Systems  
Routine- & Immunostaining  
Coverslippers  
Refractometers

## Microtomes

Sliding, Rotary & Disc  
Cryostats  
Ultramicrotomes  
EM Sample Preparation



Leica Microsystems Wetzlar GmbH  
Ernst-Leitz-Straße  
D-35578 Wetzlar (Germany)

Tel. +49 (0) 6441-290  
Fax +49 (0) 6441-292599  
www.leica-microsystems.com