Measuring Microscope VMM 200
The modular concept offers each and every customer his own tailor-made unit configuration.

- Industrial fields of application: Machines and equipment construction, automobile production plants, aircraft and aerospace industries, electrical engineering and electronic industry, precision mechanics and optical fields, and medical technology.
- Technical Engineering and Universities.
- Laboratories: Inspection and calibrating laboratories, and technical laboratories for crime investigation.
- Operational research areas: Quality control, parts production, research and development, tools and moulds construction, and materials engineering.
- Spectrum of parts: Machining and chipless of producing parts, bended and perforated parts, die-casting parts, motor and gear parts, screws, cutting tools, electrodes for spark eroding, templates, stencils, scales, and medical implants.
- Task settings: Measurements of lengths and angles, profile forms, thickness of layers, material analysis, material fractures (cracks).
- Materials: metals, plastics, ceramics, glass, rubber.

The Mechanical Basis

- Solid and massive base body of grey iron casting.
- Extreme high stability of measuring arrangement with very low sensitivity against short-time temperature changes.
- Utmost stable measuring stage with roll bearing guides.
- Highly permitted stage load.
- Measuring stages with measuring ranges (X/Y) of 150 x 100 and 250 x 150 mm.
- Fast positioning of measuring stage via free shifting of hand and comfortable precise adjustment of each coordinating direction via screws. Optionally available with motor drive.
The Measuring Systems

- Opto-electronic measuring systems based on incremental-divided scales; resolution 0.0001 mm.
- With and without digital measuring system in coordinate direction Z, measuring range 150 mm.
- Highly accurate since very low error possibility.
- Feed-back possibility on PTB Certificated Calibration Norm.
- Tested positioning accuracy according to VDI/VDE 2617.

The Optic is essential

- Measuring objectives TELEPLAN for measurements of lengths and forms.
- Micro objectives PLAN FLUOR for surface observations, e.g. metallurgy.
- Objectives with telecentrical ray path meaning even by inexact focusing of object viewing, the image size stays unchanged – an indispensable condition for high accurate measurements.
- Objectives of highest optical quality, perfectly corrected, plane and distortionless images - all designed by Leica.
- Large working distances for high work-pieces.
- Easy exchangeable objective with a single hand grip via the bayonet mount.
- Video camera connection for further image processing.
- Binocular tube.
- Image viewing through bright-field and dark-field, with and without polarised light as well as differential interference contrast (DIC).

The Light

- External cold light source with reflective halogen lamp (30 - 250 W).
- Light supply by fibre optic light guide, thereby no heat transfer.
- illuminating variants: transmitted light, incident light, oblique incident light and ring light.
- For metallurgical examination: bright-field, dark-field, interference contrast and polarisation.
Introduction

Processing of measured values

The matching software for each application.

- **QC200**
  The compact Digital Read-out unit with Up/Down counter and integrated calculating functions for quick measurings but without image processing.

- **QC5000**
  The market-leading software for optical coordinates measuring technology.

- **OMS**
  The flexible, easy-to-learn measuring software from UHL; ideally for measuring of primary samples and small batches.

- **IMS**
  The efficient fully-automated and highly integrated measuring software from UHL for batch measurements with recurring measuring tasks.
**Special Accessories**

- Field inserts with crosshair and concentrical circles for radius measurements.
- Angle measuring insert with digital measuring system (Q).
- Centre support in conjunction with aperture iris insert and interference slit insert for diameter illumination of cylinders.
- Micro optical attachment for micro objectives.
- Ring light and oblique incident light.
Measuring Microscope VMM 200
Main Unit with Measuring Stage

Main unit: grey cast iron, massive
Optics holder: guided roll bearing, height variable via turning knobs for fast and fine adjustment of focus; prepared additionally to receive an opto-electronic measuring system, movement 150 mm

Measuring stages:
Measuring range: 150 x 100 mm and 250 x 150 mm
Guiding: roll bearing
Movement: fast and fine adjustment
Swivelling stage plate: only with measuring stage 150 x 100 mm
Swivelling range: +/- 5°
Fasteners: 2 T-slots
Max. weight limit: 30 kg or 20 kg
Measuring system: opto-electronic with incremental-divided scale
Resolution: 0,0001 mm
Accuracy limit for a coordinate direction, valid for working temperature range: 1,8 µm + 0.005 x L µm
Lighting: coaxial incident and transmitted light, transmitted light with aperture iris control.
Light sources (accessories): with stepless brightness control, separately arranged
Light supply: through fibre optic light guide

Optical System
Measuring tube: binocular with dioptric compensation
Eye-pieces: with eye cups
Magnification: 10x
Visual field: 20 mm
Viewing angle: 25°
Image: upright and laterally true image
Total magnification: see table for objectives
Measuring objectives: changeable, telecentrical ray path
Measuring or video tube reception: bayonet mount
Further technical data: see under "Accessories"
Micro objectives: for viewing surface structures
Technical data: see under "Accessories"

General
Operating temperature: 10°C to 40°C
Working temperature: 20 +/- 0.5°C
Storage temperature: -10°C to 60°C
Power supply: 120/230 Vac, 50/60 Hz
Weight (net): Main unit No. VM4-BT01: 120 kg
Protective mode (CEI/IEC 529, DIN 40 050): IP40
Electromagnetic amicability: EN 50081-1, EN 50082-1, EN 61000-4, EN 61010-1
### Manual-operated Measuring Microscopes

Equipment variants of ready-to-use Measuring Microscopes VMM 200 with binocular measuring tubes for metrological application.

<table>
<thead>
<tr>
<th>Variants</th>
<th>Main unit with binocular measuring tube</th>
<th>Meas. stage/Mea. range</th>
<th>Measuring system coordinate direction</th>
<th>Digital Read-out</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VM4-110</td>
<td>VM4-602 250x150 mm</td>
<td>VM4-101 Z</td>
<td>QUADRA-Check</td>
<td>VM4-BT01</td>
</tr>
<tr>
<td>1</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>VM4-BT01</td>
</tr>
<tr>
<td>2</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>VM4-BT02</td>
</tr>
<tr>
<td>3</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>VM4-BT03</td>
</tr>
<tr>
<td>4</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>VM4-BT04</td>
</tr>
</tbody>
</table>
**Manual Main Units**

**Main Unit with Binocular Measuring Tube**  
**UHL Measuring Microscope VMM 200**  
(without measuring stage and digital read-out)

Consisting of following components:

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-110</td>
<td>Consisting of following components:</td>
</tr>
<tr>
<td>VM4-001</td>
<td>1. Base body VMM 200 of grey cast iron, painted, vertical column with adjusted Z-guiding (Path of positioning movement 150 mm), fibre optic light guide for transmitted illumination</td>
</tr>
<tr>
<td>VM4-200</td>
<td>1. Mechanical fast and fine adjustment of focus</td>
</tr>
<tr>
<td>VM4-300</td>
<td>1. Binocular measuring tube, with dioptric compensation, bayonet mount for measuring objectives or micro optical attachment, reception for the eye-pieces, connection for video camera adapter plus angle measuring device etc., with fibre optic light guide for coaxial incident illumination</td>
</tr>
<tr>
<td>VM4-301</td>
<td>1. Field insert with crosshair 90° and 2 additional lines ± 60°, usable in conjunction with binocular measuring tube</td>
</tr>
<tr>
<td>WF10XL</td>
<td>2. Eye-pieces, 10x magnification, with eye cups; Order no. for one piece</td>
</tr>
<tr>
<td>OP1-M02</td>
<td>1. Measuring objective 2:1, free-working distance ( a = 85 \text{ mm} )</td>
</tr>
<tr>
<td>VM4-512</td>
<td>1. Aperture iris insert for transmitted light, knurled wheel for aperture iris control</td>
</tr>
<tr>
<td>VMP-GL</td>
<td>2. Cold light sources with reflective halogen lamp, 30 W, stepless brightness control</td>
</tr>
</tbody>
</table>
Manual Main Units

Measuring stage 150 x 100

Order No. VM4-602
Measuring range 150 x 100 mm (coordinate directions X and Y), guided roll bearing stage movement, swivelling stage plate (area 320 x 240 mm) of ± 5° for manual alignment of work-pieces, 2 T-slots to fasten the work-pieces, opto-electronic measuring system based on incremental-divided scales, cable for measuring signal transmission, fast and fine adjustment

Measuring stage 250 x 150

Order No. VM4-600
Measuring range 250 x 150 mm (coordinate directions X and Y), guided roll bearing stage movement, stage area 420 x 256 mm, 2 T-slots to fasten the work-pieces, opto-electronic measuring system based on incremental-divided scales, cable for measuring signal transmission, fast and fine adjustment

Measuring system for coordinate direction Z

Order No. VM4-101
Opto-electronic measuring system for coordinate direction Z, incremental-divided scale, resolution 0.0001 mm
**Processing of measuring signal and result output**

- Compact Digital Read-out units with Up/Down counter for 2 and 3 coordinating directions.
- Numerical and alphanumerical displays for functions.
- Numerical interval 0.0001 mm.
- Selectable languages: German, French, English, Italian and Spanish.
- Calculable alignment of work-pieces.
- Calculating functions for geometrical combination of the measured values.
- Programmable measuring sequences.
- Memory for measured values.
- Digital output RS 232.
- Printer connection.

**Programmable Measuring Functions**

- Measuring without manual calculation.
- No mechanical work-piece alignment owing to the calculated transformation of coordinates.
- Measuring of diameters on pitch circles of 3 to 50 points.
- Right-angled cartesian and polar coordinate systems.
- Combination of up to 50 measured values per geometrical element.
- Location of origin points upon user's choice.
- **PRESET function**
# Complete Motorized Units

## Motorized Measuring Microscopes

Equipment variants of automated and semi-automated Measuring Microscopes VMM 200 with binocular measuring tubes or video tubes for metrological application.

<table>
<thead>
<tr>
<th>Variants</th>
<th>Motorized main unit w. binocu. tube</th>
<th>Motorized main unit w. video tube</th>
<th>Video adapter C-Mount 1.2x</th>
<th>Video adapter C-Mount 0.4-1.2x</th>
<th>Image Processing System OMS</th>
<th>Image Processing System IMS</th>
<th>Image Processing System QC5300</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VM4-111</td>
<td></td>
<td></td>
<td></td>
<td>VM4-OMS</td>
<td>VM4-IMS</td>
<td>VM4-QC53</td>
<td>VM4-AI01</td>
</tr>
<tr>
<td>2</td>
<td>VM4-112</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VM4-AQ01</td>
<td>VM4-AQ01</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>VM4-410</td>
<td></td>
<td></td>
<td></td>
<td>VM4-IMS</td>
<td>VM4-BO01</td>
<td>VM4-BO01</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>VM4-411</td>
<td></td>
<td></td>
<td></td>
<td>VM4-BO02</td>
<td>VM4-BO02</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>VM4-OMS</td>
<td></td>
<td>VM4-IMS</td>
<td></td>
<td>VM4-BI01</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VM4-IMS</td>
<td>VM4-BI02</td>
<td>VM4-BI02</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VM4-IMS</td>
<td></td>
<td>VM4-BQ01</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VM4-QC53</td>
<td>VM4-BQ02</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VM4-QC53</td>
<td></td>
</tr>
</tbody>
</table>
### Motorized Main Units

**Main Unit with Video Measuring Tube**  
UHL Measuring Microscope VMM 200  
(without Image Processing System)

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-112</td>
<td>Consisting of following components:</td>
</tr>
<tr>
<td></td>
<td>1. Base body VMM 200 of grey cast iron, painted, vertical column with adjusted guiding (movement 150 mm); fibre optic light guide for transmitted illumination VM4-001</td>
</tr>
<tr>
<td></td>
<td>1. Motorized Z-drive for focusing, with reception for measuring tube VM4-204</td>
</tr>
<tr>
<td></td>
<td>1. Measuring system for coordinate direction Z VM4-101</td>
</tr>
<tr>
<td></td>
<td>1. Video measuring tube, bayonet mount for measuring objectives or micro optical attachment, with C-Mount adapter for a video camera and fibre optic light guide for coaxial incident illumination VM4-303</td>
</tr>
<tr>
<td></td>
<td>1. Measuring objective, 2:1, free-working distance ( a = 85 \text{ mm} ) OP1-M02</td>
</tr>
<tr>
<td></td>
<td>1. Aperture iris insert for transmitted light VM4-512</td>
</tr>
<tr>
<td></td>
<td>1. Motorized measuring stage 250 x 150 mm VM4-601</td>
</tr>
</tbody>
</table>

**Main Unit with Binocular Measuring Tube**  
UHL Measuring Microscope VMM 200  
(without Image Processing System)

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-111</td>
<td>Similar version as above-mentioned (VM4-112) but instead of VM4-303, with:</td>
</tr>
<tr>
<td></td>
<td>1. Binocular measuring tube VM4-300</td>
</tr>
<tr>
<td></td>
<td>2. Eye-pieces, 10x magnification; Order no. for one piece WF10XL</td>
</tr>
</tbody>
</table>
A video camera with C-mounting connection can additionally be assembled when using the following listed Adapter.

**C-Mount Adapter with 1.2x magnification**

**Order-No.** VM4-410

consisting of the following components:

1. Video adapter with 1.2x magnification VM4-400
2. C-Mount camera connecting piece VM4-402

**C-Mount Adapter with integrated magnification changer**

**Order-No.** VM4-411

consisting of the following components:

1. Video adapter with integrated magnification changer 0.4x / 1.2x, suitable only for ½" cameras VM4-401
2. C-Mount camera connecting piece VM4-402
Measuring Software System Quadra-Check QC5000
Complete system for three axis

Order-No. VM4-QC53

consisting of following components:
1  Video measuring computer with image processing hardware and the software QC5300 in dual monitor version.
1  3-axis stepping motor control system with joystick/trackball combination
1  regulated cold light source with 3 independent exits
1  B/W camera
OMS
The flexible, easy-to-learn measuring software for two dimensional measurements of primary samples and small batches by either hand-operated or motorized-operated measuring microscopes, for use in laboratories or production areas.

- Element-related combination of geometrical forms in a tree structure.
- Simple manual placement of the measuring points in the video image via the mouse.
- Immediate result display in a text protocol.
- Easy in memorizing or programming of measuring sequences and additionally the possibility of automated edge findings.
- Rectangular, circular, lattice and interactive image screen masks can be created as measuring frames for quick, visual control.

Measuring Software System UHL OMS
Complete system for three axis

<table>
<thead>
<tr>
<th>Order-No.</th>
<th>VM4-OMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Desktop-PC with a 17” Monitor DPC-N7E</td>
</tr>
<tr>
<td>1</td>
<td>Software Package OMS VMP-OMS</td>
</tr>
<tr>
<td>1</td>
<td>3-axis stepping motor control system with Joystick F9S-3-M</td>
</tr>
<tr>
<td>2</td>
<td>Cold light sources 30W VMP-GL</td>
</tr>
<tr>
<td>1</td>
<td>B/W Camera MS2-403</td>
</tr>
</tbody>
</table>
IMS
The efficient fully-automated and highly integrated measuring software for measuring of series parts. Usable for recurring measuring tasks up to integration in CIM production plants.

- Space-saving, one-screen solution with integrated video image on the operating surface.
- Simple creation of measuring programmes per Teach-In.
- Direct recording of measuring results in an adaptable text protocol.
- Fast auto-focusing routine per image processing for depth measurements.
- Flexible and efficient Macro-speech for complete control of measuring sequence with variables, sub-routines, data base linking and text print-out in a comfortable Macro editor.
- User-guided measuring sequence through display and input windows, Yes/No answering and programmable interface for any desirable display window.
- Modular concept with programmable interface for extending units e.g. measuring probes, laser sensors, label printer, bar code reading.
- 6 easily selectable via diagrams prefabricated types of object coordinating systems.
- Predefined measuring functions for fast and simple combination of geometrical elements.
- Analog control of lamps for up to 4 VMP-GLS fibre optic light sources to obtain high reproduction of measuring results.
- Multiple image processing functions and filters e.g. grey scale charts, LaPlace filter, Sobel filter, Focusing filter, Low-pass filter and Median-filter.
- Objective administration for several objectives.
- 3 levels of User's password protection for safe-guarding of system adjustments and calibrating data.
- Simple to operate due 8 free verifiable Macro quick starting knobs for calling up of automated measuring sequences.
- Connection possibilities for maximum 3 CCD cameras.
- Possible usage of colour camera.
- CNC motor control for up to 12 axis.
- 8 optical isolated inputs, 16 switched relay exits for pneumatical clamping fixtures, loading and unloading of parts, and communication with SPS-control.
Measuring Software System UHL IMS
Complete system for three axis

Order-No. | VM-IMS
---|---
DPC-NFE | VMP-IMS
F9S-3-M | VMP-GLS
MS2-403 | 

consisting of following components:
1. Desktop-PC with a 15" TFT Monitor
2. Software Package IMS
1. 3-axis stepping motor control system with Joystick
2. Cold light sources 250W
1. B/W Camera
Accessories

Field insert with crosshair and concentrical circles

Order-No. VM4-304

Crosshair 90° with 2 additional lines ± 60° as well as each 2 sets of 30 concentrical circles
Usable in conjunction with binocular measuring tube VM4-300

<table>
<thead>
<tr>
<th>Total magnification</th>
<th>Diameter</th>
<th>Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10x</td>
<td>0.25 - 7.50 mm</td>
<td>0.25 mm</td>
</tr>
<tr>
<td>20x</td>
<td>0.25 - 3.75 mm</td>
<td>0.125 mm</td>
</tr>
<tr>
<td>50x</td>
<td>0.05 - 1.50 mm</td>
<td>0.050 mm</td>
</tr>
<tr>
<td>100x</td>
<td>0.05 - 0.75 mm</td>
<td>0.025 mm</td>
</tr>
</tbody>
</table>

Angle measuring insert with digital measuring system

Order-No. VM4-302

Rotatable crosshair combined with opto-electronic measuring system, based on an incremental-division, usable in conjunction with binocular measuring tube VM4-300

Measuring objectives

Telecentrical measuring objectives of highest quality designed by Leica, perfectly corrected, plane and distortionless images allowing a definable and precise edge detection.

Large working distances for measuring test objects e.g. disturbance edges or in bore holes.

Easily and quickly changeable secured fixing via the bayonet mount.

*Measuring objective 2:1 included in basic version of UHL Measuring Microscope VMM 200.
**Centre Support**

**Order-No. VM4-611**

For measuring rotation symmetrical test objects, largest centre distance 190 mm, wide diameter 50 mm, usable only in connection with measuring stage 150 x 100 mm (VM4-602)

Supplyable with a special adjusting piece for interference line measuring process during diameter measuring of cylinders, usable only with aperture iris insert and interference slit inserts (VM4-504)

**Aperture iris insert and Interference slit inserts**

**Order-No. VM4-504**

For interference line measuring process during diameter measuring of cylinders, with transmitted light, for use with centre support (VM4-611), knurled wheel for aperture iris control and contrast adjustment of interference lines

Note:

Upon purchase of the measuring microscopes, the set-up for interference line measuring process of diameter measuring, consisting of centre support, aperture iris insert and interference slit insert, should be taken into consideration. A supplementary assembly requires definite knowledge.

**Illumination Unit for Oblique Incident Light**

**Order-No. VM4-503**

Suitable for measuring objectives 1:1 to 10:1, with dual arm fibre optic light guide, swivel holder ± 45° around the optical axis, cold light source VMP-GL
Accessories

Ring Light - Illumination Unit

Order-No. VM4-506

Suitable for all measuring objectives, with one fibre optic light guide
For use in connection with cold light source VMP-GL or VMP-GLS

Manual Cold Light Source

Order-No. VMP-GL

Manually-adjustable with reflective halogen lamp 12V 30 W, and stepless brightness control

Automatic Cold Light Source

Order-No. VMP-GLS

Computer-driven with reflective halogen lamp, 250 W

Every cold light source is ready-packed for delivery with mains cable and operations manual.
Micro Optical Attachment for 6 micro objectives

<table>
<thead>
<tr>
<th>Order-No.</th>
<th>VM4-310</th>
</tr>
</thead>
</table>

consisting of:

1. Base body with changer for 6 micro objectives Plan Fluor 2.5:1 to 100:1
2. Fibre optic light guide
3. Triple illumination module (assembled in base body) for coaxial incident light (bright-field and dark-field)
4. Polarisation insert

- Semi-conductor, bright-field, 20x Plan-Fluor, video adapter with 0.4x.
- Semi-conductor, dark-field, 20x Plan-Fluor, video adapter with 1.2x.

Single bayonet mount for micro objectives

<table>
<thead>
<tr>
<th>Order-No.</th>
<th>VM4-308</th>
</tr>
</thead>
</table>

Adapter for micro objectives 2.5:1 to 100:1, suitable for coaxial incident light and transmitted light (without coaxial dark-field incident light)
Micro objectives LEICA Plan Fluor for applications with and without polarised light

Suitable for both transmitted light and coaxial incident light; for use with a single bayonet mount VM4-308, or the micro optical attachment VM4-310, but without image viewing with differential interference contrast (DIC).

<table>
<thead>
<tr>
<th>Lens magnification</th>
<th>Total magnification</th>
<th>Object-field diameter</th>
<th>Numerical aperture</th>
<th>Free-working distance</th>
<th>Focusing depth</th>
<th>Order-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 : 1</td>
<td>25x</td>
<td>8.0 mm</td>
<td>0.075</td>
<td>5.50 mm</td>
<td>0.05 mm</td>
<td>OP1-L02</td>
</tr>
<tr>
<td>5 : 1</td>
<td>50x</td>
<td>4.0 mm</td>
<td>0.100</td>
<td>10.50 mm</td>
<td>0.03 mm</td>
<td>OP1-L05L</td>
</tr>
<tr>
<td>10 : 1</td>
<td>100x</td>
<td>2.0 mm</td>
<td>0.200</td>
<td>10.50 mm</td>
<td>0.01 mm</td>
<td>OP1-L10L</td>
</tr>
<tr>
<td>20 : 1</td>
<td>200x</td>
<td>1.0 mm</td>
<td>0.400</td>
<td>10.50 mm</td>
<td>0.002 mm</td>
<td>OP1-L20L</td>
</tr>
<tr>
<td>50 : 1</td>
<td>500x</td>
<td>0.4 mm</td>
<td>0.600</td>
<td>3.60 mm</td>
<td>0.001 mm</td>
<td>OP1-L50L</td>
</tr>
<tr>
<td>100 : 1</td>
<td>1000x</td>
<td>0.2 mm</td>
<td>0.700</td>
<td>3.60 mm</td>
<td>0.0005 mm</td>
<td>OP1-L99L</td>
</tr>
</tbody>
</table>

- Semi-conductor, dark-field 20x Plan Fluor, video adapter with 0.4x.
- Semi-conductor, dark-field 20x Plan Fluor, video adapter with 1.2x.
Micro Optical Attachment for 6 micro objectives and image viewing with polarised light as well as differential interference contrast (DIC)

Order-No. VM4-311

consisting of:

1 Base body with changer for 6 micro objectives Plan Fluor 2.5:1 to 100:1 VM4-306
1 Fibre optic light guide GF7
1 Triple illumination module (assembled in base body) for coaxial incident light (bright-field and dark-field) VM4-307
1 Polarisation insert VM4-363
1 Plug-in unit for differential interference contrast (DIC) with adjustable Wollaston-Prism VM4-364

Micro Objectives LEICA Plan Fluor for image viewing with and without polarised light as well as differential interference contrast (DIC)

Suitable for both transmitted light and coaxial incident light; for use with the micro optical attachment VM4-311, and additionally usable in conjunction with the single bayonet mount VM4-308, or the micro optical attachment VM4-310. These objectives are marked with “IK” meaning interference contrast.

<table>
<thead>
<tr>
<th>Lens magnification</th>
<th>Total magnification</th>
<th>Object-field diameter</th>
<th>Numerical aperture</th>
<th>Free-working distance</th>
<th>Order-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 : 1</td>
<td>100x</td>
<td>2.0 mm</td>
<td>0.20</td>
<td>10.50 mm</td>
<td>OP1-L10P</td>
</tr>
<tr>
<td>20 : 1</td>
<td>200x</td>
<td>1.0 mm</td>
<td>0.40</td>
<td>10.50 mm</td>
<td>OP1-L20P</td>
</tr>
<tr>
<td>50 : 1</td>
<td>500x</td>
<td>0.4 mm</td>
<td>0.60</td>
<td>3.60 mm</td>
<td>OP1-L50P</td>
</tr>
<tr>
<td>100 : 1</td>
<td>1000x</td>
<td>0.2 mm</td>
<td>0.70</td>
<td>3.60 mm</td>
<td>OP1-L99P</td>
</tr>
</tbody>
</table>

- Semi-conductor, DIC, 20x Plan Fluor, video adapter with 0.4x.
- Semi-conductor, DIC, 20x Plan Fluor, video adapter with 1.2x.