Measuring Microscope VMM200

Precise measuring microscope with binocular or video tube and brilliant optics, hand driven or motorized.
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.
- Optional with 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 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.

**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).
**Introduction**

**Processing of measured values**

The matching software for each application.

- **QC 200**
  The compact digital read-out unit with display of 2-4 axes and integrated calculating functions without image processing for quick measurements in the shopfloor.

- **Metlogix M2**
  Advanced multi-touch application on a tablet PC. Clear user interface with displays and symbols. Digital read-out, graphical part view and report with tolerance evaluation and comprehensive data export facilities are the main features.

  Can be used with manual microscopes.

- **OMS**
  The flexible, easy-to-learn measuring software from UHL; ideally for measuring of first-off samples and small batches. Flexible on-screen masks and measuring lines (distance / angle) for easy visual inspection. Multiple measuring tools with automatic edge detection.

  Can be used with manual and motorized microscopes.

- **Metlogix M3**
  Enhancement of the M2 software with imaging functions. Elements can be measured just by fingertip on the touch screen or classically by mouse.

  Can be used with manual and motorized microscopes.
Introduction

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.
Technical data

Measuring Microscope VMM 200
Main Unit with Measuring Stage

Main unit: solid grey cast iron
Optics holder: guided roll bearing, coaxial coarse and fine focus; optional Z-measurement (opto-electronic linear scale).
Movement range: 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: 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 + 0.0025 * 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
## Manual Main Units

### Optical System

- **Measuring tube:** binocular with dioptric compensation
- **Eye-pieces:** 10x, with eye cups, (FOV18)
- **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:** refer to “Accessories”
- **Micro objectives:** for viewing surface structures
- **Technical data:** refer to “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
- **Main unit No.M4-BT01:** 140 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 300 with binocular measuring tubes for metrological application.

<table>
<thead>
<tr>
<th>Variants</th>
<th>Main unit with binocular measuring tube stage / measuring range</th>
<th>Measuring system coordinate direction Z</th>
<th>Digital read-out QUADRA-Check</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 x 100 mm 250 x 150 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>KT8-LHMA</td>
<td>KT9-LHMA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>VM4-110</td>
<td>VM4-101</td>
<td>QC220</td>
<td>VM4-BT01</td>
</tr>
<tr>
<td>2</td>
<td>vm4-110</td>
<td>VM4-101</td>
<td>QC230</td>
<td>VM4-BT02</td>
</tr>
<tr>
<td>3</td>
<td>VM4-110</td>
<td>QC220</td>
<td>VM4-BT03</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>VM4-101</td>
<td>QC230</td>
<td>VM4-BT04</td>
<td></td>
</tr>
</tbody>
</table>

All types are also available as motorized version, incl. joystick and 3 axis motion controller (e.g. VM4-BT01M).
Manual Main Units

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

<table>
<thead>
<tr>
<th>Consisting of following components:</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Base body VMM 200 of grey cast iron, vertical column with adjusted Z-guiding (movement range 150 mm), fibre optic light guide for transmitted illumination</td>
<td>VM4-110</td>
</tr>
<tr>
<td>1 Mechanical fast and fine adjustment of focus</td>
<td>VM4-001</td>
</tr>
<tr>
<td>1 Binocular measuring tube*, with dioptic 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>
<td>VM4-200</td>
</tr>
<tr>
<td>1 Field insert with crosshair 90° and 2 additional lines ± 60°, usable in conjunction with binocular measuring tube</td>
<td>VM4-300</td>
</tr>
<tr>
<td>2 Eye-pieces, 10x magnification, with eye cups</td>
<td>VM4-301</td>
</tr>
<tr>
<td>1 Measuring objective 2:1, free-working distance a = 85 mm</td>
<td>WX10XL</td>
</tr>
<tr>
<td>1 Aperture iris insert for transmitted light, knurled wheel for aperture iris control</td>
<td>OP1-M02</td>
</tr>
<tr>
<td>2 Cold light sources with reflective halogen lamp, 30 W, stepless brightness control</td>
<td>VM4-512</td>
</tr>
</tbody>
</table>

Measurement stage with 150 x 100 mm travel range

| (coordinate direction X and Y), roll guided bearings for stage movement, stage surface 320 x 240 mm, swivelling stage plate with ±5° swivelling range, 2 T-slots to fasten samples, incremental opto-electronic measuring systems with steel linear scales, fast and fine adjustment. | VM4-602 |

Measurement stage with 250 x 150 mm travel range

| (coordinate direction X and Y), roll guided bearings for stage movement, stage surface 420 x 256 mm, 2 T-slots to fasten samples, incremental opto-electronic measuring systems with steel linear scales, fast and fine adjustment. | VM4-600 |

Measuring system for coordinate direction Z

| Opto-electronic measuring system for coordinate direction Z, incremental-divided scale, resolution 0.0001 mm | VM4-101 |
Manual Main Units

Processing of measuring signal and result output
- Compact Digital Read-out units for 2-4 axes
- Numerical and alphanumerical displays for functions.
- Numerical interval 0.0001 mm.
- Selectable languages: German, French, English, Italian, Spanish and Russian.
- Calculable alignment of work-pieces.
- Calculating functions for geometrical combination of the measured values.
- Programmable measuring sequences.

Digital Read-out unit QC 200
- 2-axis digital read-out
- 2-axis digital read-out with additional Q-axis for angle measuring insert VM4-302
- 3-axis digital read-out
- 3-axis digital read-out with additional Q-axis for angle measuring insert VM4-302

Programmable Measuring Functions
- Measuring without manual calculation.
- No mechanical work-piece alignment owing to the calculated transformation of coordinates.
- Measuring of circle diameters with 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
- Graphical view of geometry elements
Motorized Measuring Microscopes

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

Ordering code VMM 200:

VM4-AO01

Component description
Measuring microscope VMM 200

Video adapter for binocular tube:
1 = C-Mount 1.2x (VM4-410)
2 = C-Mount 0.4 - 1.2x (VM4-411)

with video tube:
1 = integrated video c-mount

Measuring stage:
0 = VM4-601 (measuring range 250 x 150 mm)

Image Processing System:
O = OMS (VM4-OMS)
M = Metlogix M3 (VM4-M3)

Main unit:
A = motorized, with video tube (VM4-112)
B = motorized, binocular tube (VM4-111)

Example configuration:

VM4-AO01  Motorized main unit with video tube VM4-112, measuring software OMS VM4-OMS, measuring stage VM4-601 250 x 150 mm
**Motorized Main Units**

**Main Unit with Video Measuring Tube**

**UHL Measuring Microscope VMM 200**

(with measuring stage and without image processing system)

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-112</td>
<td><strong>Main Unit with Video Measuring Tube</strong></td>
</tr>
</tbody>
</table>

Consisting of the following components:

1. Base body VMM 200 of grey cast iron, vertical column with adjusted guiding (movement 150 mm), fibre optic light guide for transmitted illumination VM4-001
2. Motorized Z-drive for focusing, with reception for measuring tube VM4-204
3. Measuring system for coordinate direction Z VM4-101
4. 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
5. Measuring objective, 2:1, free-working distance a = 85 mm OP1-M02
6. Aperture iris insert for transmitted light VM4-512
7. Motorized measuring stage 250x150 mm VM4-601

**Main Unit with Binocular Measuring Tube**

**UHL Measuring Microscope VMM 200**

(with measuring stage and without image processing system)

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-111</td>
<td><strong>Main Unit with Binocular Measuring Tube</strong></td>
</tr>
</tbody>
</table>

Similar version as above-mentioned (VM4-112) but instead of VM4-303 with:

1. Binocular measuring tube* VM4-300
2. Eye-pieces, 10x magnification; Order no. for one piece WF10XL

* optional with angle-adjustable binocular tube VM4-300S
Measuring Software System UHL OMS
Complete system for 3 axes

Order No. VM4-OMS

consisting of following components:

1 Desktop-PC with a 19” TFT monitor
1 Software Package OMS
1 3-axis stepper motor control system with Joystick
2 Cold light sources, remote controlled
1 High resolution color camera
Motorized Main Units

Metlogix M3
- comes with following standard functions:
  - Intelligent imaging functions to measure regular 2D geometry elements
  - Combinations and relations from measured elements
  - Leveling and alignment functions
  - Part programs
  - Tolerance evaluation according to Din/ISO
  - Multiple coordinate systems
  - Multilingual
  - Data export and printout with graphic
  - Dimensioning of the part view
  - Image export with/without measuring result
  - DXF module to compare the measurements with the drawing, good/bad evaluation
  - Light control
  - Optimal edge detection by „Measure Logic“ or active/fixed crosshair

Measuring software system Metlogix M3
Complete system for 3 axes

Order No. VM4-M3
consisting of following components:
1 All-In-One PC with touchscreen and the software Metlogix M3
1 Motion controller for 3 axes
2 Cold light sources, remote controlled
1 High resolution color camera
UHL Measuring Microscope with Binocular Measuring Tube

A video camera with C-mount connector can be assembled when using one of the following adaptors.

C-Mount Adapter with 1.2x magnification

Order No. VM4-410

consisting of following components:

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

C-Mount Adapter with integrated magnification changer

Order No. VM4-411

consisting of following components:

- 1 Video adapter with integrated magnification changer 0.4x / 1.2x, suitable only for 1/2” cameras VM4-401
- 1 C-Mount camera connecting piece VM4-402

- Semiconductor, bright-field, 20x Plan-Fluor with video adapter 0.4x.

- Semiconductor, bright-field, 20x Plan-Fluor with video adapter 1.2x.
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 to 7.50 mm</td>
<td>0.250 mm</td>
</tr>
<tr>
<td>20x</td>
<td>0.25 to 3.75 mm</td>
<td>0.125 mm</td>
</tr>
<tr>
<td>50x</td>
<td>0.05 to 1.50 mm</td>
<td>0.050 mm</td>
</tr>
<tr>
<td>100x</td>
<td>0.05 to 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-scale, usable in conjunction with binocular measuring tube VM4-300

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
Ring Light - Illumination Unit

Order No. VM4-506

Suitable for all OP1-M measuring objectives, with one fibre optic light guide.

For use in connection with cold light source VMP-GL or VMP-GLL.

add-on devices:
Set of polarisation filters RL2.09
Diffusor RL2.10
Segment aperture RL2.11

Manual Cold Light Source

Order No. VMP-GL

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

Automatic LED Cold Light Source

Order No. VMP-GLL

Hand- or computer-driven (by USB), approx. 640 lumen, stepless brightness control
Accessories

4 Segment LED Ring Light - Illumination Unit

Order No. VM4-508Q

Suitable for all OP1-M measuring objectives, with power supply and intensity control, 40 LEDs

4 Segment LED Ring Light - Illumination Unit

Order No. VM4-509

Suitable for all OP1-M measuring objectives, with power supply and intensity control, 80 LEDs

4 Segment LED Ring Light - Illumination Unit

remote controlled

Order No. VM4-507

Suitable for all OP1-M measuring objectives, with power supply and intensity control, remote control unit for IMS/OMS software via USB/RS232
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.

<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>Sharpness depth</th>
<th>~ Probing accuracy</th>
<th>Order-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 : 1</td>
<td>10-fold</td>
<td>20 mm</td>
<td>0,03</td>
<td>88</td>
<td>0,3</td>
<td>5</td>
<td>OP1-M01</td>
</tr>
<tr>
<td>2 : 1</td>
<td>20-fold</td>
<td>10 mm</td>
<td>0,06</td>
<td>85</td>
<td>0,08</td>
<td>3</td>
<td>OP1-M02</td>
</tr>
<tr>
<td>5 : 1</td>
<td>50-fold</td>
<td>4 mm</td>
<td>0,13</td>
<td>62</td>
<td>0,02</td>
<td>1.5</td>
<td>OP1-M05</td>
</tr>
<tr>
<td>10 : 1</td>
<td>100-fold</td>
<td>2 mm</td>
<td>0,20</td>
<td>52</td>
<td>0,01</td>
<td>1</td>
<td>OP1-M10</td>
</tr>
<tr>
<td>20 : 1</td>
<td>200-fold</td>
<td>1 mm</td>
<td>0,35</td>
<td>30</td>
<td>0,002</td>
<td>1</td>
<td>OP1-M20</td>
</tr>
</tbody>
</table>

* Measuring objective 2:1 included in basic version of UHL Measuring Microscope VMM 300.

Single bayonet mount for micro objectives

Order No. VM4-308

Adapter for micro objectives 1.25:1 to 150:1, suitable for coaxial incident light and transmitted light (without coaxial dark-field incident light)
## Micro Optical Attachment for 6 micro objectives*

<table>
<thead>
<tr>
<th>Order No.</th>
<th>VM4-310</th>
</tr>
</thead>
<tbody>
<tr>
<td>consisting of:</td>
<td></td>
</tr>
<tr>
<td>1 Base body with changer for 6 micro objectives Plan Fluor 1.25:1 to 150:1</td>
<td>VM4-306</td>
</tr>
<tr>
<td>1 Fibre optic light guide</td>
<td>GF7</td>
</tr>
<tr>
<td>1 Triple illumination module (assembled in base body) for coaxial incident light (bright-field and dark-field)</td>
<td>VM4-307</td>
</tr>
<tr>
<td>1 Polarisation insert</td>
<td>VM4-363</td>
</tr>
<tr>
<td>optional: motor driven</td>
<td>VM4-310M</td>
</tr>
</tbody>
</table>

* Reduces the maximum specimen height to 135 mm

## Micro Optical Attachment for 6 micro objectives and image viewing with polarised light as well as differential interference contrast (DIC)*

<table>
<thead>
<tr>
<th>Order No.</th>
<th>VM4-311</th>
</tr>
</thead>
<tbody>
<tr>
<td>consisting of:</td>
<td></td>
</tr>
<tr>
<td>1 Base body with changer for 6 micro objectives Plan Fluor 1.25:1 to 150:1</td>
<td>VM4-306</td>
</tr>
<tr>
<td>1 Fibre optic light guide</td>
<td>GF7</td>
</tr>
<tr>
<td>1 Triple illumination module (assembled in base body) for coaxial incident light (bright-field and dark-field)</td>
<td>VM4-307</td>
</tr>
<tr>
<td>1 Polarisation insert</td>
<td>VM4-363</td>
</tr>
<tr>
<td>1 Plugin unit for differential interference contrast (DIC) with adjustable Wollaston-Prism</td>
<td>VM4-364</td>
</tr>
<tr>
<td>optional: motor driven</td>
<td>VM4-311M</td>
</tr>
</tbody>
</table>

* Reduces the maximum specimen height to 135 mm
**Accessories**

**Micro Objectives OLYMPUS 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. Objectives suitable for differential interference contrast are marked with „IK“ on the engraving.

<table>
<thead>
<tr>
<th>Lens magnification</th>
<th>Total magnification</th>
<th>Field of view diameter</th>
<th>Numerical aperture</th>
<th>Free-working distance</th>
<th>Depth of focus (µm)</th>
<th>~ Probing accuracy</th>
<th>Order-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.25 : 1</td>
<td>20 x</td>
<td>14.4 mm</td>
<td>0.04</td>
<td>3.5</td>
<td>170</td>
<td>5</td>
<td>OP1-LO001*</td>
</tr>
<tr>
<td>2.5 : 1</td>
<td>20 x</td>
<td>7.2 mm</td>
<td>0.08</td>
<td>10.7</td>
<td>43</td>
<td>3</td>
<td>OP1-LO002*</td>
</tr>
<tr>
<td>5 : 1</td>
<td>50 x</td>
<td>3.6 mm</td>
<td>0.13</td>
<td>15.0</td>
<td>16</td>
<td>1.5</td>
<td>OP1-LO005</td>
</tr>
<tr>
<td>10 : 1</td>
<td>100 x</td>
<td>1.8 mm</td>
<td>0.25</td>
<td>10.0</td>
<td>5</td>
<td>1</td>
<td>OP1-LO010</td>
</tr>
<tr>
<td>20 : 1</td>
<td>200 x</td>
<td>0.9 mm</td>
<td>0.4</td>
<td>12.0</td>
<td>2</td>
<td>1</td>
<td>OP1-LO020</td>
</tr>
<tr>
<td>50 : 1</td>
<td>500 x</td>
<td>0.36 mm</td>
<td>0.5</td>
<td>10.60</td>
<td>1</td>
<td>0.5</td>
<td>OP1-LO050</td>
</tr>
<tr>
<td>100 : 1</td>
<td>1000 x</td>
<td>0.18 mm</td>
<td>0.8</td>
<td>3.40</td>
<td>0.5</td>
<td>0.3</td>
<td>OP1-LO100</td>
</tr>
<tr>
<td>150 : 1</td>
<td>1500 x</td>
<td>0.12 mm</td>
<td>0.9</td>
<td>1.0</td>
<td>0.4</td>
<td>0.2</td>
<td>OP1-LO150</td>
</tr>
</tbody>
</table>

* not suitable for differential interference contrast
- Semiconductor, bright-field, 20x Plan-Fluor.
- Semiconductor, dark-field, 20x Plan-Fluor.
- Solar cell, bright-field, 50x Plan-Fluor.
- Solar cell, dark-field, 50x Plan-Fluor.
- Semiconductor, bright-field, 50x Plan-Fluor.
- Halbleiter, bright-field with differential interference contrast DIC, 50x Plan-Fluor.
Micro Optical Attachment for 4 micro objectives with extra long working distance*

Order No. VM4-312

Revolving attachment for 4 micro objectives 2.5:1 to 100:1

* Reduces the maximum specimen height to 125 mm

Apochromatic incident light objectives with extra long working distances, parfocalizing length 95 mm, RMS thread

<table>
<thead>
<tr>
<th>Lens magnification</th>
<th>Total magnification</th>
<th>Field of view</th>
<th>Numerical aperture</th>
<th>Free-working distance</th>
<th>Depth of focus (µm)</th>
<th>~ Probing accuracy</th>
<th>Order-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 : 1</td>
<td>20x</td>
<td>9 mm</td>
<td>0,06</td>
<td>35,6</td>
<td>76</td>
<td>5</td>
<td>OP1-VX02</td>
</tr>
<tr>
<td>5 : 1</td>
<td>50x</td>
<td>3,6 mm</td>
<td>0,14</td>
<td>35</td>
<td>14</td>
<td>3</td>
<td>OP1-VX05</td>
</tr>
<tr>
<td>10 : 1</td>
<td>100x</td>
<td>1,8 mm</td>
<td>0,28</td>
<td>35</td>
<td>4</td>
<td>1.5</td>
<td>OP1-VX10</td>
</tr>
<tr>
<td>20 : 1</td>
<td>200x</td>
<td>0,9 mm</td>
<td>0,42</td>
<td>20,2</td>
<td>2</td>
<td>1</td>
<td>OP1-VX20</td>
</tr>
<tr>
<td>50 : 1</td>
<td>500x</td>
<td>0,36 mm</td>
<td>0,55</td>
<td>13,1</td>
<td>1</td>
<td>1</td>
<td>OP1-VX50</td>
</tr>
<tr>
<td>100 : 1</td>
<td>1000x</td>
<td>0,18 mm</td>
<td>0,52</td>
<td>14,1</td>
<td>1</td>
<td>0.5</td>
<td>OP1-VX99</td>
</tr>
</tbody>
</table>
Accessories

Ring Light - Illumination Unit

Order No. MS3-504

Suitable for all OP1-VX objectives, with one fibre optic light guide.
For use in connection with cold light source VMP-GL or VMP-GLL.

LED Ring Light - Illumination Unit

Order No. RL8-LED

Suitable for all OP1-VX objectives, 8 LEDs
related power supplies:
Transformer with power supply
TR7-N
Transformer with power supply, remote controlled
TR7-NS
Accessories

rotary stage 360°

<table>
<thead>
<tr>
<th>Order-No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-613</td>
<td>Assembly for the stages VM4-600 and VM4-602 for easy angle measurement. By untightening the clamp, the stage can be moved by hand. A fine adjustment is used for an accurate measurement. The vernier has a resolution of 0.1°</td>
</tr>
</tbody>
</table>

swiveling stage plate

<table>
<thead>
<tr>
<th>Order-No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-610</td>
<td>For product alignment on the stages VM4-600 and VM4-601. Swiveling range: ± 3°</td>
</tr>
</tbody>
</table>

centre supports

<table>
<thead>
<tr>
<th>Order-No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM4-611</td>
<td>For fixing turned parts on the stage VM4-602</td>
</tr>
<tr>
<td>VM4-616</td>
<td>Optional swivelable</td>
</tr>
<tr>
<td>VM4-612</td>
<td>For fixing turned parts on the stages VM4-600 and VM4-601</td>
</tr>
<tr>
<td>VM4-617</td>
<td>Optional swivelable</td>
</tr>
<tr>
<td>VM4-614</td>
<td>With handwheel drive</td>
</tr>
</tbody>
</table>
USB digital color camera

Order-No. VM4-USB

Digital camera for the c-mount adapters VM4-410/411 (not included) to store images or view live picture.

- Resolution of the CMOS-sensor: 1280x1024 pixel
- USB 2.0 interface
- incl. PC-software for the image acquisition

Optional:

VMS-USB

- Easy software to measure samples in the video image, movable video scale with distance measurement, images can be watermarked and saved with a comment.
- VMS is available in german or english.
A special design using parts of our component system is possible at any time:

Special design of a wafer inspection microscope with integrated imaging system, matrix-code reader and white-light interferometer for the geometric measurement of laser marks. Measuring range 420 x 300 mm. The depth measurement of the laser marks has a measuring accuracy of ± 50 nm.