



Leica MEF4 A/MEF4 M

Widefield Metallographs

Leica
MICROSYSTEMS

Leica MEF4 A / MEF4 M

The Inverted Metallographs

Leica MEF4 A –

The Widefield Metallograph with a high degree of automation

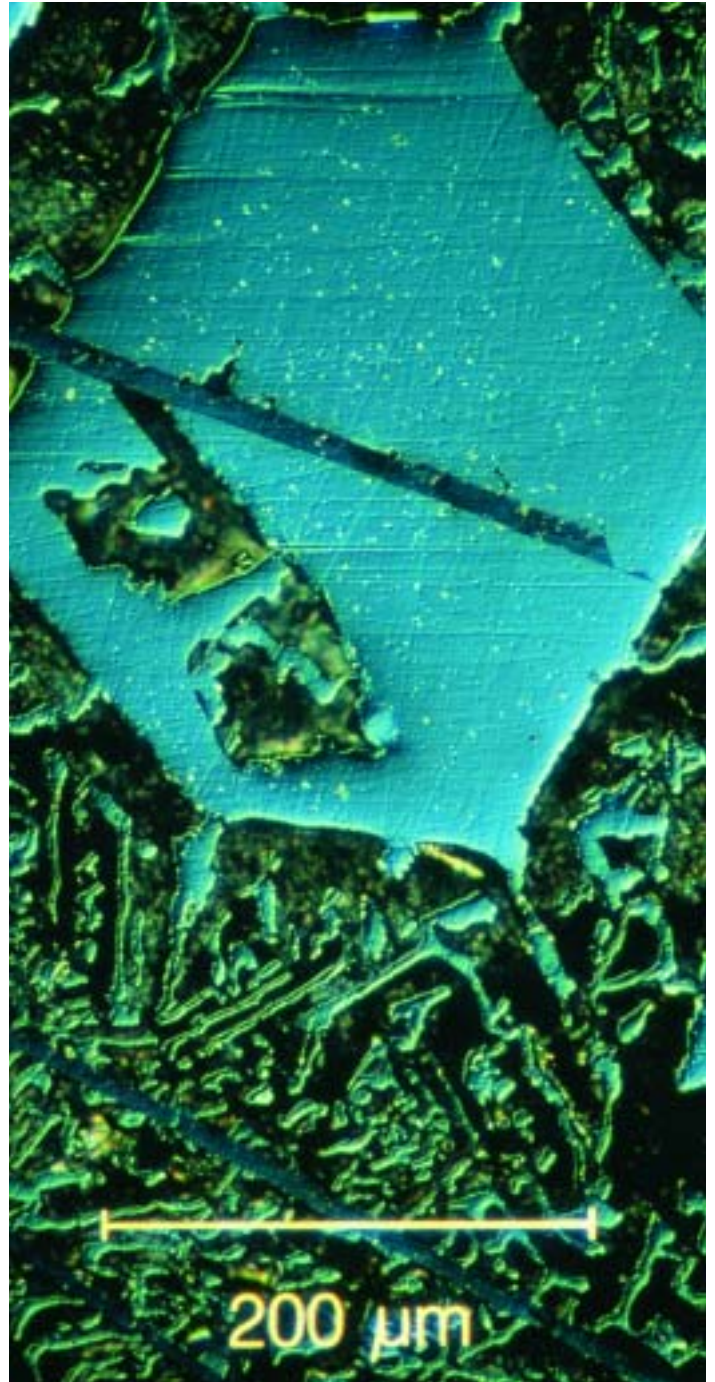
Does your work involve large numbers of similar samples to be examined under identical conditions and are the main criteria speed and reproducibility?

Then the Leica MEF4 A will be the answer.

Never has microscopy been quicker and easier –

- automatic objective change,
- automatic diaphragm setting,
- automatic illumination setting,
- automatic coarse focus stop,
- automatic twin cameras,

– you can fully concentrate on getting on with your work.



Bearing metal – DIC



The personal touch



An extremely sturdy casting stand is the prerequisite for a trouble free observation of the sample.

Leica MEF4M – The Widefield Metallograph for the user who prefers the personal touch

Do you have to examine a great variety of different samples in various methods and at individual microscope settings, where automation will be of little help?

Then the Leica MEF4M will be the answer.

It offers the same versatility as the Leica MEF4A but with less automation and at a lower price –

- Brightfield,
- Darkfield,
- Polarized Light,
- Polarization Contrast,
- Differential Interference Contrast,
- Interferometry,
- complemented by a host of accessories,
- both instruments have the same pleasing ergonomic design and outstanding performance.

For many years the name MeF has been synonymous with high performance inverted metallographs. The newest members of this family, the Leica MEF4A and MEF4M represent one concept and two microscopes.

Brass – Brightfield



What do the MEF4 A and MEF4 M have in common?

The Leica TRIMATIC fully automatic camera system with a host of novel features offers for both cameras an image field 24 for all methods from micro to macro.

New precentred halogen reflector bulbs and high intensity reflector burners on easily interchangeable lamp inserts eliminate the need for a lamp collector and guarantee an always evenly illuminated field and a higher light output.

An integrated universal lamp housing with thermal insulation from the stand accepts all light sources. A stabilized D. C. power supply for the halogen reflector bulbs is built-in.

Our Triple Modules for brightfield, darkfield and polarized light, with a choice of filters or FOSTER prism, or for brightfield and two exciter wavelengths for incident light fluorescence allow a quick comparison of results in different methods at the touch of a slide.

A parfocal objective **Plan Apo 1x/0.03** allows a specimen area for 30 mm diameter at 8x magnification to be observed and offers a continuous transition from micro to macro.

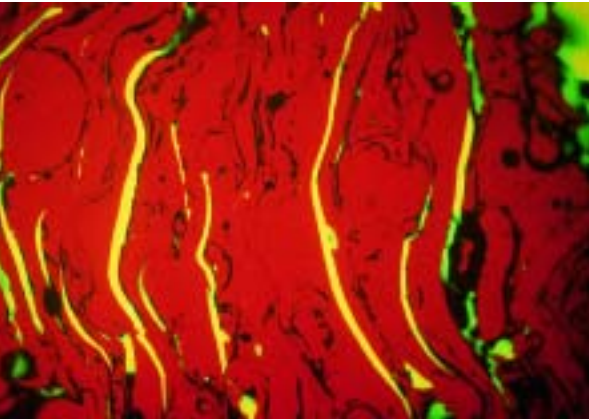
They do not only carry on this tradition, but by retaining the outstanding optical and mechanical performance of their predecessor and by incorporating many new features we have made them unique in their class.



Excellent optics design and 125 years experience in building microscopes are the prerequisites for the supreme quality standard of the Mef4.



User Convenience



Chrome steel – Incident Light Fluorescence

What is different on the Leica MEF4 A?

The TELEMATIC objective changing device with patented immersion stop enables push-button selection of any objective. In combination with the MHT4 Ultra-Microhardness Tester it changes automatically from measuring objective to indenter when pressing the RUN-button and back when the indentation is made.

The automatic setting of aperture and field iris diaphragm. This is controlled by the position sensors on nosepiece and magnichanger and ensures always correct Koehler illumination, irrespective which objective or magnichanger position has been selected. Manual override is possible at the touch of a button.

The photo format projection system for both cameras with automatic intensity adjustment governed by the image brightness.



35 mm camera (left) and large format camera (front) are the integrated solutions of image documentation.

These accessories increase the versatility of both microscopes even further:

DUAL REFLEX Module, MACRODUAL-ZOOM System, MHT4, Widefield Television, Scanning Stage, VACUTHERM.

Measuring Principle

The image brightness is determined by centre-biased integral measurement of all the light finally responsible for exposing the film. From this, under consideration of the camera factor and the film speed, which can be set for each camera separately, the exposure time is computed. It is transferred to the swing-mirror shutter and indicated on an LED-display, either in fractions or decimals. Measurement and exposure are continuous.

Camera System

The large format camera with factor 8x and the 35 mm camera with factor 2.25x are built into the microscope stand, which also contains the camera optics, the photodiode and the electronic shutter. Selection of specimen area and focusing are carried out through the binocular viewing tube. To facilitate focusing of the frame size graticule, both eyepieces are equipped with focusable eyelenses. The higher eyepiece magnification in relation to the camera optic ensures perfectly focused photomicrographs even at low magnifications.

Control Unit

The ergonomic design with its clear layout of all controls does not require any time to get used to.

Microprocessor controlled light measurement and automatic or manual exposure times from $\frac{1}{125}$ second to 60 minutes indicated on an alphanumeric LED-display in fractions or decimals. With exposures over 1 second the remaining time is continuously indicated. Multiple exposures and "autobracketing" – a series of 7 exposures are taken at $\frac{1}{2}$ step interval, starting $1\frac{1}{2}$ steps below and ending $1\frac{1}{2}$ steps above the measured exposure time – are extremely useful features.

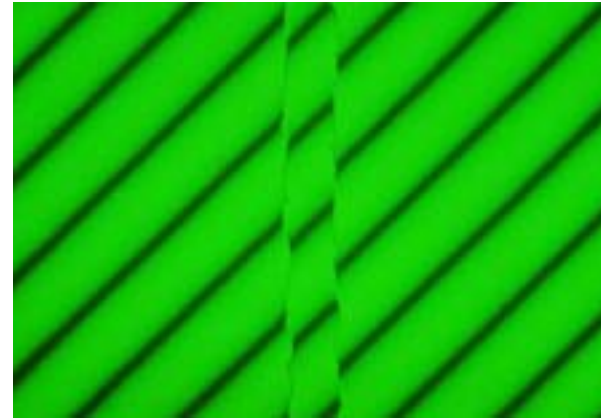
A memory enables the storage of any selected exposure time for mosaic-photomicrographs or other special applications.

Two reciprocity failure correction curves eliminate problems at long exposure times. They can be selected with a push-button.

Film speeds ISO 6 – 12,800/4° – 42° can be selected with two push-buttons and are indicated on the LED-display. The display can be in either of the two ISO values (formally ASA and DIN).

A fine adjustment in $\frac{1}{3}$ ISO steps over ± 3 steps is provided.

The novel software design enables the user to carry out comparative photometric measurements with the TRIMATIC camera system. The change-over of cameras automatically also transmits the camera factor and the film speed to the microprocessor for calculating the exposure time.



Step in evaporated layer –
Nomarski Polarization Interferometer



Control unit for automatic twin camera system

The TELEMATIC



Motorized sextuple turret carrying the high quality lenses

The TELEMATIC

consists of the motorized sextuple nosepiece and a keyboard, conveniently integrated into the arm rest, for push-button selection of any objective. When working with the MHT10 Ultramicro-hardness Tester it changes automatically from measuring objective to indenter when pressing the RUN-button and back when the indentation is made.

Programmable Immersion Stop

This feature, patented by us, makes the nosepiece stop automatically in an intermediate position before using an immersion objective for applying the immersion liquid and afterwards for cleaning the objective front lens.

The position of the immersion stop is freely programmable. An indispensable advantage for the work with a motorized nosepiece.



Armrest with integrated keyboard of the Mef4

Automatic Diaphragm Control

The setting of aperture and field iris diaphragm can be preselected for each objective and magnification changer.

A motorized servo system automatically adjusts them after every change of objectives or magnification changer, thereby ensuring always correct Koehler illumination. A manual override is possible at any time at the touch of a button.

When the Triple module is moved to the darkfield position, both diaphragms are opened automatically. They assume there preselected setting when changing back to brightfield or polarized light. All this results in a considerable time saving and makes operation much easier – allowing the user to concentrate entirely on the work at hand.

DUAL REFLEX Module

The DUAL REFLEX Module consists essentially of a beamsplitter prism mounted in the microscope stand, which can easily be switched in and out of the light path. This prism is effective in two directions and facilitates the attachment of the following accessories: TV ADAPTERS, MACRODUAL-ZOOM, DIGITAL MEASURING DEVICE.

TV Microscopy

In compliance with the various requirements of TV microscopy virtually all colour and b/w TV systems can be connected to the Leica MEF4. All TV adapters are designed so that the high image quality is fully retained. This makes image processing and image analysis of high density objects with maximum precision and reproducible results possible. The magnification on the TV target can be altered by changing objectives or magnichanger positions. In combination with high resolution TV monitors and video printers the Leica MEF4 is an ideal TV microscope for the highest demands on optical quality.

Leica VACUTHERM Micro Furnace

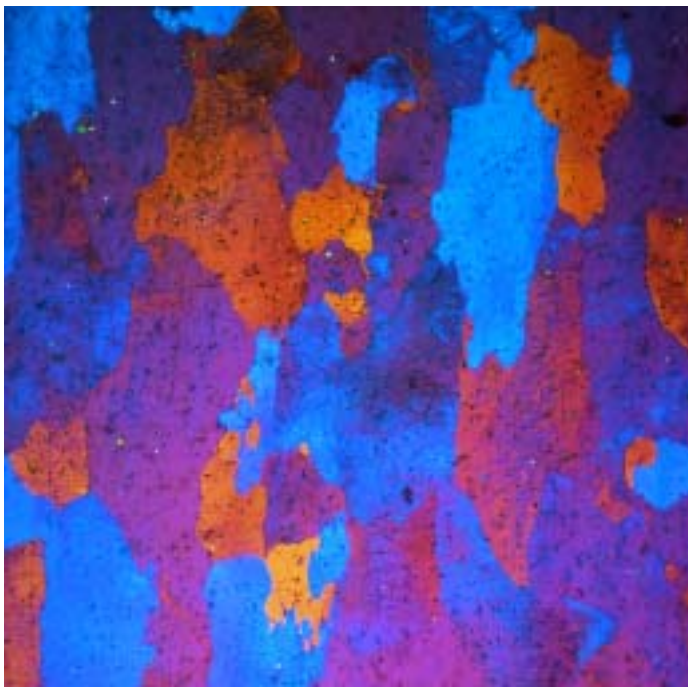
As a special accessory to the Leica MEF4 the VACUTHERM affords the microscopic observation and evaluation of all thermally induced structural changes of metallic and nonmetallic materials:

- within the temperature range from ambient to 1,750 °C
- under high vacuum down to 10^{-3} Pa (10^{-5} mb)
- in reactive or inert gases
- at magnifications from 80x to 750x (with 2.5x magnichanger)
- in brightfield and DIC.

The heating power is concentrated within a small space around the specimen. Water-cooling protects the objectives and the furnace against excessive heat even during continuous operation. Temperature measurement is by a thermocouple introduced in a bore immediately behind the specimen surface observed. The vacuum-tight observation window is kept clear by 20 interchangeable cover glasses.



TV-widefield exit, factor $p=0.66x$
Various cameras may be connected in conjunction with different adapters



Aluminium alloy – Polarizing Contrast

Wide range of accessories



VACUTHERM Micro Furnance Device

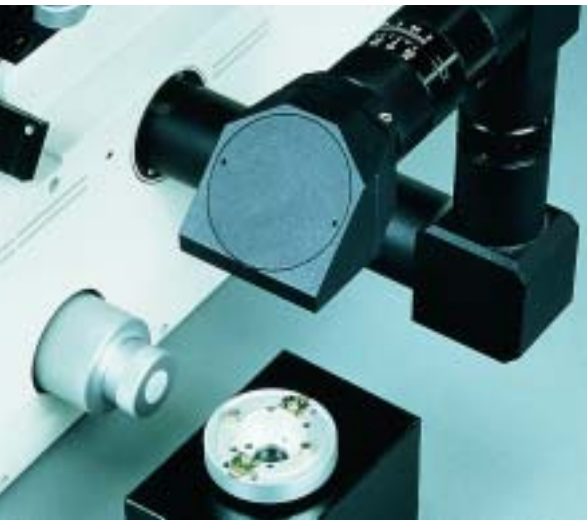
VIDEOTRONIC TV Interface

For superimposing and recording on a b/w or colour TV system actual temperature, time, date, magnification, sample identification, etc. the VIDEOTRONIC TV interface system can be added.

NOVOCONTROL Programmable Temperature Controller

with buffered memory to store 10 programs with 10 segments each. These can be automatically run, either individually or linked in any sequence. The following parameters can be programmed:

- **Temperature range:** ambient to 1,750 °C
- **Temperature changes:** 1 °C/min to 999 °C/min
- **Holding times:** 0.1 min to 199.9 min.



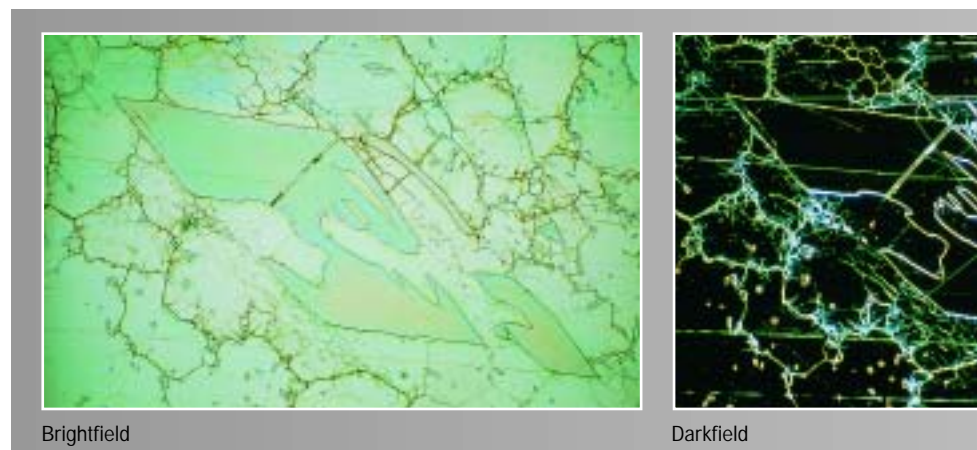
Macro dual Zoom attached on the left hand side of the stand

MACRODUAL-ZOOM

This is not simply a macro equipment, but a universal system for many applications.

Any illuminated object, placed next to the microscope, can be seen in the binocular body, the camera system and, if connected, on a TV monitor.

- Macroscopic examination of fractured parts, large area macro etchings, subassemblies, printed circuits, etc.
- Superimposing reticles with the VARICODE
- Microdrawing
- Manual-optical image analysis
- Reproduction of printed data or drawings.



Brightfield

Darkfield

Magnification

binocular body: 1.4x – 11x
large format camera: 1.1x – 9x

Object field diameter

binocular body: 178 mm – 22 mm
large format camera: 142 mm – 17 mm

The magnification is continuously adjustable by altering the zoom setting and the object distance.

A separate macro illumination is required as the microscope illumination and optic are out of operation.

VARICODE Image Projection System

The VARICODE facilitates the projection of illuminated reticles and transparencies into the binocular viewing tube, the camera system and the TV camera.

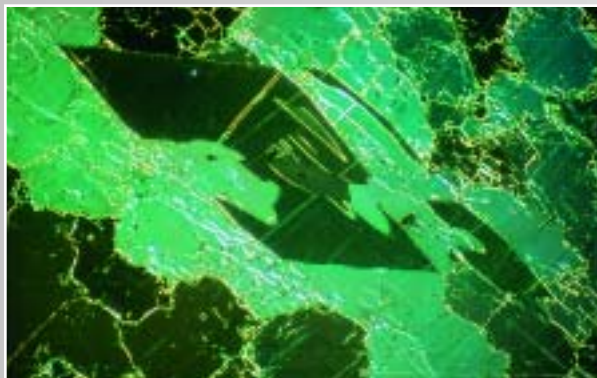
The projected signs can be turned in any direction and positioned in any part of the field. The following adapters are available:

Code adapter

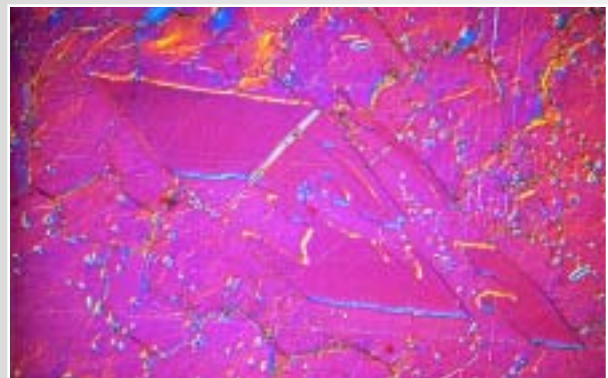
for superimposing a combination of 3 letters and 6 numbers, at any size.

Transparency adapter

for 35 mm negative transparencies offering the possibility to superimpose selfmade patterns, logos, etc.



Polarized Light



Nomarski Differential Interference Contrast (DIC)