Leica FS4000 Microscope
Leica FS C Macroscope

Two NEW Forensic Comparison Microscopes

Your Best Evidence Just Got Better!

Leica
MICROSYSTEMS

Leica Microsystems Has Already Helped Convict Many Criminals

Since the pioneering days of forensic evidence comparison, one name has always stood for quality – Ernst Leitz GmbH. Over the course of nine decades, Leitz comparison microscopes were developed in cooperation with leading forensic scientists from around the world. The company name has since changed, but the quality remains the same. Leica Microsystems continues the Leitz tradition of designing and producing innovative comparison microscopes, and now introduces the Leica FS4000 Forensic Solution Microscope and Leica FS C Forensic Solution Comparison Macroscope.

The forensic scientist's expertise plus Leica's innovation make a perfect pair

The forensic scientist's expert knowledge paired with a Leica microscope is an unbeatable combination. Clear evidence images down to the smallest detail, and unmistakable, reproducible results – Leica's comparison optics provide all this and more. The scientist can identify ambiguous evidence and draw expert conclusions with ease using Leica's newest microscope solutions. Leica comparison microscopes provide state-of-the-art technology and superior ergonomics to make comparison microscopy easier and allow the examiner to concentrate on the work at hand.

Leica Microsystems AG – Winner of the World's First Innovation Award: German Business Innovation Award 2002

The Principal Innovation – A Fully Integrated Comparison Bridge

Whether the evidence is fiber analysis, toolmark comparison or ballistics, Leica's new fully integrated, automated comparison bridge provides better and faster evidence assessment through optimized comparison techniques. Both the Leica FS C and the FS4000 feature the new comparison bridge design. The following observation modes can be selected at the touch of a button:

- FullScreen left, FullScreen right
- Split-image with adjustable dividing line
- Split-image with adjustable strip for partial superimposed image
- Color contrasting of non-conforming structures

Superimposed image comparison
The new comparison bridge's use of complementary color filters renders unmatched sample portions in color. The overlaying details only appear in their original color in those places where there is no structural deviation.

Side-by-side or superimposed image comparison
Leica's bridge design offers new freedom in side-by-side comparison. The width and position of the dividing line can be adjusted as the user desires or set as a wide strip, in which both objects can be overlaid according to the superimposed image mode described above.

Central control unit
The central control unit, which operates the comparison bridge, is conveniently and ergonomically located at the base of the stand. The FS C's control unit is located at the bottom of the instrument, and the FS4000 features a separate control box that can be freely positioned anywhere on the work surface.

Light path – Twice as much light
The light path is two times more efficient than predecessor systems. The new beam-splitter prism ensures complete color balance and identical image quality for the viewing tube and documentation port, which greatly contributes to this new level of efficiency.

Easy zoom compensation function
Comparing deformed specimens or temperature-sensitive materials may require that the magnification of one side of the light path be adapted. The new bridge allows a zoom adjustment of +/-4% on the right side. Zooming is easy and reliable. The calibrated matched configuration is easily reproducible and indicated by an LED.

Impression (Microsil) of stamp traces on automobile license plate compared using parallel distribution of light (butterfly view).
Image courtesy of the German Federal Bureau of Criminal Investigation

Leica Design by Christophe Apothéloz

The Leica FS4000 Microscope – Pinpoint Accuracy

Trace evidence may consist of hair, fiber, paint chips or other microscopic items. With magnifications up to 1000x and a wide variety of optical contrast options, such as fluorescence and polarization, the forensic scientist is properly equipped for every kind of case with the Leica FS4000 microscope. For matching evidence, the Leica FS4000 provides identical magnification, reproducible illumination, and color balance of the left and right microscope image.

The Leica FS4000 features two new Leica DM4000 B microscopes, with fully automatic light management and integrated Leica Variolux color module, which allows continuous variable color adjustment on both microscope stands. Carefully selected optical pairs and reproducible illumination assure accurate comparison. The desired contrast method is available at the touch of a button. Leica offers a wide variety of documentation options, such as photo systems and cameras with dedicated software, high-output image recording, as well as processing and archiving possibilities.

The core benefits of the Leica FS4000:

Incredible optical performance

- Automized Koehler illumination for each magnification.
- Constant Color Intensity Control (CCIC) maintains color temperature regardless of illumination intensity.
- New 1.25x scanning overview system lens.

Unparalleled reproducibility

- One button activates each new contrast method.
- Automatic switching of required components.
- Reproducible field diaphragm and aperture diaphragm settings at the touch of a button.
- Manual override and fine-tuning of illumination settings according to personal preferences.

Ergonomics is the science of comfort

The Leica FS4000 achieves an ideal balance between opto-mechanical design and ergonomy. The shape, position and layout of microscope controls are optimized to promote a natural, relaxed posture at the microscope.

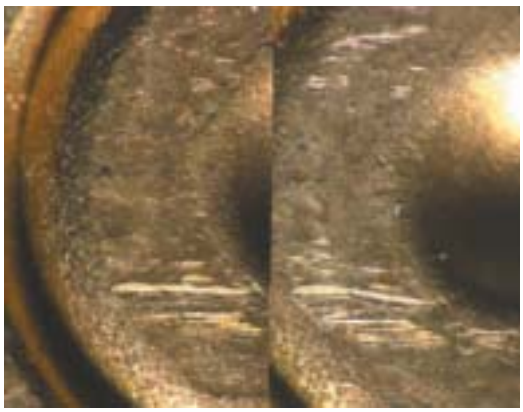
Stand-alone control panel of the Leica FS4000.

Leica Design by Christophe Apothéloz

The Leica FS C Macroscope – Simultaneous Comparison

In addition to excellent ergonomics and a stable design, the Leica FS C offers true technical innovations such as motorized, synchronous control of both stages. This allows the simultaneous comparison of evidence in x and y while maintaining a complete overview of both partial images. Even evidence samples on inclined surfaces can be viewed easily with the simultaneous z adjustment, as refocusing using individual focus drives is no longer required.

The Leica FS C ensures fatigue-free microscopy, even over long periods of time. All operating elements, such as the selection buttons for observation modes, the focus buttons, the x-y dial encoders for the stages, etc., are within easy reach of the user.



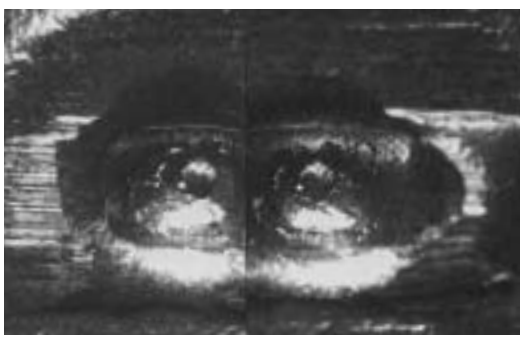
Split-image comparison of breech face.

The core benefits of the Leica FS C:

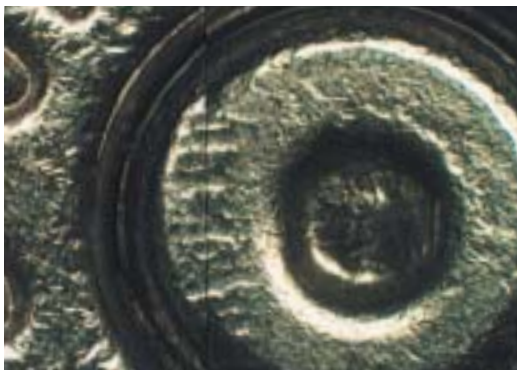
Incredible optical performance
Whether it's the structure of a DVD or the impression mark of a crowbar, Leica's optics are up to any comparison task. With magnification deviation of less than 0.1%, the objective pairs provide the highest degree of certainty for optical comparisons.

- New long working distance (60 mm) Plan Apochromatically-corrected objectives provide clear, crisp, high contrast images with the highest color correction characteristics in the industry.
- The new 1x, 2x, and 4x telecentric objectives provide exact magnifications no matter what the z position of the objectives are relative to the sample.
- Higher magnification capabilities are achieved through a compatible interface, which allows the use of a variety of Leica DM microscope objectives.
- Built-in iris diaphragms in each objective provide a convenient way to increase contrast and depth of field that is optimized for each sample.
- 5 individual click stops for the aperture diaphragm allow easy reproduction of image settings.

Unparalleled reproducibility
The Leica FS C system provides accurate, reproducible measurements and settings. The new illumination arms that support the fiber optic illumination system are graduated for rapid set-up and review of already examined cases, so that peer review and case follow-up at a later date can be set up more efficiently and accurately. The exact position of the illumination can be reproduced from the left side of the instrument to the right side for rapid set-up.



Split-image comparison of a striker impression mark.



Split-image comparison of breech face markings.

- Fixed magnification objective and built-in 1.5x magnification changer allow exact replication of magnifications.
- Intelligent automation with a coded nosepiece allows the image acquisition database to automatically collect microscope data.
- Optional software interface for the Palm OS® PDA permits measurements to be stored or read directly to the device.

Total human engineering

Leica's ergonomically designed forensic workstation is a harmonious blend of form and function. The settings of the macroscope, work table and chair are easily adjusted to adapt to any body size or position. The result: relaxed work, even for many hours at a time.

- Features integrated tilting eyetubes from 5° to 35°.
- Motorized z column provides convenient height adjustment for tall and short samples.
- Motorized z table can be adjusted for each examiner's height at the push of a button or foot pedal.
- Low positioned, centrally located controls for all bridge functions, are activated by push button or convenient knobs.
- Control of left, right or synchronous movement of the stage is provided via Leica's "SmartMove™" remote 3D control device.

Motorized control of x/y/z for single and synchronous movement.

Brilliant Images with the Leica FS C's New Objectives

The new apochromatic macro-objectives – You can believe your eyes
The apochromatically-corrected objectives provide you with brilliant, bright images in extremely high resolution. Exact optical measurements can be performed at 8 fixed magnification levels and at object field sizes from 2.6 mm to 55 mm. For higher magnification levels, Leica's extensive range of microscope objectives is available. These objectives can be used without modification to the Leica FS C.

View evidence in perfect light
To ensure homogeneous, reflection-free illumination, Leica uses remote-controllable cold light sources with fiber optics and filters. There is also a wide range of accessories to choose from. Additionally, special lighting fixtures are available such as UV lamps for document examination. The intensity of the cold light sources can be conveniently adjusted using a rotary encoder at the base of the stand.

Oblique incident light – Now with reproducible settings
Gone is the time-consuming task of adjusting the oblique light illumination devices. Leica's new oblique incident light holders (included) allow reproducible settings in 4 axes. Never before has it been so easy to perfectly match the illumination of the left and right comparison beam paths. The holders are attached to the objective turrets. When moving the samples, the light cone always remains exactly oriented to the object field.

Four axis oblique light holder.

Coaxial illumination for reflection-free images
For clear and reflection-free display of fine markings on highly reflective metallic surfaces or plastics, the Leica FS C comparison microscope can be equipped with newly designed coaxial light illumination. You will see details which were previously difficult to image, such as trace evidence on toolmarks, bullets, adhesive tape, and audio or videotapes.

Transmitted light for more transparency
Transmitted light is perfectly suited for samples such as paint layer cross-sections, foils or textile specimens. Leica's cold light source, using fiber optic bundles, ensures uniform illumination of samples in field diameters between 5 mm and 50 mm.

Convenient Documentation and Archiving

Leica digital camera.

Modular, versatile system
From a 4.5 mm bullet to a cartridge case, from a stamp to a bill of sale, from a picked lock to a crowbar, the Leica FS C is ready for all real-time comparisons. Documentation and long-term archiving of comparison samples and the creation of detailed reports with integrated images are as important as the actual comparison. Both of Leica's new comparison instruments offer a variety of documentation solutions and are compatible with a wide range of peripheral devices.

Integration – A single vendor, a complete imaging solution
From high-fidelity image capture to low light fluorescence, Leica's digital cameras, software, and microscopes provide the basis to create seamless solutions for your image comparison needs. Based on a common software platform, each Leica component, be it hardware or software, works in close concert to provide optimal system performance.

Microphotography
The Leica MPS30 and Leica MPS60 microphotography systems provide quick and sure documentation. Modular accessories range from a standard small photo cartridge (35 mm) to Polaroid and large-format attachments.

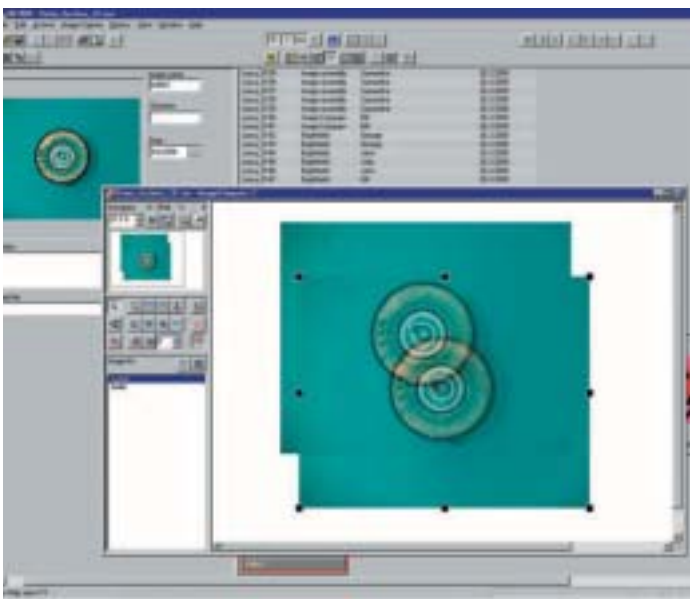
Split-image comparison of ejector marks.

Digital cameras
The extensive range of Leica DC cameras seamlessly integrates with Leica's image management software. Recorded images are immediately available and ready to process electronically, e-mail or archive.

Software and data transfer
The perfect complement to your analog or digital camera for image archiving, measuring, analyzing or direct reporting is the network-compatible image management software.
Every Leica FS C comparison macroscope and FS4000 comparison microscope comes with Leica software, including an image viewer and controls for the automated microscope functions. With the click of a mouse, data is transferred to the image manager and is available for processing. The modular structure of the image manager allows the creation of custom image databases (i.e., for ballistics investigations or toolmark comparison).

The Leica FS C facilitates completely new software applications, such as image assembly in which multi-field images are assembled into a single larger mosaic image. Another software application, multi-focus module, takes a 3D object at multiple focus points and renders only the in-focus elements into a single image.

22 caliber shell casing.
Images courtesy of Peter Lawrence, South Australia Police



Leica Image Management software IM showing image compare module.

Technical Data

• Comparison Bridge

Motorized comparison bridge with integrated ergonomic tube:
- For combination image or split-image comparisons with adjustable dividing line
- Variable width of the dividing line
- Combination of side-by-side image and superimposed image possible
- Color differentiation of abnormal markings during superimposed image observation
- Magnification adjustment (zoom) of the right beam path possible (+/- 4%)
- Distance between optical paths: 400 mm

For macro system only:
- Locking screw for rotation of the oblique incident light holder
- Slot for insertion of filter slides

Tube factor:
1x, 1.5x with magnification changer

Field number:
22

Image orientation:
Upright, non reversed

• Leica FS4000

Stand
Power supply:
Stabilized, multi range (90V-250V), integrated in stand

Display:
Information display (3.7 x 7.7 cm)

Transmitted light axis illumination:
12V/100W halogen lamp

Automation:
- Contrast and Light Manager (adjustment of light intensity, field and aperture diaphragm), selection of contrast method
- Constant Color Intensity Control (CCIC)

Condensers
Automation:
- Motorized condenser top
- Motorized condenser turret (7 pos.) optional

• Leica FS4000 *(cont.)*

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

Fluorescence axis illumination:
100W Hg lamp; 50W Hg lamp

Automation:
- FIM (fluorescence intensity management) technique for reducing the light intensity in 5 steps
- Booster lens for increasing the light intensity (optional)
- Circular and rectangular field diaphragms for eyepiece or camera viewing with automatic adjustment

Motorized filter turret:
5-position

Objective nosepiece:
6-position M25, coded

Stages:
- Ceramic-coated
- Without rack on y drive
- Adjustable torque
- Telescopic stage drive
- With and without rotation
- Left-hand version on request

Optional motorized work table:
- Height adjustment range: 619 mm plus 300 mm movement
- Lifting capacity: 2000 N
- Lifting speed: approx. 12 mm/sec.
- Load capacity: 200 kg
- Control system: integrated toggle switch and by foot pedal
- Table area: 1200 mm x 560 mm
- Universal power supply

• Leica FS C

Stand:
- Stable, warp-resistant cast stand with motorized height adjustment for the comparison bridge carrier (movement 255 mm), motorized stages and motorized focus
- Motorized synchronous motion of the stage and the focusing unit over the entire distance
- Built-in power supply for all motorized functions

Focusing:
- 2 motorized focus drives
- Focus speed adjusted to the current magnification
- Movement: 25 mm

Stages:
- Motorized x/y stages (stage surfaces 220 mm x 160 mm) with openings of 80 mm x 80 mm, removable glass inlays, ergonomic operating buttons for transverse and synchronized movement (50 mm x 50 mm) with optional "SmartMove™" remote control module
- Bore holes for positioning the adjustable holder, rotating stages, large sample stage or bullet holder

Stackable rotating stages:
- (Ø 118 mm) with openings (Ø 50 mm), removable glass inlays, clamping device for the stage rotation
- Stage carrier with receptacles for revolving polarizer

Inclining rotating stages:
- (Ø 75 mm) with locking device
- Inclined up to 45° on every side
- Ridged surfaces

Large sample stages:
(210 mm x 300 mm) with metal plates and glass inserts for thin objects (i.e., documents, can be placed on x/y stages)

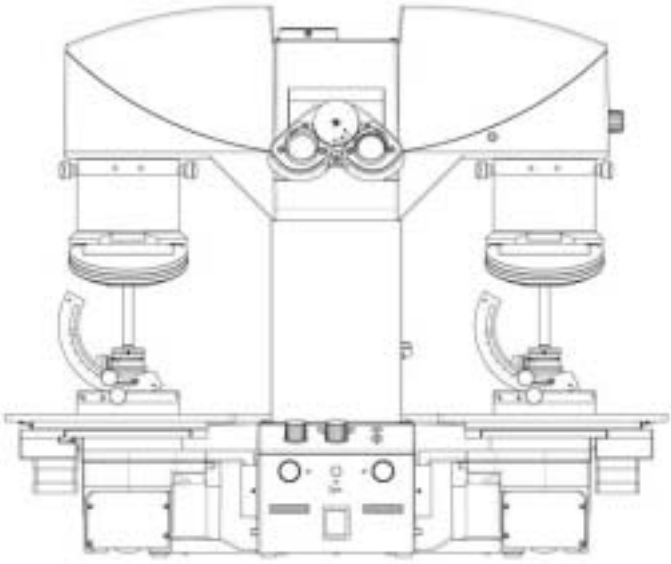
Objectives:
Macro-objectives 0.4x, 1x, 2x, 4x (with iris diaphragms) and micro-objectives

Eyepieces:
HC PLAN S 10x/22

Magnification and object fields:

				2/3" camera	
	FWD	10x eyepiece		0.63x C-mount	
Objective		FOV	Tot.Mag.	FOV	Tot. Mag.
0.4x	60	55.0	4.00	43.60	10.10
0.6x	60	36.6	6.00	29.00	15.20
1x	60	22.0	10.00	17.44	25.40
1.5x	60	14.6	15.00	11.60	37.90
2x	60	11.0	20.00	8.70	50.60
3x	60	7.3	30.00	5.80	75.90
4x	60	5.5	40.00	4.40	101.30
6x	60	3.60	60.00	2.90	152.00

Dimensions without camera:
- Height 785 mm (maximum; Z column extended)
- Width 1035 mm (oblique incident light with maximum extension of articulated arms)
- Depth 530 mm (including front operating buttons)



Weight:
45 kg (with basic equipment)

Optional motorized work table:
- Height adjustment range: 619 mm plus 300 mm movement
- Lifting capacity: 2000 N
- Lifting speed: approx. 12 mm/sec.
- Load capacity: 200 kg
- Control system: integrated toggle switch and foot pedal (optional)
- Table area: 1200 mm x 560 mm
- Universal power supply (90V-250V)

Illumination:
- Oblique light
  – 4.5 mm randomized bifurcated light guide
  – 4 axis illumination arms with scales for reproducible settings
  – UV light source (180W)
  – Cold light bar for homogeneous broad light illumination with bifurcated 9 mm light guide
- Light source
  – Color neutral cold light source (250W) with remote control
- Transmitted light
  – 9 mm bifurcated randomized light guide
  – Motorized condenser lens
  – Illumination field ø 5-50 mm
- Coaxial illumination
  – 9 mm bifurcated randomized light guide with λ/4 plate
  – Polarization system for reflexfree images
  – Simultaneous coaxial and oblique illumination

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, developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Yet Leica symbolizes innovation as well as tradition.

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

Australia:	Gladesville	Tel. +61 2 9879 9700	Fax +61 2 9817 8358
Austria:	Vienna	Tel. +43 1 486 80 50 0	Fax +43 1 486 80 50 30
Canada:	Richmond Hill/Ontario	Tel. +1 905 762 2000	Fax +1 905 762 8937
Denmark:	Herlev	Tel. +45 4454 0101	Fax +45 4454 0111
France:	Rueil-Malmaison	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 9615
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
People's Rep. of China:	Hong Kong	Tel. +852 2564 6699	Fax +852 2564 4163
Portugal:	Lisbon	Tel. +351 21 388 9112	Fax +351 21 385 4668
Singapore		Tel. +65 6779 7823	Fax +65 6773 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:	Bannockburn/Illinois	Tel. +1 847 405 0123	Fax +1 847 405 0164

and representatives of Leica Microsystems in more than 100 countries.

The companies of the Leica Microsystems Group operate internationally in five business segments, where we rank with the market leaders.

- **Microscopy Systems**
  Our expertise in microscopy is the basis for all our solutions for visualization, measurement and analysis of microstructures in life sciences and industry.

- **Imaging Systems**
  With confocal laser technology and image analysis systems, we provide three-dimensional viewing facilities and offer new solutions for cytogenetics, pathology and materials sciences.

- **Specimen Preparation**
  We provide comprehensive systems and services for clinical histo- and cytopathology applications, biomedical research and industrial quality assurance. Our product range includes instruments, systems and consumables for tissue infiltration and embedding, microtomes and cryostats as well as automated stainers and coverslippers.

- **Medical Equipment**
  Innovative technologies in our surgical microscopes offer new therapeutic approaches in microsurgery. With automated instruments for ophthalmology, we enable new diagnostic methods to be applied.

- **Semiconductor Equipment**
  Our automated, leading-edge measurement and inspection systems and our E-beam lithography systems make us the first choice supplier for semiconductor manufacturers all over the world.

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