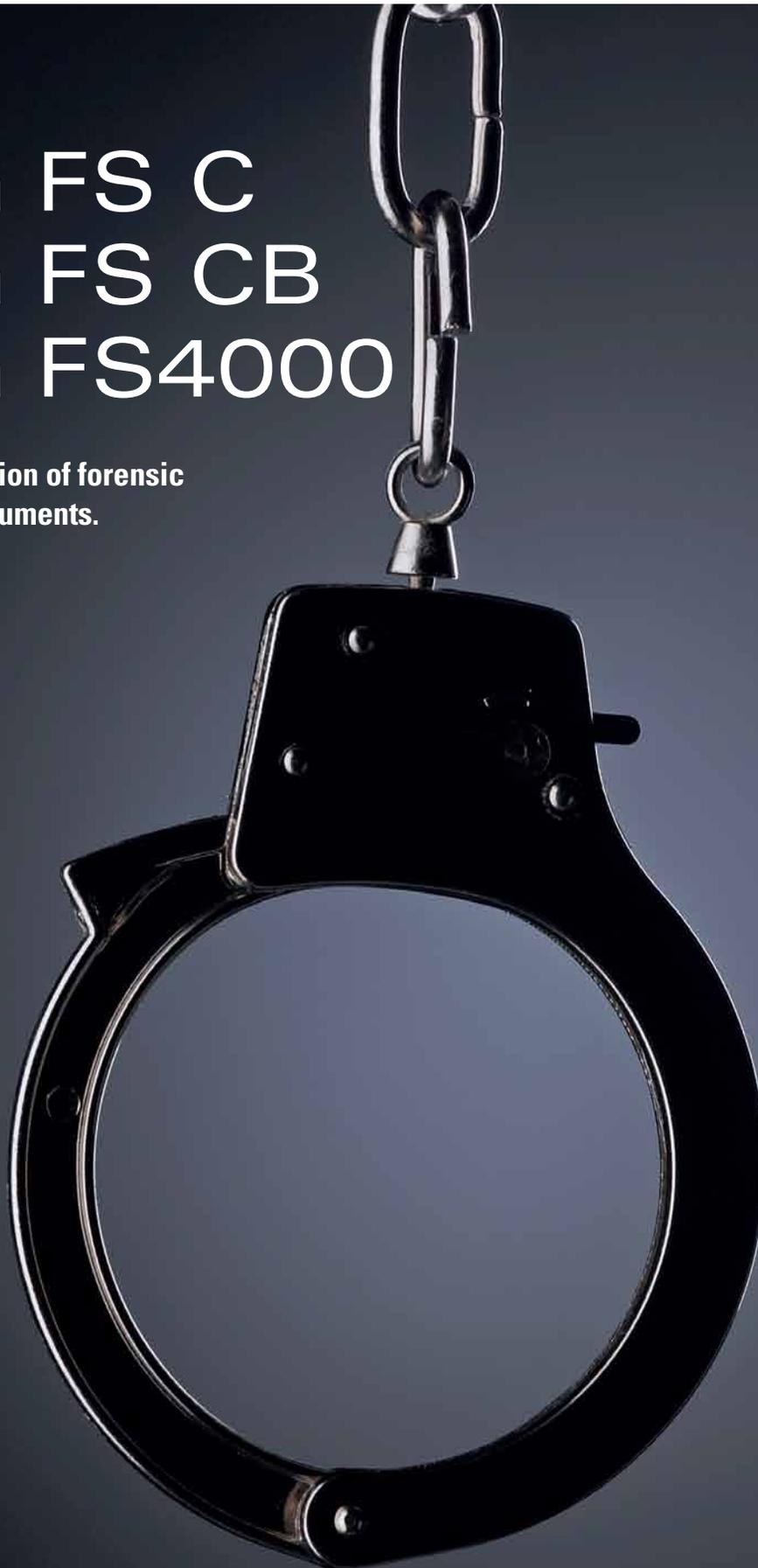


From Eye to Insight

*Leica*  
MICROSYSTEMS

Leica FS C  
Leica FS CB  
Leica FS4000

The next generation of forensic  
comparison instruments.





Comparison microscope for forensic investigations by Ernst Leitz, Wetzlar, 1925



Monocular comparison microscope by Ernst Leitz, Wetzlar, year of construction 1955



# A success story in forensics

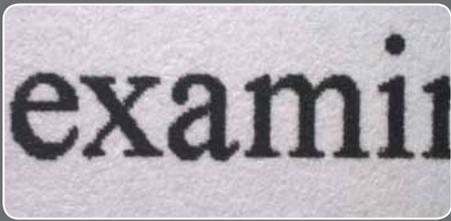
Leica Microsystems can look back on a long and successful tradition in forensics that goes back to the 1920s. At the time, Otto Metzger, Director of the "Chemical Investigation Authority" in Stuttgart, Germany, awarded Leitz in Wetzlar the contract to build a comparison microscope suitable for studying two bullets or cartridge cases at the same magnification.

The problem was solved by developing a "micro comparison bridge" and fitting it to two standard microscopes from the product range of the time. The experience thus gained was applied to the development of the special "comparison microscope for forensic purposes" in 1931, the first such universal instrument available to forensics laboratories the world over. The success story of comparison microscopy had begun.

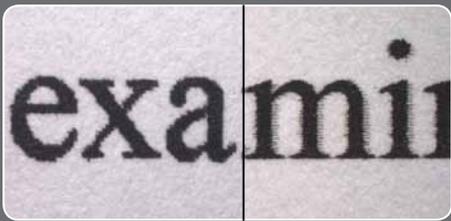
Much has changed since then. Powerful computers, DNA tests and the latest scientific findings have revolutionized virtually every aspect of forensics. But despite all of those technical advances, the visual comparison of weapons, cartridge cases, tool marks and documents remains indispensable – even today, many courts will only admit expert opinions based on direct comparisons.



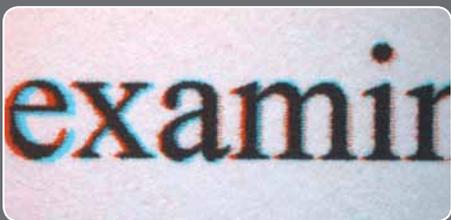
Split or superimposed images – the new comparison bridge offers both at the touch of a button.



Full left/right image: if a direct comparison is not required, this mode permits razor-sharp full-image views without distractions.



The width and position of the dividing line can be varied as required in the split-image comparison or set as a strip in which the two images are superimposed.



Differences are indicated in colors in superimposed mode. Complementary color filters show the specimens in their original colors only in places where no structural differences exist.

The motorized comparison bridge gives you the choice of four different observation modes. The revised beam path of the bridge is especially efficient in its handling of available light. The greatest contribution in this respect is made by the new, patented splitter prism that additionally ensures absolute color neutrality for the tube eyepiece and photo port.

Maximum ease of use and optical performance let you concentrate on the essential – your investigation.



# The bridge from suspicion to proof: Forensic Solution Comparison Bridge

**Proof is often hidden in a minute detail. The new comparison bridge permits even faster and easier comparison of evidence thanks to optimized comparison technologies with maximum ease of use.**

Regardless of whether your evidence consists of hair, fibers, cartridge cases or tool marks – you are well-equipped for any case with all known contrast and illumination methods at your disposal. The Leica FS CB comparison bridge fulfills every requirement for unambiguous identification: identical magnification, reproducible illumination and color neutrality of the left- and right-hand microscope images.



Our partnership with leading forensics laboratories worldwide has led to a forensics instrument that sets new standards: the Leica FS C – for “Forensic Solution Comparison”.

In addition to its outstanding ergonomics and ultra-rugged design, the Leica FS C offers a number of revolutionary technical innovations such as motorized control of both stages and focus drives. Thanks to this motorization, the stages and drives can be synchronized, permitting multifocus images to be captured automatically by the LAS software – for investigations of sloping surfaces or deformed bullets, or in any other case in which greater depth of field is desirable.

The comparison microscope satisfies ergonomic requirements for fatigue-free microscopic work over a period of hours in an impressive manner. All controls, such as the observation mode selection buttons, focus knobs and rotary encoders for the stages are within the user’s easy reach. Using the microscope becomes second nature in no time!

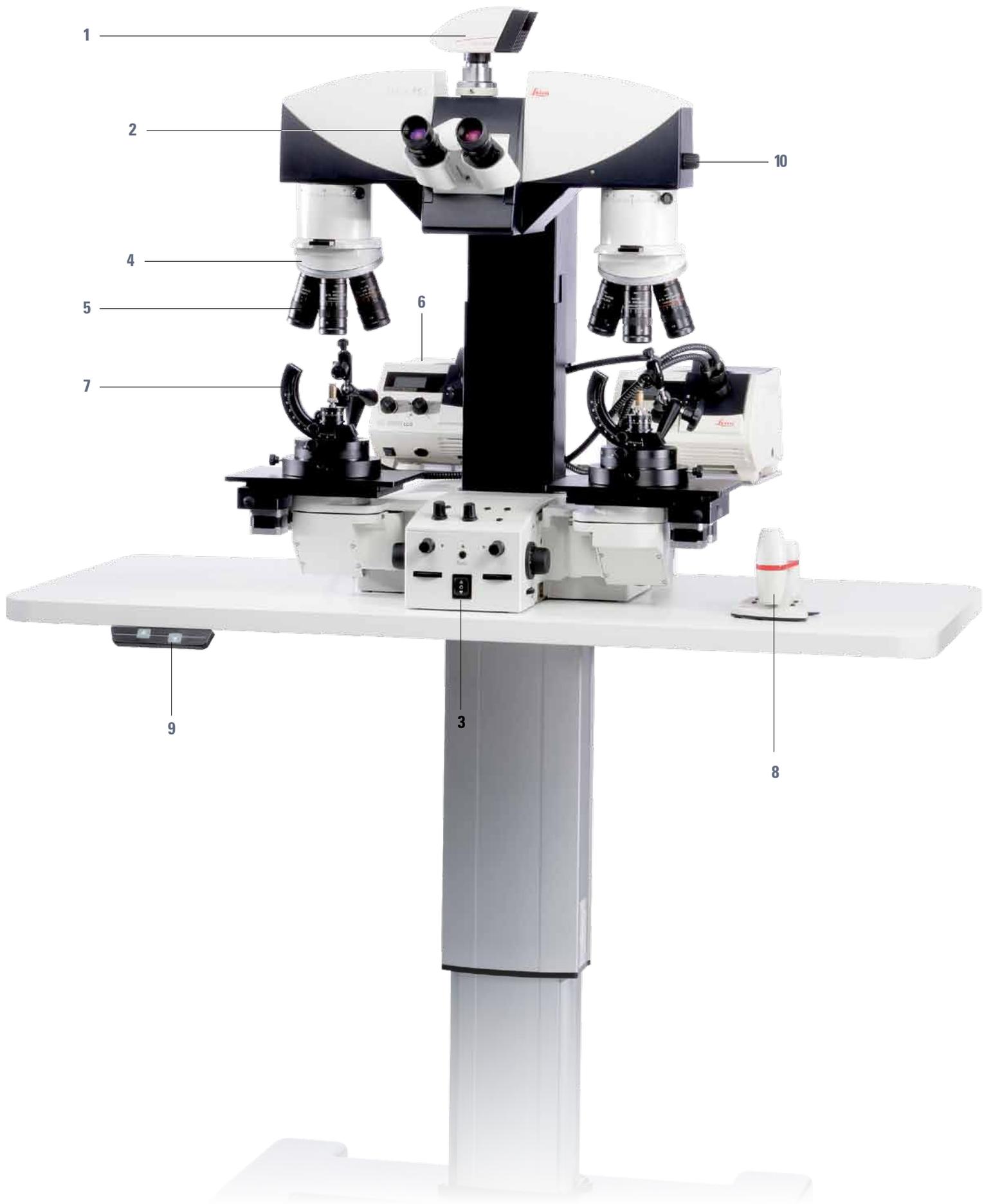


The Leica STP8000 supports the control of all motorized functions of the FS C comparison microscope.

# The results of your requests: Leica FS C

## Overview of the Leica FS C

- 1 The Leica DFC digital cameras deliver razor-sharp images for documentation.
- 2 The adjustable angle of the tube eyepiece lets all users assume a relaxed work posture, regardless of their size.
- 3 The motorized Z column accommodates different specimen heights quickly.
- 4 The encoded 6-position turret features high locking precision for parcentric objective magnifications.
- 5 The apochromatic macro objectives together with the motorized magnification changer offer 10 permanently calibrated magnification levels.
- 6 The cold-light sources can be remotely controlled via the knobs on the front for maximum convenience.
- 7 Everything under control: the Leica FS C offers optimal specimen holders for any application. The extensive accessory program is user-friendly and has demonstrated its practical value over decades.
- 8 Everything in the right place: the Smart Move ergonomic remote control module supports precise, individual and synchronized control of motorized stages and focusing drives.
- 9 Convenience: the work table features motorized height adjustment.
- 10 The zoom control of the right-hand comparison channel compensates for magnification differences due to temperature or deformation – in the case of bullets, for example.



### **Leica DM4 B – everything at the touch of a button**

The Leica DM4 B complements perfectly the micro comparison bridge. Its fully automatic light management, integrated Variolux color module, selected optics pairs and reproducible illumination ensure you the greatest possible comparison reliability.

Contrast methods are available at the touch of a button, while the microscope parameters are automatically stored by the software. The results are thus reproducible at any time.

### **For “craftspersons”: the manual DM2500 with FS comparison bridge**

The FS CB with two DM2500 microscopes is an alternative to the FS4000 that offers comparable optical performance at a significantly lower price. The intuitive controls and levers feature additional color coding to permit less-experienced users to quickly optimize image contrast. The FS CB uses the same comparison bridge as the FS4000. Both systems can achieve absolutely homogeneous lighting with optical fibers and a single light source for transmitted light, incident light and fluorescence.

The FS CB comparison bridge can also be fitted to educational microscopes (e.g. DM750 P) for use in educational or training settings.

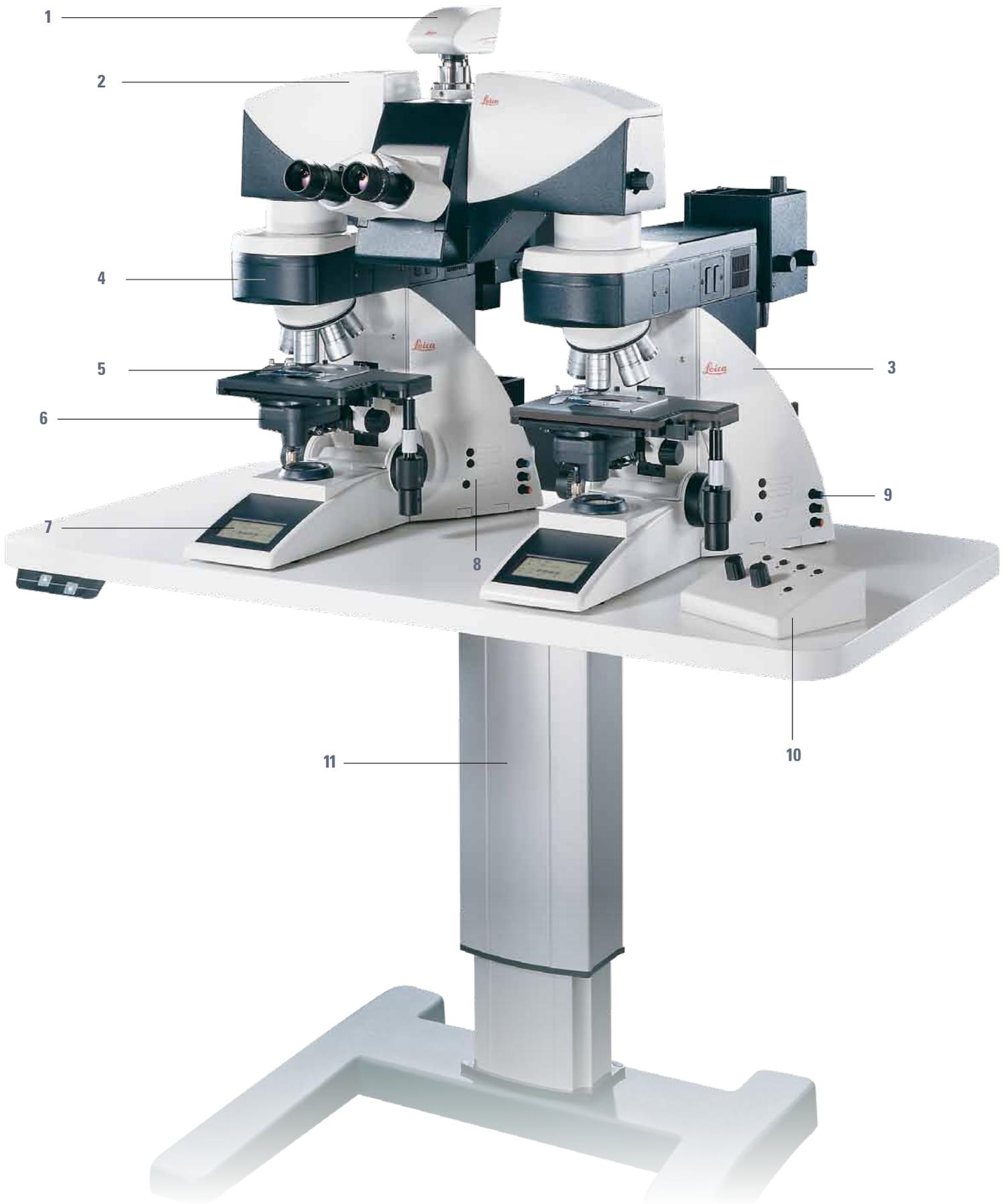


FS CB with lab-class DM2500 stands

# Perfect for splitting hairs: Leica FS4000

## **Overview of the Leica FS4000**

- 1** Leica DF cameras are the ideal accessories to document your findings.
- 2** Highest optical performance paired with best ergonomics: the new, patented, color-neutral micro comparison bridge.
- 3** The DM4 research microscopes harmonize perfectly with the comparison bridge.
- 4** Choose between the 4-position industrial incident-light axis (for BF, DF and FL) and the 5-position fluorescence axis.
- 5** Rotatable mechanical stages for left- and right-hand operation and one or two slides or rotatable polarization stages.
- 6** Fully automatic condensers with auto-Köhler function.
- 7** The graphical display provides information on the AP, FD and light intensity. You are always in the picture.
- 8** The six buttons in the rear side plates of the microscopes are freely programmable.
- 9** The Variolux filter module ensures identical color contrasts in transmitted light.
- 10** The control panel permits easy management of the motorized bridge at all times.
- 11** All users find their optimal working positions. The optional motorized height-adjustable work table is an ideal accessory for relaxed work.





### **The Leica DFC-series digital cameras**

Leica DFC digital cameras are the seeing link between our microscopes and the software. Their fast USB links guarantee fast live image response times.



### **The Leica Application Suite**

The Leica Application Suite (LAS) is included with all Leica comparison instruments. It controls the camera, captures and manages images, and even supports measurements of the live image. The LAS core version includes everything you need to record and document specimens.

And that's not all: numerous special applications can be integrated as modules for untold additional options.



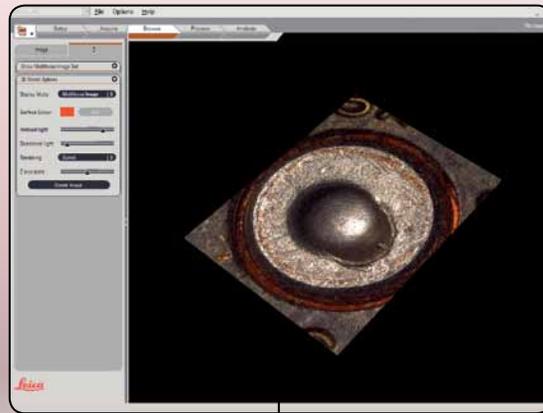
### **Leica Application Suite...**

...is used for measurement as in this example.



# Leica Application Suite: the logical end of the chain of evidence

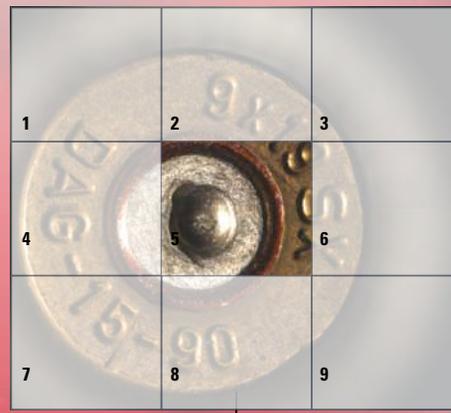
An investigation is only as valuable as its documentation. Capture images, record comments, add measuring scales and create montages to reinforce your findings. The Leica LAS software provides you insights that would remain hidden without computer technology. Set new standards with your reports!



## Motorized Multifocus module

It is only natural that depth of field decreases as magnification increases until only a tiny part of a specimen is visible in focus. As result, it is practically impossible to record and document an uneven specimen in its entirety.

The Motorized Multifocus module demonstrates impressively that even the laws of physics can be overcome when necessary. It merges a fully automatic Z image series into a razor-sharp image of the entire specimen which would not be possible without the help of a computer. Use Motorized Multifocus when examining deformed bullets or core pins, or to simply provide greater depth of field.



## Motorized Multistep module

A further innovation in Leica comparison microscopy is the use of motorized stages in conjunction with the Motorized Multistep software module.

Large specimens are captured bit by bit. The individual images are then joined with pixel precision for a high-resolution view of the entire specimen.



The motorized Z column, the height-adjustable work table and adjustable angle of the observation tube help ensure relaxed, fatigue-free work – regardless of the physical size of the user.



The bright, crystal-clear Leica optics are easy on the eyes, while the variable viewing angle of 0° to 35° lets all users assume a relaxed posture.



The Leica DM4 and DM6 microscopes feature intuitive operation coupled with an appropriate degree of automation and an easy-to-read status display.

### **Ergonomics are not a luxury**

An optimally-configured workstation is essential for maximum concentration. We have therefore done everything we can to ensure your comfort. Muscle tension, back pain and eyestrain are a thing of the past with a Leica forensics station – after hours of work you will still feel as fresh as when you started!

# One thing is absolutely clear – our objectives

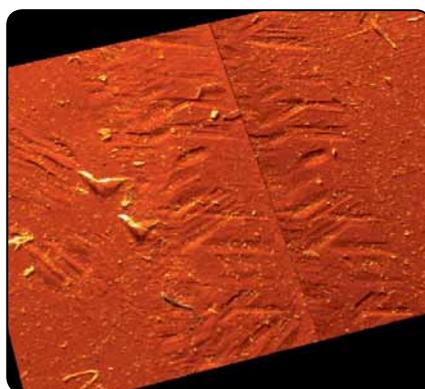
Some prints or tool marks are so clear that a magnifying glass would suffice for a positive identification. And then there are cases that demand the utmost from forensics experts and their comparison microscopes – clues that are so small and complex that they approach optical limits.

Optics are a decisive factor in such situations. Their quality and resolution can deliver the decisive margin of safety – and thus the basis for a conclusive "yes" or "no". Do not settle for compromises – trust in the legendary quality of Leica objectives.



## Leica APO macro objectives

With our new Leica macro objectives, we show our unwillingness to compromise. Look forward to brilliant, bright images with extremely high resolution. Precise optical measurements can be performed at ten fixed levels between 1× and 120× with object field sizes ranging from 1.3 to 160 mm. And thanks to their apochromatic correction, distracting color fringes have been eliminated almost completely.



## LAS Montage

LAS Montage 3D multifocus image of a Mikrosil casting in split-image mode.



## No room for error

With deviations in magnification of less than 0.1%, the various objective pairs give you the greatest possible flexibility and reliability in optical comparison.

In addition, the right-hand comparison channel can be zoomed by  $\pm 4$  to compensate for deformations or temperature-related differences in magnification.



### **It all fits perfectly**

Cold light, soft source, optical wave-guide transition, LED spot, mini ring light or power LED: the universal lighting mount can accommodate any light source and allows it to be rotated around the object by 360°. The articulated arm permits easy adjustment to the left or right comparison beam path.

The light cone remains positioned precisely on the object field when moving the object. The light source installation is optimized for use with automatic multifocus, as it precisely follows the movement of the Z drives.

Naturally, provision has also been made for alternative illumination mounting (e.g on the stage bracket or above the objective turret).

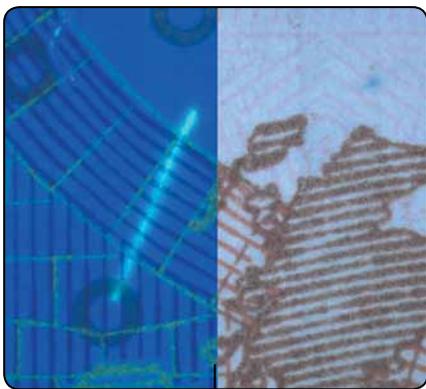


**As with chess, the wide range of accessory and illumination options leads to virtually limitless versatility. Have a word with your Leica advisor – together you can determine the optimal configuration for your needs.**

# On closer examination, light is everything.

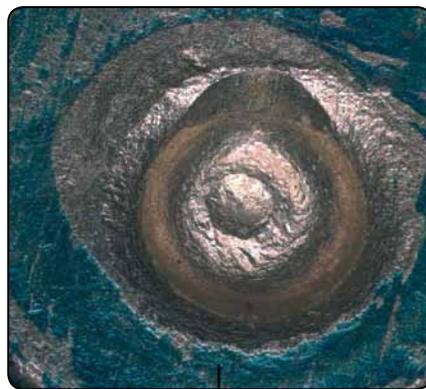
Illumination can frequently be decisive in the search for conclusive proof. That's why Leica offers an extensive modular illumination system that can be adapted perfectly to your special requirements.

Our standard illumination methods (angled incident and coaxial illumination) use quality light guides and cold-light sources with remote-control support. Powerful LED components can be combined ideally to provide optimal lighting for any object.



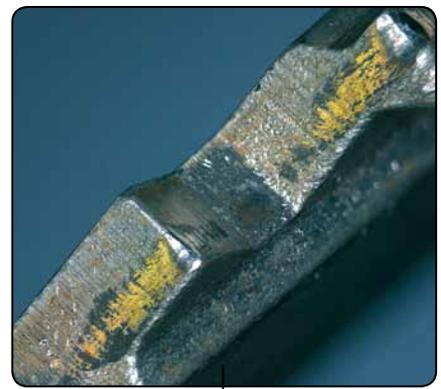
## **Example 1: document verification**

Choose between the UV ring light and the black light to stop counterfeiters in their tracks. The large-format stage and magnetic clamps secure documents easily and reliably. (shown here: 10-euro banknote with identical image detail, on the left in UV, on the right in coaxial light.)



## **Example 2: LED ring lamp**

The mini ring lamp fits perfectly to APO macro objectives and is outstanding for examining cartridge cases. The segmental control permits the selection of quarter, half and full LED light. (shown here: multifocus image of a firing pin impression with LED ring lamp illumination)



## **Example 3: reflective surfaces**

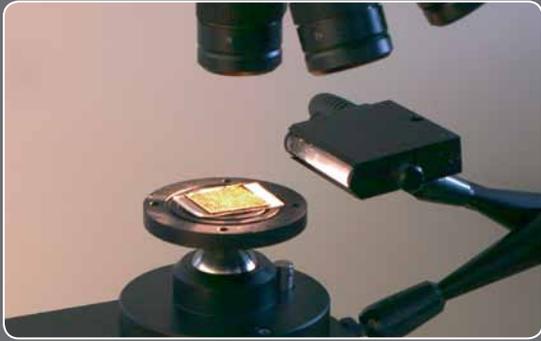
Coaxial illumination is ideal for examining metallic and highly reflective surfaces. Highlights and distracting reflections are suppressed to a high degree, permitting details to be viewed that would otherwise hardly be visible. (shown here: key with traces of coding keys. Illumination: Angled incident light in combination with coaxial illumination.)

# Optimal accessories for any case



## Fiber illumination unit

Universal sample holder with plug receptacle for all common calibers and miniature articulated arm for additional tilting. Rotatable by 360°.



## Universal illumination holder

Rotatable by 360° with optical wave-guide transition for tool marks on casting material (Mikrosil).



## UV ring light

Together with large-format stage and magnetic clamps. The UV share of the black light makes watermarks and other special effects on banknotes visible.

The secure retention of an object under the microscope is crucial to the ease and reliability with which it can be studied. Whether you need to investigate documents, projectiles, fibers or tools, our wide range of object holders contains the optimal accessory for your requirements.

We can only present a small selection of our accessory range here. For a demo and further information contact your Leica representative.





### LED ring lamp

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



### Wire holder

Universal illuminator, rotatable by 360°, with fiber illumination, universal holder with wire holder.



### Cylinder holder

Universal illuminator, rotatable by 360°, with fiber illumination, universal holder with holder for lock cylinders.

## Comparison bridge (FS C/FS4000/FS CB)

### Motorized comparison bridge with integrated (tiltable) Ergotube

- color-neutral image thanks to patented splitter prism
- left/right magnification difference = 0.1
- superimposed- or split-image comparisons with motorized variable dividing line
- motorized adjustable width of dividing line
- combination of split- and superimposed image supported
- LED display "Calibrated (green) or Zoom (red)"
- magnification adjustment (zoom) of right-hand beam path supported ( $\pm 5\%$ )
- spacing of optical axes: 400 mm
- operating panel for all motorized functions (not FS C)

### Tube factor

- 1 $\times$ , 1.5 $\times$  with motorized magnification changer
- field number: 22 mm
- image orientation: upright and laterally correct

### Only for macro system (additional):

- clamping screw for turning the holder with angled incident light (long articulated arm)
- holder for filter slide
- color differentiation of deviations in superimposed-image observation
- operating unit integrated in FS C base

## Magnifications and object fields

Magnification changer	Macro objective	FAA	Field of view in eyepiece 10 $\times$	Total magnification, eyepiece 10 $\times$
1 $\times$	0.33:1	100 mm	166.0 mm	1.32 $\times$
1 $\times$	0.4 $\times$	60 mm	55.0 mm	4 $\times$
1.5 $\times$	0.4 $\times$	60 mm	36.6 mm	6 $\times$
1 $\times$	1 $\times$	60 mm	22.0 mm	10 $\times$
1.5 $\times$	1 $\times$	60 mm	14.6 mm	15 $\times$
1 $\times$	2 $\times$	60 mm	11.0 mm	20 $\times$
1.5 $\times$	2 $\times$	60 mm	7.3 mm	30 $\times$
1 $\times$	4 $\times$	60 mm	5.5 mm	40 $\times$
1.5 $\times$	4 $\times$	60 mm	3.6 mm	60 $\times$
1 $\times$	8 $\times$	45 mm	2.75 mm	80 $\times$
1.5 $\times$	8 $\times$	45 mm	1.80 mm	120 $\times$

## Leica FS C

### Stand

- solid, rigid cast stand with motorized height adjustment of comparison bridge carrier (255 mm range), motorized stages and focusing
- motorized and synchronized movement of stages and focusing units over entire travel range
- integrated power supply for all electrical functions Focusing:
  - 2 motorized focus drives
  - focus speed adjusted to current magnification
  - travel: 25 mm

### Stages

- motorized cross-stages (220 mm×160 mm stage area), 80×80 mm opening with removable glass inserts. The stages can be controlled via the ergonomic operating knobs for individual or synchronized x/y movement (50×50 mm) or the optional remote control modules.
- cross-stages have holes to accommodate various special holders

### Separate rotating stages

- (118 mm dia.) with openings (50 mm dia.), removable glass inserts, stage rotation clamp
- stage carrier with receptacle for revolving polarizers

### Tiltable rotating stages

- (75 mm dia.) with clamp
- tilts up to 45° in all directions
- concentric grooves on surface for improved grip when using adhesives

### Stages for large objects

(210×300 mm) with metal plates and glass inserts for thin objects (i.e. documents); sufficient for A4 pages.

### Objectives

Macro objectives 0.4×, 1×, 2×, 4×, 8× and auxiliary lens 0.3:1 for 1:1 imaging (with iris diaphragms) and micro objectives (10×, 20×)  
Eyepieces: HC PLAN S 10×/22

## Leica FS4000

### Stand

- power supply: stabilized, 90 – 250 V, integrated in stand
- display: information display (LCD, LAS-compliant)
- illumination of transmitted-light axis: LED or cold-light illumination

### Automation

- contrast and light manager (intensity, field and aperture diaphragm settings), contrast method selection
- motorized condenser head
- motorized condenser turret (7-position), optional

### Contrast methods

- BF (brightfield)
- PH (phase contrast)
- DF (darkfield)
- POL (polarization)
- FL (fluorescence)

### Standard illumination:

- LED integrated in lamp housing
- cold-light source with twin light guide and link for adjustment-free standard illumination

### Illumination of fluorescence axis

- HG50/HG100 integrated in lamp housing
- Leica EL6000 light source with twin light guide and link for adjustment-free standard illumination

### Automation

- FIM (Fluorescence Intensity Management) method to reduce intensity by five levels
- round and rectangular field diaphragms for optimal adaptation to eyepiece observation or camera imaging

### Motorized filter turret

- 5-position

### Objective turret

- M25, 6-position, encoded

### Stages

- left- and right-handed operation
- ceramic-coated
- without rack on Y drive
- adjustable torque
- with and without stage rotation
- rotatable polarization stages

### Optional motorized work table

- height: 619 mm plus 300 mm adjustment range
- power: 2000 N
- travel speed: approx. 12 mm/s.
- max. load: 200 kg
- control: integrated rocker switch and footswitch
- tabletop: 1200 mm×560 mm (alternatives available on request)
- universal power supply



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