



# Leica FS M

Manually-controlled Forensic Comparison Microscope

Living up to Life

**Leica**  
MICROSYSTEMS



# Manually-controlled FS M Forensic Macroscopic

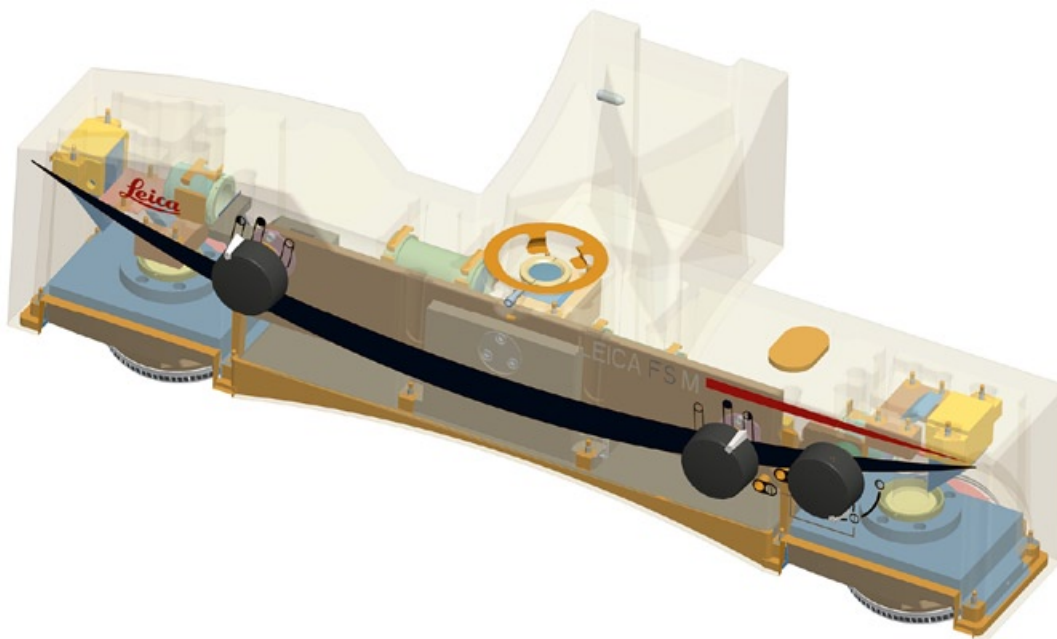
## Introducing the Leica FS M

The Leica FS M forensic comparison microscope provides superior optical and mechanical performance to forensic scientists. The Leica FS M provides straightforward manual control of the system's stages, comparison bridge, and illumination. Offering flexibility, convenience, and user comfort, the Leica FS M is a universal instrument for high-precision firearm and toolmark examinations. The versatile system can be configured with dual viewing accessories, which is ideal for the simultaneous observation of evidence during training and consultation.

## Highly stable comparison bridge

As a core component of the Leica FS M, the bridge supports two precisely matched sets of apochromatically-corrected objectives on the five-position, ball-bearing nosepieces. The bridge is opto-mechanically designed to provide a variety of different image views: split image, full left, and full right, as well as superimposed imaging of the specimens on each macroscopic stage. By rotating the conveniently located split image control, the viewing field can be continuously adjusted between the left and right specimen. The user can achieve full left or full right viewing and switch between all imaging modes in less than one second. The user can also adjust the width of the split and tilt of the split line.

The system's excellent stability and superior optics provide a 22-mm-field of view with erect, unreversed images. When manipulating a specimen on a macroscopic stage, the image seen through the objectives moves in the same direction as the specimen on the stage. This allows fast, easy manipulation of a specimen while viewing.





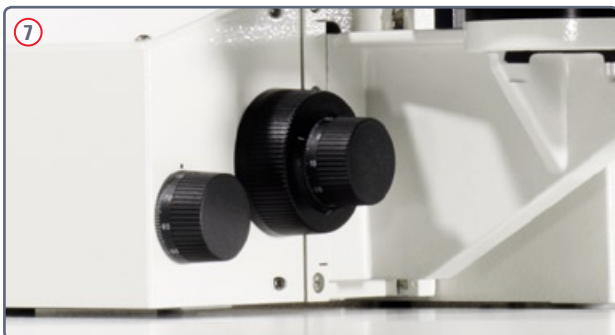
The Leica Application Suite (LAS) software is the link between the Leica FS M and digital cameras.



Manual comparison bridge with three observation modes; side by side, full left or right side, superimposed.



The dual view bridge allows simultaneous observation.



The separate coarse and fine focus controls provide precise control while focussing in on a specimen.

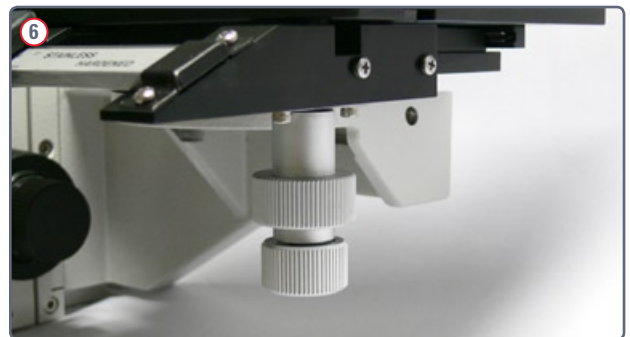




A choice of observation tubes are available for the Leica FS M.



The 6-position turret features high locking precision for parcentric objective magnifications.



The Leica FS M is equipped with left- and right-handed manual stages with coaxial drives.



A unique feature of the Leica FS M is the synchronized movement of both stages in both direction.

# Highest optical performance and ergonomic design for your convenience and comfort

## The highest optical performance

The Leica FS M features telecentric objectives with built-in iris diaphragms to further enhance image contrast and increase the depth of field. All objectives are long working distance and apochromatically-corrected for the ultimate high contrast reproduction of evidence. The parfocal objectives allow quick examination of specimens under different magnifications without complicated, time-consuming refocusing when switching from one objective to another.

The nosepieces can be rotated a full 360°, which allows the user to position the objectives wherever they are needed. This facilitates manipulation and orientation of the specimen and precise illumination of the critical details.

The complete Leica FS M system is always calibrated. The entire optical system ensures comparisons with less than 0.4% deviation in magnification. Two optional low power objectives are also available, which are particularly useful for document comparisons and examinations of large toolmarks. They provide exceptionally large fields of view up to 160mm.

The Leica FS M optical system includes a variety of optional binocular and trinocular observation tubes for comfortable, long-term viewing. The focusable 10x eyepieces compensate for differences in visual acuity between different users or an individual's eyes, offer a large 22 mm field of view, and provide a high eyepoint for eyeglass wearers.

## Magnification changer

The magnification changer fits between the Leica FS M stand and the tube, or between the Leica DM Multi Viewing system and the tube. It provides additional calibrated magnifications and applies factors 1.0x, 1.5x and 2.0x.



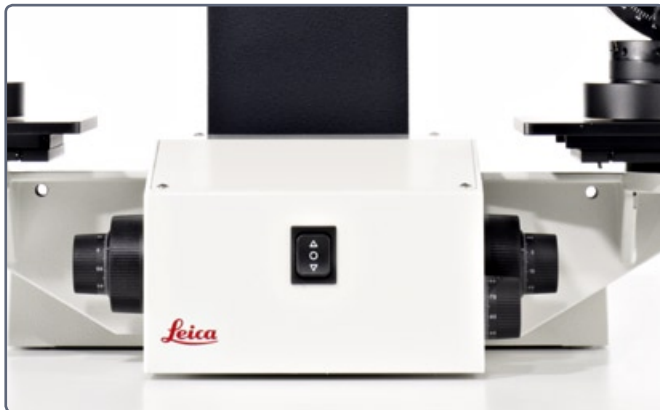
All objectives are critically and precisely matched left to right to assure identical magnification and color.

Magnifications and object fields				
Magn. Changer	Objective	FWD (mm)	FOV with 10x Eyepiece (mm)	Total mag. 10x Eyepiece
	0.33:1	100	166.0	1.32x
	0.4x	60	55.0	4x
1.5x	0.4x	60	36.6	6x
2x	0.4x	60	27.5	8x
	1x	60	22.0	10x
1.5x	1x	60	14.6	15x
	2x	60	11.0	20x
1.5x	2x	60	7.3	30x
	4x	60	5.5	40x
1.5x	4x	60	3.6	60x
	8x	48	2.75	80x
1.5x	8x	48	1.80	120x
2x	8x	48	1.37	160x

### **Stable, ergonomic design for comfort and convenience**

Even when examining heavy objects or using the highest magnifications, the Leica FS M ensures vibration-free visual observation and precise digital image recording. The rugged, motor-operated column is bolted down to the stand's heavy base to provide maximum stability.

While the microscope can be used on any laboratory bench or work table, Leica Microsystems offers an optional, specially designed work table for the Leica FS M. The work table features motorized height adjustment, and when used with an adjustable stool, can create an ergonomically correct, comfortable workstation. The viewing height and position of the work table can be set to individual requirements. The power supply for the work table's motorized height adjustment is built into the column of the workbench, and it is conveniently activated by the switch underneath the table top or by foot pedal.



The Leica FS M control center – all knobs are conveniently positioned.

### **Versatile stage movement and focus**

The Leica FS M is equipped with left- and right-handed mechanical stages with coaxial drives to allow fast, precise specimen manipulation. During low position manipulation, the image moves in the same direction as the specimen, which makes the system convenient and comfortable to use. In addition, two mutually aligned specimens can be moved simultaneously in the x-direction using a synchronized stage control that moves both stages. The separate coarse/fine focus controls are centrally located on the microscope base and provide precise control while focusing on a specimen.



Optional measuring device for the manual stages.

# Many options for viewing the smallest details



The adjustable holder is the universal base for the individual object mounts.

## Reliable object clamping for precise documentation

The inclination, rotation, and sliding stage mechanisms are integrated with a universal, adjustable holder. This enables even critical objects to align correctly with the focus plane of the objectives, the illumination, and the impressions with which they will be compared.

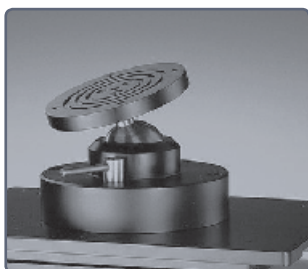
## Optional tilting stages

Optional tilting stages, which mount onto the mechanical stages, have a surface diameter of 80 mm. Objects can be inclined up to 45° and clamped at any angle. Special mountable stages are also available for large objects up to 297×210 mm such as documents or large objects with toolmarks. Magnets hold the paper and thin objects in place.

Available accessories range from a basic set of brush holders to holding devices that are designed to clamp specific objects in place. The Leica FS M offers a variety of holders to clamp fired ammunition parts, objects bearing toolmarks, documents, and other pieces of evidence, including those that are deformed or oddly shaped. The accessories are compatible among all Leica Microsystems comparison microscopes.



Brush mount cartridge case holder set, which is ideal for slightly deformed cartridge cases.



75 mm ball stage



Wire holder



Tiltable articulating arm, convenient orientation for examination of extractor marks



Push-in mounts available for 0.22 – 0.45 caliber

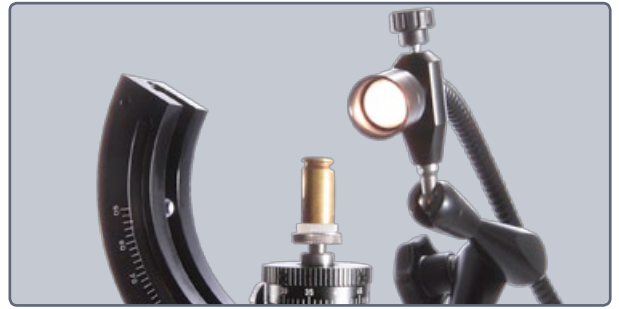


## Illumination source

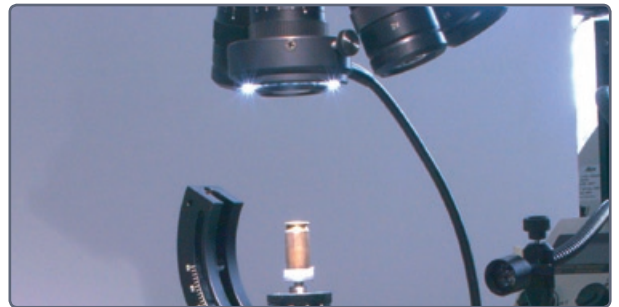
The Leica FS M can be configured with a variety of light sources, which can be easily and precisely positioned for the best specimen illumination. Filters are available to help reduce glare and to provide more even illumination and color balance for high-quality digital image recording. The user can select various mounting locations for an illumination source, which enable reverse lighting techniques for toolmark examination, among other techniques.

### Specific illumination options include:

- ▶ 150 W and 250 W bifurcated, flexible fiber optic illuminators provide cool, white, even illumination.
- ▶ LED-based ring lights for near vertical illumination are ideally suited for viewing firing pin impressions and breech marks.
- ▶ Powerful, multi-purpose LED spot lights with a lifetime of up to 25,000 hours, generate cool 5500 K, near-daylight illumination and are easy to handle.
- ▶ Fluorescent illuminators are available for less intense, diffuse illumination; they are ideally suited for digital photography. They can be mounted on articulated arms or gooseneck supports for easy, precise positioning of the illumination.
- ▶ Near-UV illumination is ideal for visualizing forgery evidence with large surfaces, such as documents, which are easy to compare under the excitation of a shorter wavelength.



Versatile cold light illumination



LED ring light with partial control of LED segments (half ring, quarter ring, two quarters, and full ring).



Multi purpose LED spots available with different color temperatures (2800 K – 5500 K).



Fluorescent tubes for low reflective (diffused) illumination, precisely positioned.

# Technical data

## Comparison bridge

- ▶ Image position: Upright and laterally correct
- ▶ Color-neutral image
- ▶ Left/right magnific. difference max. 0.5%
- ▶ Superimposed- or split-image comparison with manually adjustable dividing line
- ▶ Dividing line adjustable for width and parallel
- ▶ Color differentiation of deviations in superimposed image observation
- ▶ Spacing of optical axes: 450 mm

## Tube factor

- ▶ 1×, 1.5×, 2× with optional magnification changer

## Field number

- ▶ Up to 22 mm

## Integrated camera module

- ▶ Integrated camera module

## Observation tubes

- ▶ 30° phototube
- ▶ Phototube HC L1T 4/5/7,
- ▶ Vario phototube HC L 1 VT 0/4/4
- ▶ Ergo variotube HC LVB 0/4/4 long version no photo port
- ▶ Ergo 15° tube HC -/0/4 (no photo port)
- ▶ Ergo Variotube HC -/0/4 (no photo port)

## Stand

- ▶ Solid, rigid cast stand with motorized height adjustment of the comparison bridge carrier (vertical travel range 255 mm)
- ▶ Mechanical cross-stages (stage surface 202 mm × 140 mm) with low-set coaxial controls for x/y movement (50 mm × 50 mm)
- ▶ Synchronized movement of the stages in x-direction
- ▶ Mechanical coarse and fine focus drives with coaxial controls acting individually on the stages (vertical travel = 25 mm)

## Leica digital camera systems

- ▶ Leica DFC295 (DFC290 HD),  
Leica DFC420 (Leica DFC420 C),  
Leica DFC490

Please see special camera brochures.

## Illumination sources

- ▶ Color neutral cold light sources (150 W and 250 W) with bifurcated light guides
- ▶ LED-power spots with single LEDs (3.5 W)
- ▶ LED-spot with 19 LEDs
- ▶ LED-ring light with segmental control for near vertical illumination
- ▶ Fluotube illumination for diffuse light
- ▶ Line lights with light guides
- ▶ UV-fluorescent ring lights

## Objectives

- ▶ Fixed-magnification APO-macro objectives 0.4×, 1×, 2×, 4×, 8× (with individual iris aperture diaphragm)
- ▶ Macro lens 0.33:1 (generates images with factor 1.3×, FoV = 160 mm)

## Eyepieces (tube dependend)

- ▶ 10×/18×, 10×/20×, 10×/22×

## Optional motorized work table

- ▶ Height adjustment range: 619 mm plus 300 mm movement
- ▶ Table area: 1200 mm × 560 mm
- ▶ Lifting capacity: 2000 N, dual-voltage 120V/60 Hz 230V/50 Hz
- ▶ Lifting speed: approx. 12 mm/sec.
- ▶ Load capacity: 200 kg
- ▶ Control system: integrated toggle switch and foot pedal
- ▶ Universal power supply

## Dimensions and weights

- ▶ Height at max. column lift: 845 mm, Height at minimum column lift: 530 mm
- ▶ Width 700 mm (at max. extension of the x/y stages)
- ▶ Depth: 530 mm
- ▶ Viewing height for ballistic specimens in universal 510 mm to 590 mm holder

## Weights

- ▶ Comparison bridge approx. 15 kg
- ▶ Macroscope stand with stages approx. 32 kg
- ▶ Ergonomic work table approx. 50 kg

## General data

- ▶ Operating voltage: 90 to 254 V
- ▶ Frequency: 50/60 Hz
- ▶ Power consumption 125 VA max.
- ▶ Operating temperature: 10 °C–36 °C
- ▶ Relative humidity: 0 to -80% at 30 °C



Keep accessories clean and handy with the Leica FS storage case.

# “With the user, for the user”

## Leica Microsystems

Leica Microsystems operates internationally in four divisions, where we rank with the market leaders.

### ● Life Science Division

The Leica Microsystems Life Science Division supports the imaging needs of the scientific community with advanced innovation and technical expertise for the visualization, measurement, and analysis of microstructures. Our strong focus on understanding scientific applications puts Leica Microsystems' customers at the leading edge of science.

### ● Industry Division

The Leica Microsystems Industry Division's focus is to support customers' pursuit of the highest quality end result. Leica Microsystems provide the best and most innovative imaging systems to see, measure, and analyze the microstructures in routine and research industrial applications, materials science, quality control, forensic science investigation, and educational applications.

### ● Biosystems Division

The Leica Microsystems Biosystems Division brings histopathology labs and researchers the highest-quality, most comprehensive product range. From patient to pathologist, the range includes the ideal product for each histology step and high-productivity workflow solutions for the entire lab. With complete histology systems featuring innovative automation and Novocastra™ reagents, Leica Microsystems creates better patient care through rapid turnaround, diagnostic confidence, and close customer collaboration.

### ● Surgical Division

The Leica Microsystems Surgical Division's focus is to partner with and support surgeons and their care of patients with the highest-quality, most innovative surgical microscope technology today and into the future.

The statement by Ernst Leitz in 1907, “with the user, for the user,” describes the fruitful collaboration with end users and driving force of innovation at Leica Microsystems. We have developed five brand values to live up to this tradition: Pioneering, High-end Quality, Team Spirit, Dedication to Science, and Continuous Improvement. For us, living up to these values means: **Living up to Life.**

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