Leica M420

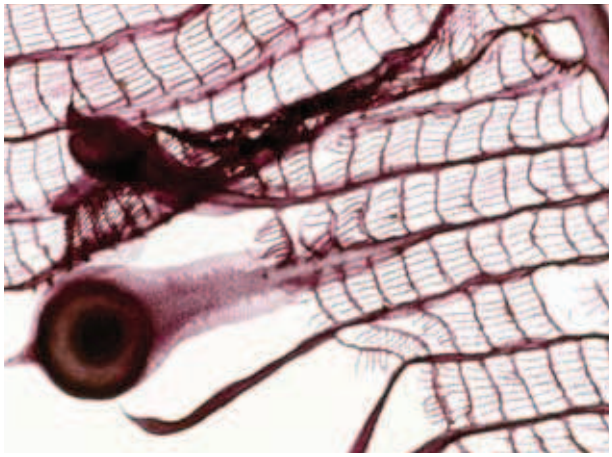
Macroscope for high-precision work in documentation, inspection and measurement

Leica

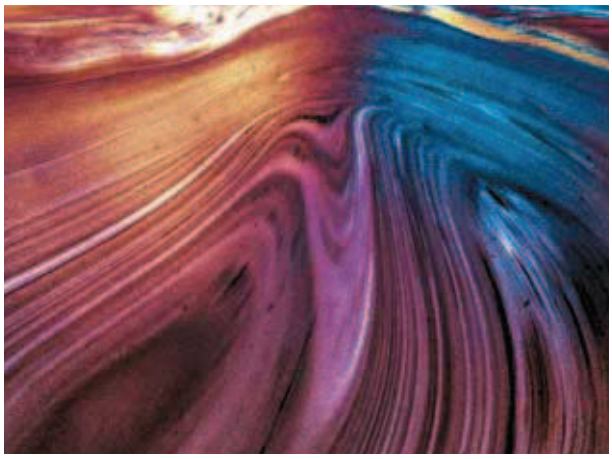
Leica M420
Top technology from Leica

Leica, the leading brand for microscopes and scientific instruments, offers the Leica M420 Macroscope for all tasks relating to documentation and investigation in which highest accuracy, optimum image quality and maximum information content are all paramount. The Leica M420, with 5:1 or 6:1 zoom, typifies the outstanding quality attainable with the latest optical technology. With its vertical beam path, its apochromatic zoom objective and its extremely high resolution, the Leica M420 is the ideal instrument for faithful photography, parallax-free measurement and correct polarization colours. The Leica M420 Macroscope offers perfect conditions for all possible types of documentation involving digital, cine, video and still cameras which can be equipped with the camera optics required and inserted into the built-in video-/phototube.

An innovative range of stands, a precise new coarse/fine focusing mechanism and a convenient motor-focusing system, open up new applications, offer ergonomic advantages, and complement the attractive design. With its outstanding optical performance, its adaptability to all types of work situations and its interesting price/performance ratio, the Leica M420 Macroscope satisfies the highest requirements of science and technology.



Claudea elegans, transmitted light, bright field, original scale 5:1.
R.W. Ricker



Polyethylene cold melt, Nz.temp. staining, polarized light with first-order red compensator, original scale 10:1

Leica M420 Macroscope with 6:1 Apozoom objective, transmitted-light stand HL, motor focus for repetitive tasks, and Leica DC 100 digital imaging system

Leica Design
by Ernest Igl/Christophe Apothéloz


V90
LEICA M 420
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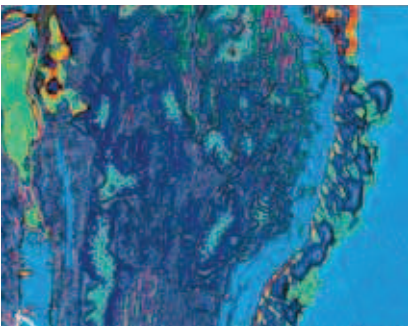
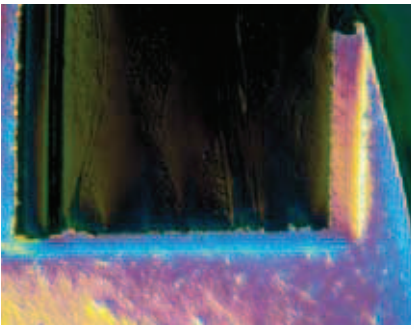
Unique in every way



Interference layer, transmitted light (bright field), original image scale 8.5:1



Layering on printed circuit, sectioned; coaxial incident light with quarter-wave plate, original image scale 120:1

The macroscope, a type of instrument developed by Leica, is matched to the special requirements of discriminating customers. Its large fields of view and its long working distances enable entire objects to be studied as with a stereomicroscope, but the vertical beam path provides for top imaging fidelity and higher resolution.

The advantages of the macroscope concept

- More details, and higher colour fidelity, accuracy and contrast in digital imaging and in photography
- High measuring precision (parallax-free), and selection of a convenient image scale by means of the zoom
- True rendering of polarization colours
- Planar, distortion-free imaging of flat highly-reflecting objects during inspections involving coaxial illumination

Perfect image quality right down to the finest detail

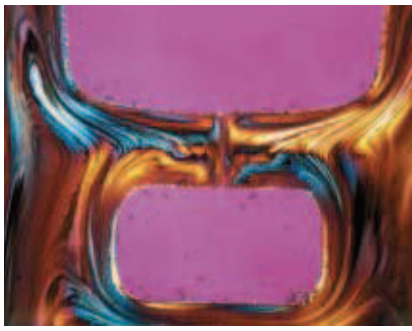
The high-performance 5:1 Macrozoom and 6:1 Apozoom objectives offer high numerical aperture (up to 0.116) and a maximum resolution of up to 348 line-pairs per millimetre, ensuring high useful magnification. The level of chromatic correction is excellent; the achromatic Macrozoom objective is corrected for red and blue, and the apochromatic Apozoom objective for all colours of the spectrum. Leica places great emphasis on materials and manufacture, resulting in better contrast, sharpness and brilliance. The built-in diaphragm matches the depth of field to the momentary requirements.

The Apozoom objective: A refined system consisting of eleven multiple-coated convex and concave lenses made from high-quality optical glass. The complete elimination of colour fringing results in crisp contours and excellent contrast.

High precision at all levels
Instruments from Leica have always been among the best and most accurate available. Only top-quality materials are used during manufacture. Each instrument is assembled and adjusted to extreme tolerances using environmentally-acceptable procedures, and is then subjected to exhaustive inspections and tests under extreme conditions. The Business Units in Leica Microsystems hold the management system certificates for the international standards ISO 9001 and ISO 14001 relating to quality management, quality assurance and environmental management.

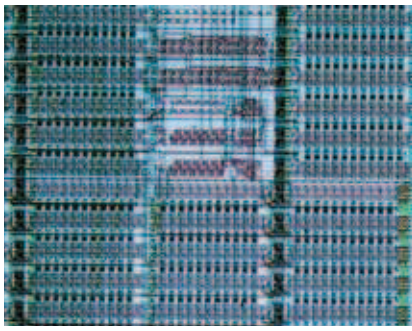
Ergonomics on principle
Ergonomic design is a basic assumption for Leica. It includes the comfortable handrests of the new stands, the new low-positioned coarse/fine drive for ergonomic focusing with the forearms supported, and the motor-focus for effortless productive working while using the entire length of the column.

The low binocular tube, which introduces an additional magnification factor of 1.25×, promotes comfortable viewing. So do the distortion-free wide-field eyepieces for spectacle wearers, with adjustable eyecups and long exit pupils which permit viewing either with or without spectacles. Parfocality ensures that the visual and photographic images remain in focus when the magnification is changed.



Weld line in polymer component, void in polyethylene, cold melt, polarization, original image scale 8:1

Head louse, transmitted-light, bright field, original image scale 37:1



Wafer, coaxial incident light with quarter-wave plate, original image scale 70:1

The macroscope concept: Vertical beam path for faithful imaging, built-in video-/phototube for all types of digital, still, TV and video cameras.

Modular system for universal application

Measuring with the Leica image database

By virtue of its modular design, the Leica M420 Macroscope can accommodate all requirements encountered in practice. Even with the basic outfit, applications-oriented combinations are readily available with the choice between 5:1 Macrozoom and 6:1 Apozoom objective, the various interchangeable additional objectives and eyepieces, the numerous stands and the appropriate illuminators. Digital imaging, video and photography are important additional options.

Practice-related application

The efficient use of a macroscope depends on using an appropriate stand along with the ideal illuminator. Leica can always offer the best solution for the job, irrespective of the light source and of whether you are working with an incident or transmitted-light stand. For example, high-performance transmitted light stands, and polarization accessories, are available for observing transparent specimens. The new column allows focusing over a wide range, and is long enough (500mm) to accommodate the 0.4× and 0.5× additional objectives.

The swinging-arm stand provides room for manipulating bulky objects, which can be ergonomically focused with the motorfocus. The coaxial illuminator brings out the contrasts on the flat, highly-reflecting surfaces of wafers. The rotatable quarter-wave plate emphasizes different types of structures on polished metal sections or on LCDs. Various types of fibre-optic light guides and cold-light sources ensure that the object is illuminated uniformly.

Leica M420 presented in an attractive and ergonomic new design with new stands and new coarse/fine focusing.

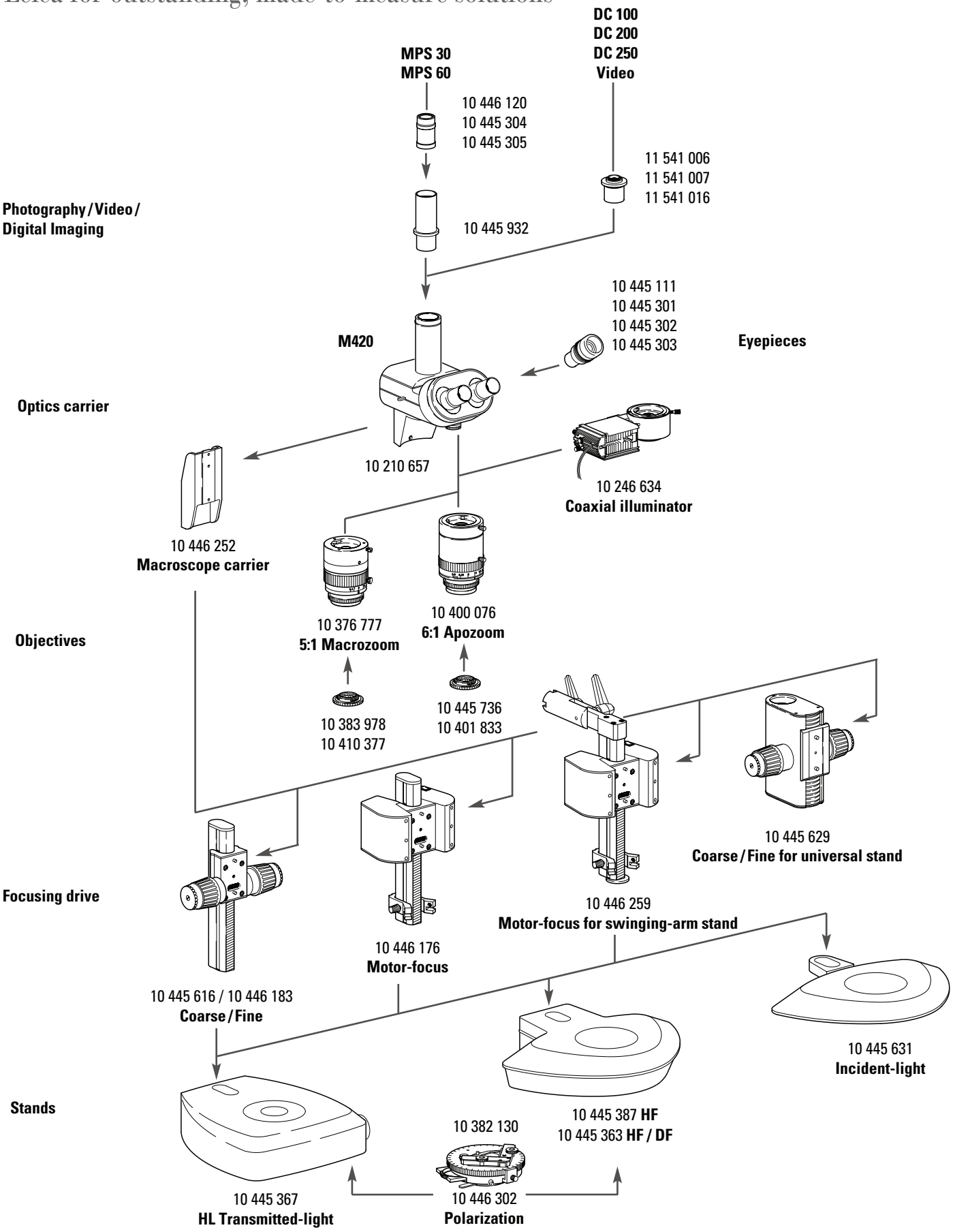
Digital imaging
The innovative digital imaging systems Leica DC 100 (0.9 Mpixels), DC 200 (2.6 Mpixels) and DC 250 (black and white camera, 2.6 Mpixels) are attractive accessories for professional microscopy. The advantages of electronic image processing range from short, cost-saving work processes right through to the immediate availability of images for post-processing.
These systems meet the highest requirements and expand user benefits in virtually all applications in industry, medicine and research. Their optical components and their software are designed specifically for microscopy. In both incident- and transmitted-light techniques, digitized images can be efficiently created, processed and stored.
The Leica IM 1000 professional image-management system for storing and post-processing images is perfectly compatible, right up to the level of complex network solutions.

The Leica MPS30 and MPS60 photoautomats
The competitively-priced Leica MPS30 photoautomat for routine photography has a digital display, integrated metering and a 32-character data back. In the Leica MPS60 photoautomat, by using 1% spot metering and directing 100% of the light to the highly-sensitive measuring diode, perfect photomicrographs can be obtained even with short exposure times.

The Leica M420 at a glance
- Vertical beam path for top imaging fidelity and highest resolution
- Apochromatic 6:1 zoom objective
- Built-in video-/phototube
- Built-in aperture diaphragm
- Ergonomic design with low-positioned coarse/fine focusing
- Motorized focusing for repetitive tasks
- Constant image sharpness throughout the magnification range (parfocal)
- High-performance transmitted light stand, polarization, coaxial illuminator with quarter-wave plate
- Accessories for all types of documentation, including digital imaging systems

Leica M420 with 6:1 Apozoom and swinging-arm stand with coarse/fine focusing (left); with 5:1 Macrozoom, incident-light stand, coaxial illuminator with quarter-wave plate, and Leica MPS60 modular photomicrographic system with data back (right).

Leica for outstanding, made-to-measure solutions



Optical data

Eyepiece	Zoom-position	Macrozoom objective/ Apozoom objective 1.0×		In combination with additional objective					
				0.5×		0.4×		2.0×	
		Working distance							
		100 mm Macrozoom 102 mm Apozoom		192 mm Macrozoom		253 mm Apozoom		39 mm Macrozoom 45 mm Apozoom	
		Total magni-fication	Field diameter	Total magni-fication	Field diameter	Total magni-fication	Field diameter	Total magni-fication	Field diameter
10×/21B	5.8×	7.3×	29.0 mm			2.9×	72.4 mm	14.5×	14.5 mm
	6.3×	7.9×	26.7 mm	3.9×	53.3 mm	3.2×	66.7 mm	15.8×	13.3 mm
	10.0×	12.5×	16.8 mm	6.3×	33.6 mm	5 ×	42 mm	25 ×	8.4 mm
	20.0×	25 ×	8.4 mm	12.5×	16.8 mm	10 ×	21 mm	50 ×	4.2 mm
	32.0×	40 ×	5.3 mm	20.0×	10.5 mm	16 ×	13.1 mm	80 ×	2.6 mm
	35.0×	43.8×	4.8 mm			17.5×	12 mm	87.5×	2.4 mm
16×/14B	5.8×	11.6×	19.3 mm			4.6×	48.3 mm	23.2×	9.7 mm
	6.3×	12.6×	17.8 mm	6.3×	35.6 mm	5 ×	44.4 mm	25.2×	8.9 mm
	10.0×	20.0×	11.2 mm	10.0×	22.4 mm	8 ×	28 mm	40 ×	5.6 mm
	20.0×	40.0×	5.6 mm	20.0×	11.2 mm	16 ×	14 mm	80 ×	2.8 mm
	32.0×	64.0×	3.5 mm	32.0×	7.0 mm	25.6×	8.8 mm	128 ×	1.8 mm
	35.0×	70.0×	3.2 mm			28 ×	8 mm	140 ×	1.6 mm
25×/9.5B	5.8×	18.0×	13.0 mm			7.3×	32.8 mm	36.3×	6.6 mm
	6.3×	19.7×	12.0 mm	9.8×	24.0 mm	7.9×	30.2 mm	39.4×	6.0 mm
	10.0×	31.3×	7.6 mm	15.6×	15.2 mm	12.5×	19 mm	62.5×	3.8 mm
	20.0×	62.5×	3.8 mm	31.3×	7.6 mm	25 ×	9.5 mm	125 ×	1.9 mm
	32.0×	100.0×	2.4 mm	50.0×	4.8 mm	40 ×	5.9 mm	200.0×	1.2 mm
	35.0×	109.4×	2.2 mm			43.8×	5.4 mm	218.8×	1.0 mm
40×/6B	5.8×	29.0×	8.3 mm			11.6×	20.7 mm	58.0×	4.0 mm
	6.3×	31.5×	7.6 mm	15.8×	15.2 mm	12.6×	19 mm	63.0×	3.8 mm
	10.0×	50.0×	4.8 mm	25.0×	9.6 mm	20 ×	12 mm	100.0×	2.4 mm
	20.0×	100.0×	2.4 mm	50.0×	4.8 mm	40 ×	6 mm	200.0×	1.2 mm
	32.0×	160.0×	1.5 mm	80.0×	3.0 mm	64 ×	3.8 mm	320.0×	0.8 mm
	35.0×	175.0×	1.4 mm			70 ×	3.4 mm	350.0×	0.5 mm

Zoom range
1:5 Macrozoom: 6.3× – 32×
1:6 Apozoom: 5.8× – 35×

Image scale
On 35 mm film: 1:1 to 45:1 (with 16× photo eyepiece)
On 3¼ in × 4¼ in Polaroid film: 3:1 to 112:1 (with 16× photo eyepiece)

Leica M420 macroscope	
Design principle	Vertical beam path, binocular observation
Zoom objectives	Macrozoom 5:1, achromatic Apozoom 6:1, apochromatic
Built-in video-/phototube	Beam-splitter ratio: 50% video or photo, 50% observation Built-in stop for eliminating stray light during the exposure
Magnification factor	1.25× for observation and for photo/video
Built-in aperture diaphragm	For adjusting the depth of field
Numerical aperture	0.116 / 0.232 with 2.0× additional objective
Resolution	348 lp/mm / 696 lp/mm with 2.0× additional objective
Zoom range (with 10× eyepieces)	Macrozoom: 7.9× – 40× / Apozoom 7.3× – 43.8×
Total magnifications	Macrozoom: 3.9× – 320× / Apozoom: 2.9× – 350×
Field diameter	Macrozoom: 0.8 – 53.3 mm / Apozoom: 0.7 – 72.4 mm
Working distances	Macrozoom: 100 mm, additional objective 0.5×: 192 mm, 2.0×: 39 mm Apozoom: 102 mm, additional objective 0.4×: 253 mm, 2.0×: 45 mm
Additional objectives	For Macrozoom: 2.0×, 0.5× / for Apozoom: 2.0×, 0.4×
Wide-field eyepieces for spectacle wearers	10×/21B, 16×/14B, 25×/9.5, 40×/6B, distortion-free
Dioptric correction	+5 to –5
Eyecups	Eye contact adjustable
Binocular tube	Ergonomically low, with 45° viewing angle
Interpupillary distance	Range of adjustment 54 mm to 75 mm
Stands, illuminators	
Incident-light stand	300 mm and 500 mm side-faced columns; 120 mm diameter stage plate
Focusing drive	Coarse/fine, manual and motorized
Swinging-arm stand	Column length 550 mm, diam. 50 mm, also available with clamp for table tops, motorized focusing
Universal stand	Column diam. 50 mm, length 450 mm or 800 mm, magnetic carrier for stages
Transmitted-light stands	Bright field, bright and dark field, and high-performance base
Stages	Several, including rotatable polarization stage
Incident lamps	Including inclined, coaxial with quarter-wave plate, fibre-optic light guides
Accessories	
Photomicrographic systems	Leica MPS30 and MPS60, fully automatic, with data back
Video and filming	Leica DC 100, DC 200, DC 250 digital imaging systems, Image Manager
Measuring graticules	For measuring lengths and for counting
Filter-slide housing	For two gelatin filters

For further information, please ask for the brochure “The Modular System“ (M1-425-4en).

The Business Units in Leica Microsystems hold the management system certificates for the international standards ISO 9001 and ISO 14001 relating to quality management, quality assurance and environmental management.

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