

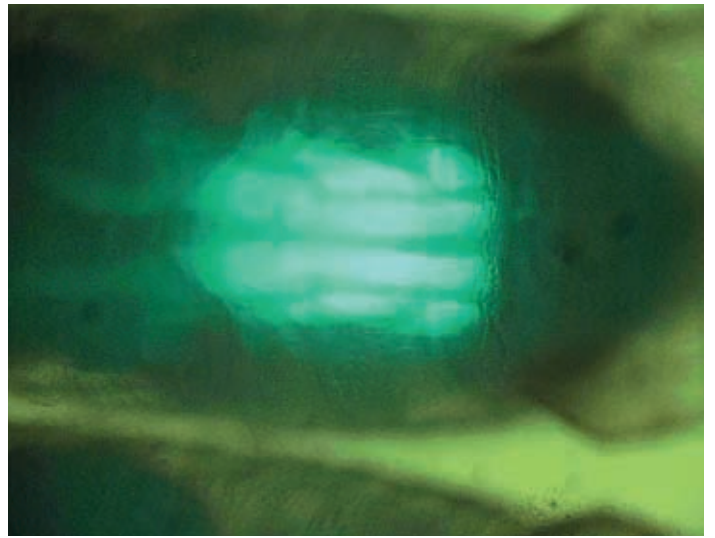
Shining advantages

The key to the inside of living cells:
Leica MZ FLIII fluorescence stereomicroscope

Leica
MICROSYSTEMS

Fluorescence in the third dimension

Research into the functions and interactions of living organisms requires an investigation procedure permitting in-vivo observation of growth processes. For this reason, modern research makes use of fluorescence techniques, particularly in molecular biology and in gene technology, to gain an insight into the distribution and development of certain structures of living cells and tissues. With a combination of green-fluorescent protein (GFP, see box) and the Leica MZ FLIII fluorescence stereomicroscope, living objects can now be observed spatially in large fields of view; the long working distances enable them to be manipulated.



Drosophila, flight muscles

The drosophila larvae were made available by courtesy: Sharyn A. Endow, Ph.D., Duke University Medical Center, and Eric Fyrberg, The Johns Hopkins University

An insight into fluorescence techniques

Some substances fluoresce when irradiated with short-wave light; non-fluorescing areas remain dark. This property can be exploited for subjects which are not naturally fluorescent, by applying a fluorescent dye which is taken up selectively by certain structures. Green-fluorescent protein (GFP) is an example. This albumen from a species of jellyfish fluoresces bright green when stimulated by blue- or ultraviolet light. Using gene-specific paths to transfer them into other cells, the GFP allows a look into the distribution, anatomy and development of certain cell forms. GFP is nontoxic and allows examining living cells without destroying them. The Leica fluorescence stereomicroscope therefore offers ideal conditions for in-vivo, in-situ investigations of living organisms in real time.

Shining advantages for biology, medicine and technology

The Leica MZ FLIII underlines once more the competence of Leica in the field of stereomicroscopy. This instrument is the first fluorescence stereomicroscope to be in harmony in all respects with the purposes for which it will be used:

- Patented separate beam path (TripleBeam™) for extremely intensive fluorescence illumination
- Patented filter system (FLUOIII™) for changing the filters quickly and easily
- Wide choice of filters for various fluorescence techniques
- Comprehensive protection of the user against UV radiation

The Leica MZ FLIII fluorescence stereomicroscope offers not only a 3D image but also, compared with a classical microscope at any given magnification, a larger panoramic field of view, more intense fluorescence, and longer working distances. These advantages make it possible to manipulate, sort and process specimens. Just one instrument is enough for carrying out time-consuming preparation work, embedding, rubbing down or cutting. The patented Leica MZ FLIII* fluorescence stereomicroscope opens up an almost infinite number of new possibilities for research and diagnosis in medicine and biology, and for nondestructive testing and analysis related to industrial quality control and to forensic work.

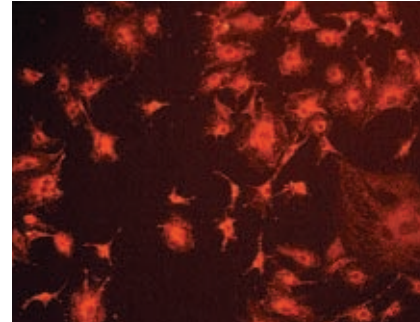
Intelligent system solutions for digital fluorescent recording

The digital image recording systems from Leica Microsystems allow rational creation, processing and archiving of digitized images (see p. 8). Combined with the Leica Image Manager image management system, the user has a professional complete system for highest demands. The IM Image Overlay module delivers perfect results for multiple fluorescence recordings in cell biology, genetics, virology (human and animal physiology), plant biology, pharmacology.

New for Leica MZ FLIII: Leica Fluo Combi™

Quick switching from 3D to microscopic observation with 10x micro objectives (resolution 0.7 µm, 1320 Lp/mm) or 20x (resolution 0.8 µm, 1260 Lp/mm). Simple retrofitting of your current Leica MZ FLIII.

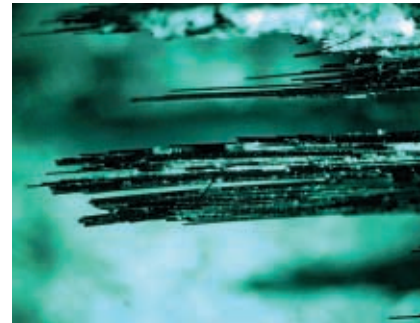
Bovine pulmonary
artery endothelial
cells



Polymers



Carbon fibers



* Patented in EP (CH, DE, FR, GB), additional patents have been filed



The Leica MZ FLIII: Trendsetter in fluorescence stereomicroscopy

TripleBeam™, the patented third beam path for brilliant fluorescence images

Leica stereomicroscopes are designed with two parallel beam paths above a common main objective. This is the most elaborate, but proven the best principle for fatigue-free viewing and for perfect image quality. In addition, the Leica MZ FLIII has the patented separate illumination beam path (TripleBeam™) for the fluorescence illuminator. This unique innovation ensures that, at all zoom positions, the light is guided correctly and utilized fully, and that the background of the field of view is uniformly dark. Leica's innovation in the design and manufacturing stages pay off with the intense fluorescence and in the detail-rich, reflex-free images with their jet-black backgrounds.

FLUOIII™, the patented filter system for super-fast changing

Two novel features enable filters to be changed in a moment: the arrangement of excitation and barrier filters on the same filter carrier, and the creation of a horizontally-rotatable rapid filter changer for four filter combinations. With just one quick movement, the excitation filter is in the illumination beam path and the barrier filter is in the observation beam path.

Zoom 12.5:1 – information from the overview to the detail

At low magnifications, stereomicroscopes provide a panoramic view of the whole object; at high magnifications, they reveal fine detail. The zoom range of the Leica MZ FLIII, from 8x to 100x with 1x objective and 10x eyepieces, its maximum magnification of 800x and its high resolution of up to 750 line pairs/mm with the 2x planapochromatic objective, take its observation range into that of the classical microscope.

UV protection – the devices for comprehensive security

Intense UV radiation can cause damage to the retina of the observer's eye. Leica is aware of our great responsibility in this respect and have introduced strict precautions. UV barrier filters are permanently installed in the observation beam paths; there is a UV protection screen above the specimen plane and stray-light protection at the lamp housing, and there are dummy filter carriers in the empty filter positions.

Fluorescence system with TripleBeam™ and rapid filter changer



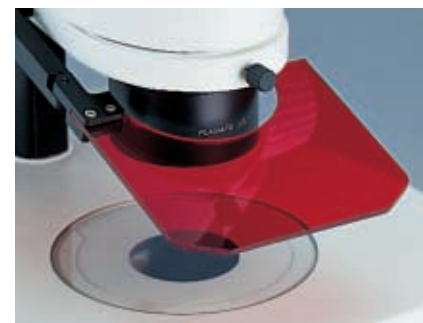
FLUOIII™ fluorescence filter system



12.5:1 zoom



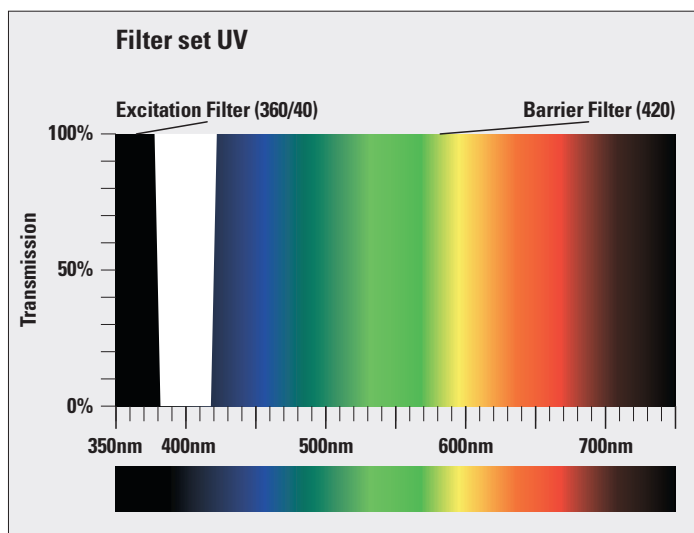
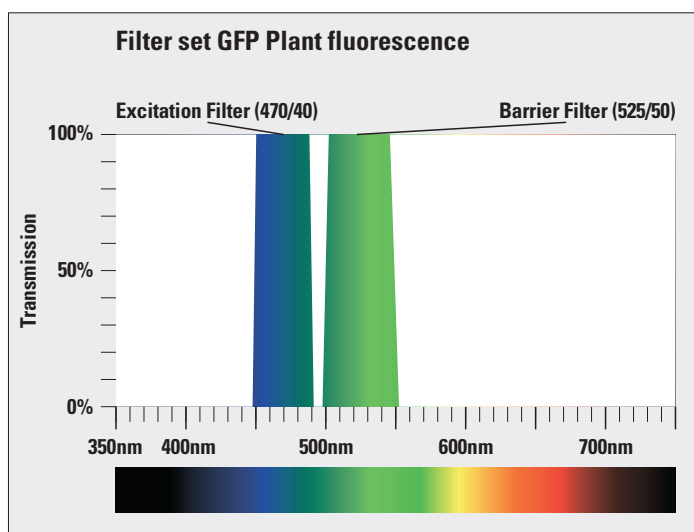
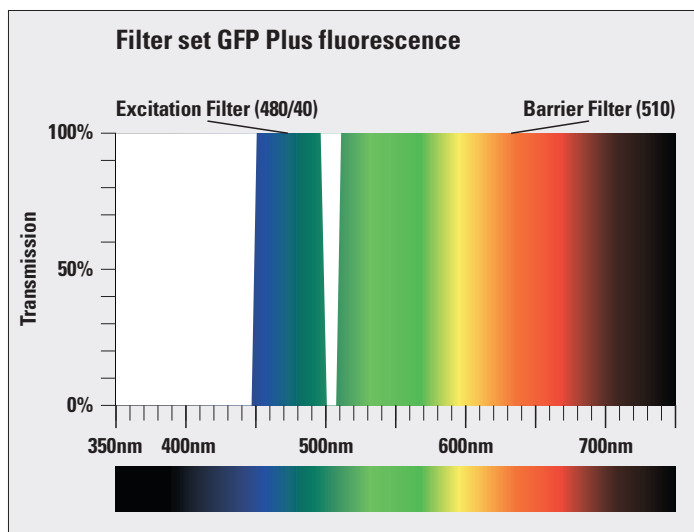
UV protection screen



Leica Design
by Ernest Igl/Christophe Apothéloz

Selected filter sets, from GFP to Green

| Filter sets | Excitation filter | Barrier filter |
|------------------------|-------------------|----------------|
| GFP fluorescence | 425/60 nm | 480 nm |
| GFP Plus fluorescence | 480/40 nm | 510 nm |
| GFP Plant fluorescence | 470/40 nm | 525/50 nm |
| UV fluorescence | 360/40 nm | 420 nm |
| Violet fluorescence | 425/40 nm | 475 nm |
| Blue fluorescence | 470/40 nm | 515 nm |
| Green fluorescence | 546/10 nm | 590 nm |
| CFP | 436/20 nm | 480/40 nm |
| YFP | 510/20 nm | 560/40 nm |
| Texas Red | 560/40 nm | 610 LP nm |
| DsRED | 546/12 nm | 560 LP nm |
| Cy3™ | 555/50 nm | 610/75 nm |
| Cy5™ | 620/60 nm | 700/75 nm |

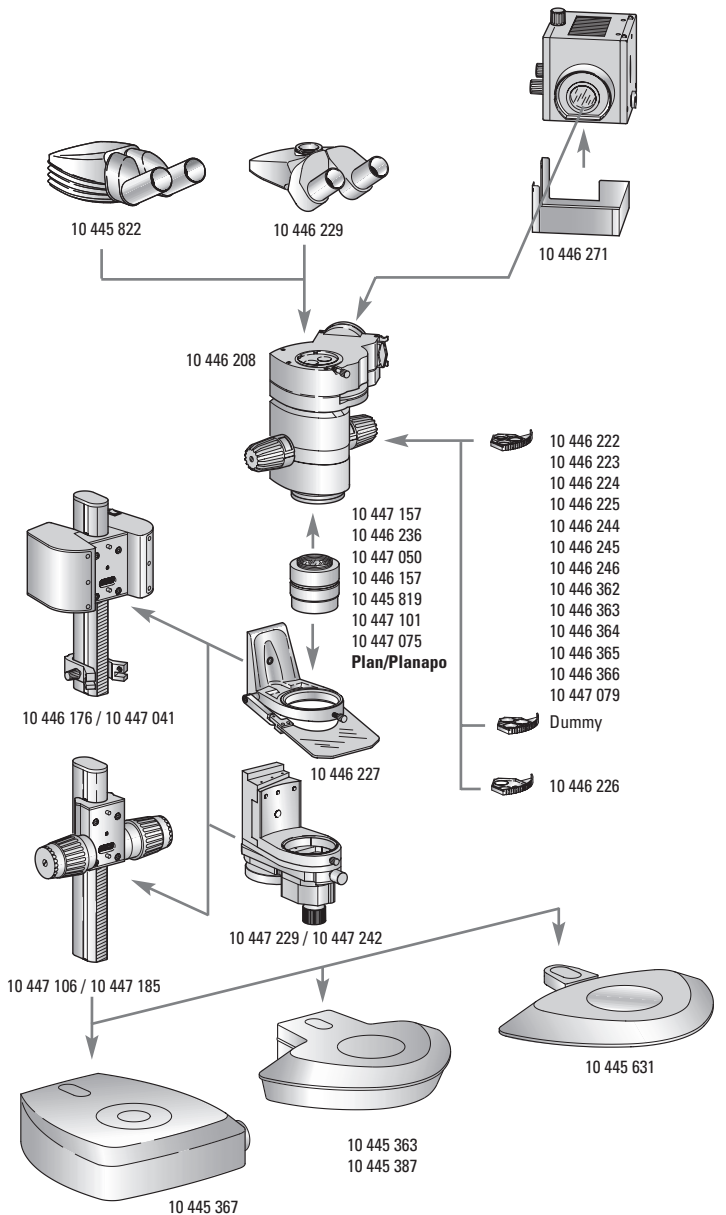


Standard delivery

Order no.

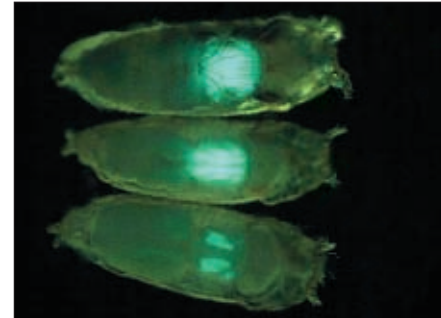
- 10 446 208 Leica MZ FLIII optics carrier with 12.5:1 zoom, 2 observation and 1 illumination beam path, integrated FLUOIII™ filter system, UV protection screen, 3 dummy filter carriers, slot for light stop, empty filter holder
- 10 446 227 Microscope carrier MZ FLIII for focusing drive
- 10 447 229 Fluo Combi™ with 10x HR objective
- 10 447 242 Fluo Combi™ with 20x HR objective
- 10 445 822 ErgoTube™ with variable viewing angle from 10°–50°
- 10 446 229 Trinocular video/phototube 100%
- 10 446 271 Stray-light protection for lamp housing 105Z and 106Z
- 10 447 157 Planapochromatic objective 1x
- 10 447 101 Planapochromatic objective 2x
- 10 447 050 Planapochromatic objective 1.6x
- 10 446 236 Planapochromatic objective 0.63x
- 10 445 819 Plano objective 1x
- 10 446 157 Plano objective 0.5x
- 10 447 075 Plano objective 0.8x
- 10 447 160 Wide-field eyepieces for eyeglass wearers 10x/21B
- 10 445 301 Wide-field eyepieces for eyeglass wearers 16x/14B
- 10 445 302 Wide-field eyepieces for eyeglass wearers 25x/9.5B
- 10 445 303 Wide-field eyepieces for eyeglass wearers 40x/6B
- 10 445 927 Double-iris diaphragm
- 10 446 222 GFP Filter set
- 10 446 223 GFP Plus filter set
- 10 446 244 GFP Plant filter set
- 10 446 224 UV filter set
- 10 446 245 Violet filter set
- 10 446 225 Blue filter set
- 10 446 246 Green filter set
- 10 446 363 CFP filter set
- 10 446 364 YFP filter set
- 10 446 365 Texas Red filter set
- 10 447 079 DsRED filter set
- 10 446 362 Cy3™ filter set
- 10 446 366 Cy5™ filter set
- 10 446 226 Filter carrier without filter
- 10 445 631 Incident-light base, with black-and-white stage plate
- 10 445 387 Transmitted-light base 20W bright field, with mirror for vertical/oblique illumination, with glass stage plate, clear, 2 6 V/20 W halogen bulbs and built-in regulating transformer 0 V–6 V 40 VA, 100 V–120 V/200 V–240 V
- 10 445 363 Transmitted-light base bright/dark field with glass stage plate, clear, for fiber-optic light guide
- 10 445 367 Transmitted-light base HL for highest demands, with mirror for vertical/oblique illumination, for fiber-optic light guide
- 10 446 184 Additional condenser for HL base, for optimizing illumination at magnifications >100x

- 10 447 106 Focusing drive, coarse/fine, with 300 mm column for incident/transmitted-light bases
- 10 447 185 Focusing drive, coarse/fine, with 500 mm column for incident/transmitted-light bases
- 10 446 176 MF drive with 300 mm column and power supply for incident and transmitted-light bases
- 10 447 041 MF drive with 500 mm column and power supply for incident and transmitted-light bases
- 10 446 237 Leica IC A video module with integrated CCD and camera control, PAL
- 10 446 238 Leica IC A video module with integrated CCD and camera control, NTSC



The accessories for ergonomics and documentation

Within the comprehensive and innovative range of accessories for Leica Microsystems stereomicroscopes there is a solution to meet any requirement. Owners of the Leica MZ FLIII can benefit. For example, thanks to modular design, the integrated Leica IC A video camera, one of the digital high-performance cameras of the Leica DC line, motor focusing system, high-performance transmitted-light stand HL, ErgoModule™ and the new thermo stage Leica MATS as well as accessories for second-observer tube, measuring, polarization can be used problem-free.



Actin-GFP in drosophila flight muscles

Leica MZ FLIII fluorescence stereomicroscope with motor focusing system and Leica DC digital image recording system



Leica fluorescence stereomicroscopy

The fields of application

Biology and medicine Application

| | |
|---------------|---|
| Anatomy | Monitoring of capillary flow |
| Biology | Gene expression in chicken embryos, fruit flies, threadworms and zebra fish, fish otoliths marked with alizarin red |
| Genetics | Cellular detection and protein expression, sorting and dissection, monitoring developmental processes |
| Biomedicine | Humatic seals on pacemakers |
| Neurology | Gap junctions on muscles and nerves |
| Ophthalmology | Cell development in rats' eyes |
| Pharmacy | Drugs, ELI spotting in cell structures, monitoring of capillary flow with FITC |
| Parasitology | Detection of bacteria on ticks |
| Agronomy | Seeds, genetic expression, transgenetics, bacteria recognition |
| Botany | Plant cells, plant surfaces, soil samples, parasites |
| Hydrology | Water quality (bacterial and other pollutants), filtered water, cell structures in and on the filter membrane |
| Forestry | Development of environmentally-acceptable methods of pest control (investigation of viruses on pests) |

Technology Application

| | |
|-------------------------|--|
| Electronics | Solder paste on SMDs, epoxy resin on SMD plates, luminescent coatings on TV monitor tubes, quality of polymer castings for embedding integrated circuits |
| Semiconductors | Foreign particles, photo resists |
| Oils | Organic and inorganic oils |
| Polymers | Detection of foreign particles, identification of non-polymerized parts, examination of beads (polymer pellets used in chemical measurements and analyses) |
| Precision engineering | Inspection of cemented areas on mechanical or optical components |
| Metalworking industries | Cracks and surface defects, detection of contamination on components, quality control of welds, fracture analysis |
| Materials science | Cracks, fractures, welds, carbon bonding materials, fractures and orientation of carbon fibers |
| Bitumen | Quality control for tar and bitumen |
| Concrete | Cracks and pores |
| Papermaking | Coating of paper fibers; investigation of inclusions |
| Forensic work | Textile fibers, body fluids, fingerprints, bank notes, forgeries |
| Art restoration | Pigments, forgeries |
| Gemology | Quality, value, inclusions |

The performance features

| | |
|---|---|
| Microscope type | Stereomicroscope with patented separate beam path (TripleBeam™) and patented fluorescence filter system (FLUOIII™), lead-free |
| TripleBeam™ illumination beam path | Separate beam path for fluorescence illumination, coupled zoom optical system |
| FLUOIII™ filter system | Excitation and barrier filters in one filter carrier, horizontal rapid filter changer for four sets of filters, light stop, filter slide for neutral density filter |
| Fluorescence filter sets | GFP, GFP Plus, GFP Plants, UV, Violet, Blue, Green, CFP, YFP, Texas Red, DsRED, Cy3™, Cy5™ |
| Light source | 50W or 100W mercury-vapor burner, lamp housing 106Z, focusable and chromatically-corrected collector, centrable lamp mount |
| Safety precautions | UV protection screen, UV barrier filter, stray-light protection, dummy filter carrier |
| Zoom | 12.5:1, 10 engageable steps |
| Zoom range | 8x–100x (with 1.0x objective and 10x eyepieces) |
| Total magnifications | 5x to 800x |
| Numerical aperture | 0.125 with planapochromatic or plano objective 1x 0.25 with planapochromatic objective 2x |
| Max. resolution | 750 Lp/mm with 2 planapochromatic objectives |
| Field diameter | 0.4 mm to 52,5 mm |
| Working distances | 134 mm, 90 mm, 60 mm, 55 mm, 19 mm |
| Objectives | Planapochromatic 2x, 1x, 1.6x, 0.63x and plano 1x, 0.8x, 0.5x |
| Wide-field eyepieces for eyeglass wearers | 10x, 16x, 25x, 40x, distortion free |
| Leica Fluo Combi™ | Switchable between 3D observation and 10x or 20x micro-objectives |
| Focusing drive | Coarse/fine, motor driven |
| Ergonomics | Apochromatic ErgoTube™ 10°–50°, ErgoModules™ |
| Stands | Transmitted light bright/dark field, incident light, swinging arm, heating stage Leica MATS thermocontrol system |
| Illuminators | Oblique, cold light, coaxial, option of polarization |
| Accessories | Video (digital), photography, second-observer tube, drawing, measuring |

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