

# Measuring Microscope VMM300

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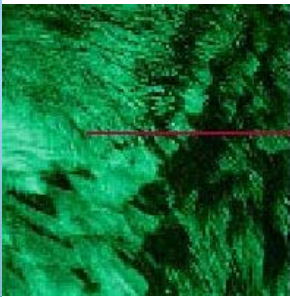


Revision No.: 07

Precise measuring microscope with binocular or video tube, hand driven or motorized, for the measurement of large products (up to 420 x 300 mm).



Technische  
Mikroskopie



## Measuring all and Seeing all

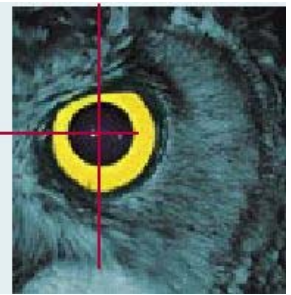
### The modular concept offers each and every customer his own tailor-made unit configuration.

- 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 granite.
- 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 350 x 200 and 420 x 300 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.

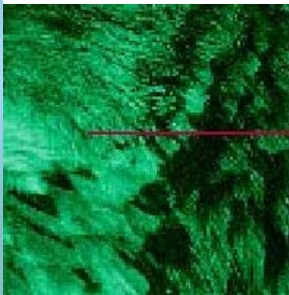
### The Optic is essential

- Measuring objectives TELEPLAN for measurements of lengths and forms.
- Micro objectives PLAN FLUOR for surface observations, e.g. metallurgy.
- Objectives with telecentric 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 LED cold light source.
- 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.

- **MX230**

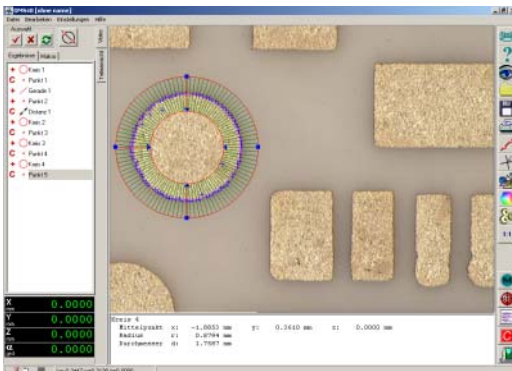
The compact digital read-out unit with display of 3 axes and integrated calculating functions without image processing for quick measurements in the shopfloor.



- **Metlogix M2**

Advanced multi-touch application on a tablet PC for 2-4 axes. 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.

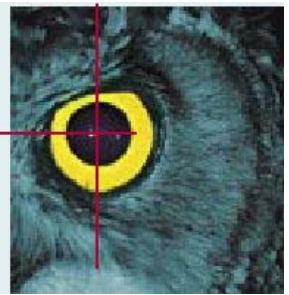


- **Metlogix M3**

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.





### Accessories

- Field inserts with crosshair and concentric 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.

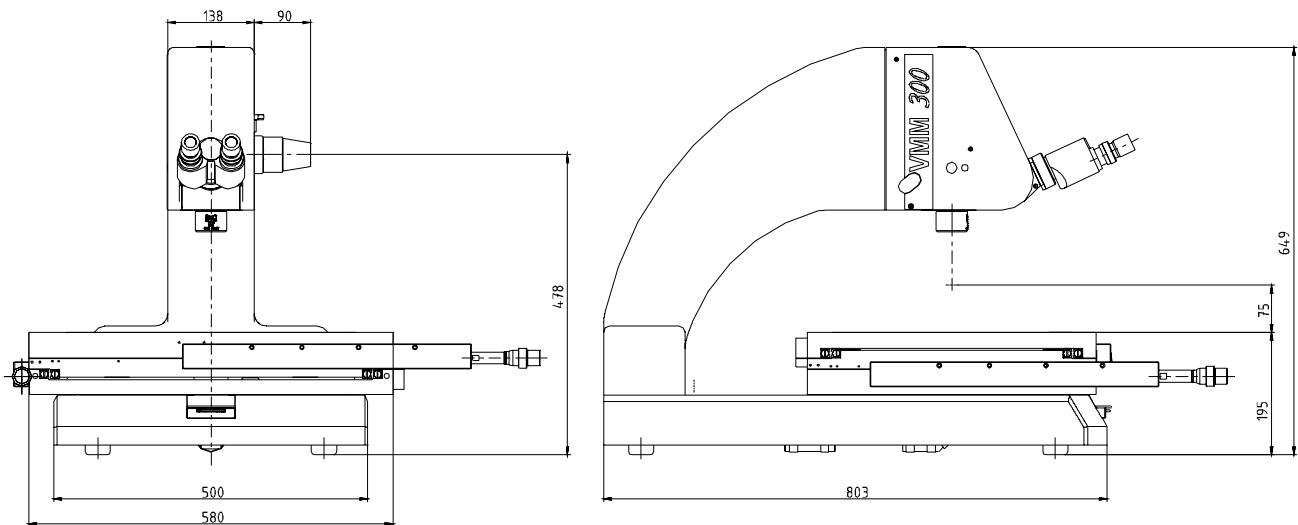


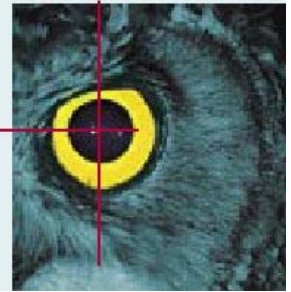


## Technical data

### Measuring Microscope VMM 300 Main Unit with Measuring Stage

Main unit:	solid granite base
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:	350 x 200 mm and 420 x 300 mm
Guiding:	roll bearing
Movement:	fast and fine adjustment
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:	$1.8 \mu\text{m} + 0.005 \times L \mu\text{m}$
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 dioptic 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, telecentric 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

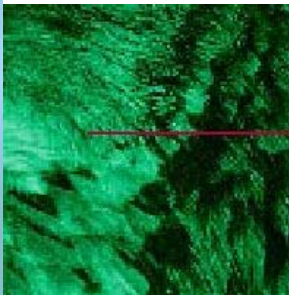
Operating temperature:	10° C to 40° C
Working temperature:	20 +/- 0,5° C
Storage temperature:	-10° C to 60° C
Power supply:	120/230 Vac, 50/60 Hz
Weight (net)	
Main unit No. VM4-BT01:	140 kg
Protective mode (CEI/IEC 529, DIN 40 050):	IP40
Electromagnetic compatibility:	EN 50081-1, EN 50082-1, EN 61000-4, EN 61010-1

## Manual-operated Measuring Microscopes

Equipment variants of ready-to-use Measuring Microscopes VMM 300 with binocular measuring tubes for metrological application.

Variants	Main unit with binocular measuring tube stage / measuring range 350 x 200 mm 420 x 300 mm <b>KT8-LHMA KT9-LHMA</b>		Measuring system coordinate direction Z	Digital read-out Metlogix	Order No.
	<b>VM5-110</b>	<b>VM5-111</b>	<b>VM4-101</b>	<b>MX230</b>	
1		●	●	●	<b>VM5-BT01</b>
2	●		●	●	<b>VM5-BT02</b>
3		●		●	<b>VM5-BT03</b>
4	●			●	<b>VM5-BT04</b>

All types are also available as motorized version, incl. joystick and 3 axis motion controller (e.g. VM5-BT01M).



## Manual Main Units

### Main Unit with Binocular Measuring Tube UHL Measuring Microscope VMM 300

(with measuring stage, without digital read-out)

Consisting of following components:

Order No.

1 Base body VMM 300 of granite, vertical column with adjusted Z-guiding (movement range 150 mm), fibre optic light guide for transmitted illumination, measurement stage KT8-LHMA **measurement range 350 x 200 mm** (coordinate direction X and Y), roll guided bearings for stage movement, stage surface 410 x 360 mm, opto-electronic measuring systems, based on incremental linear glass scales, fast and fine adjustment.

**VM5-110**

**VM5-111**

1 Base body VMM 300 of granite, vertical column with adjusted Z-guiding (movement range 150 mm), fibre optic light guide for transmitted illumination, measurement stage KT9-LHMA **measurement range 420 x 300 mm** (coordinate direction X and Y), roll guided bearings for stage movement, stage surface 580 x 460 mm, opto-electronic measuring systems, based on incremental linear glass scales, fast and fine adjustment.

1 Mechanical fast and fine adjustment of focus

VM4-200

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

VM4-300

1 Field insert with crosshair 90° and 2 additional lines  $\pm 60^\circ$ , usable in conjunction with binocular measuring tube

VM4-301

2 Eye-pieces, 10x magnification, with eye cups

WX10XU

1 Measuring objective 2:1, free-working distance  $a = 85$  mm

OP1-M02

1 Aperture iris insert for transmitted light, knurled wheel for aperture iris control

VM4-512

2 LED cold light sources, 65 W, stepless brightness control

VMP-GLL



\* optional with angle-adjustable binocular tube VM4-300S

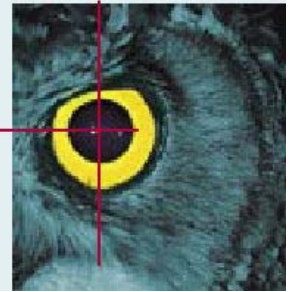
### Measuring system for coordinate direction Z

Order No.

Opto-electronic measuring system for coordinate direction Z, incremental-divided scale, resolution 0.0001 mm

**VM4-101**





## Processing of measuring signal and result output



- Compact Digital Read-out units for 3 axes
- Numerical and alphanumeric displays for functions.
- Numerical interval 0.0001 mm.
- Selectable languages:  
German, French, English, Italian, Spanish, Portuguese, Chinese.
- 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.
- USB-connection.

### Digital Read-out unit QC 200

3-axis digital read-out

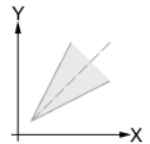
Possibility to connect either a Z-axis or a Q-axis (configurable by software)

Order No.

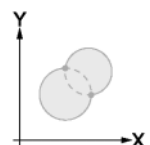
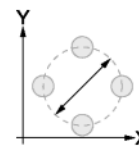
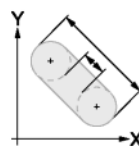
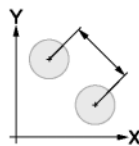
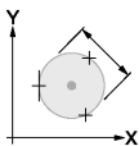
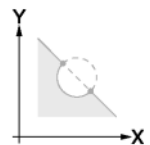
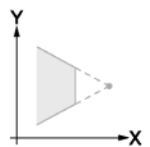
**MX230**

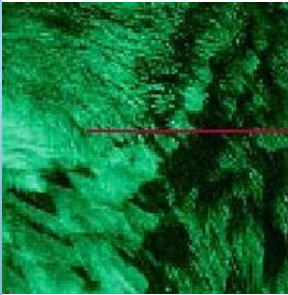
Revision No.: 06

## 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 Main Units

### Motorized Measuring Microscopes

Equipment variants of automated and semi-automated Measuring Microscopes VMM 300 with binocular measuring tubes or video tubes for metrological application.

#### Ordering code VMM 300:

#### VM5-BO22

Component description  
Measuring microscope  
VMM 300

##### Measuring stage:

- 1 = KT8-LSMA (measuring range 350 x 200 mm)
- 2 = KT9-LSMA (measuring range 420 x 300 mm)

##### Video adapter for binocular tube:

- 0 = n.a. for video tube
- 1 = C-Mount 1x (VM4-406)
- 2 = C-Mount 0.5x (VM4-407)

##### Image Processing System:

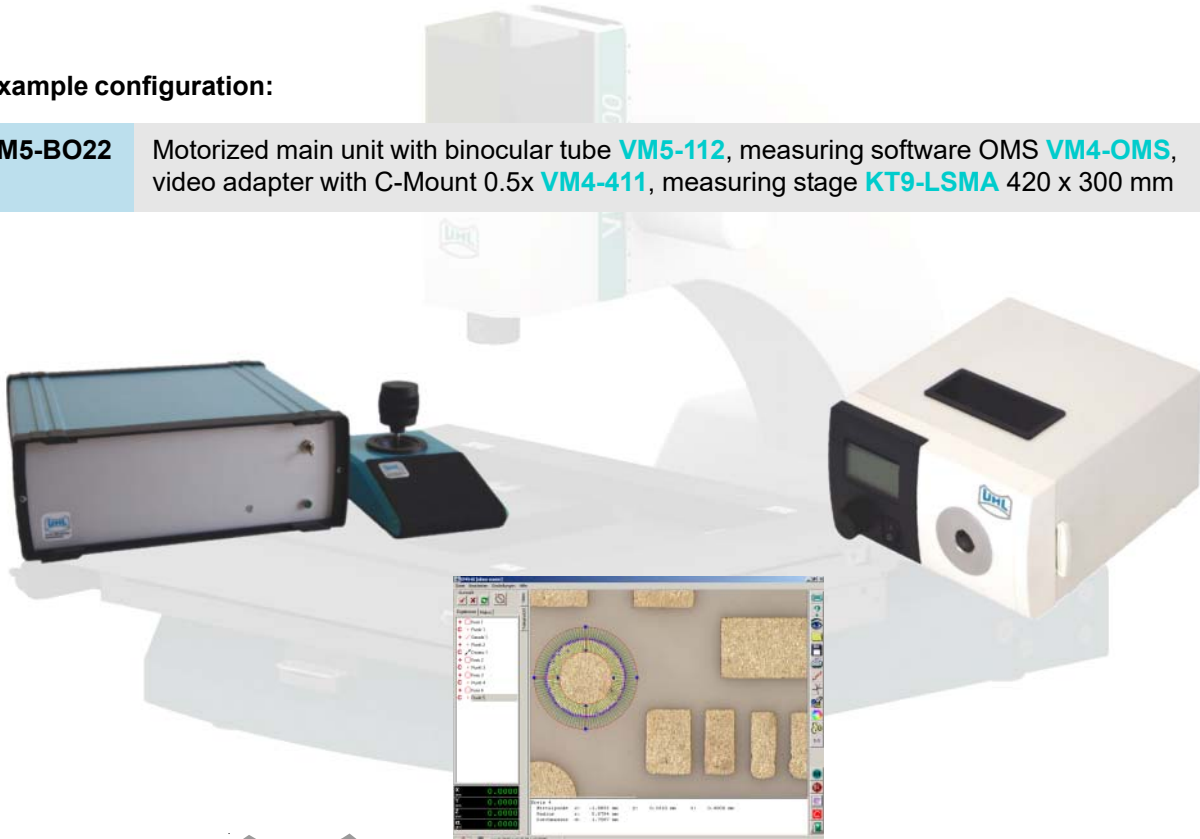
- O = OMS (VM4-OMS)
- M = Metlogix M3 (VM4-M3)

##### Main unit:

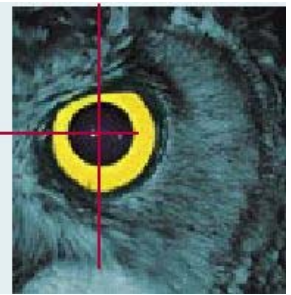
- A = motorized, with video tube (VM5-113)
- B = motorized, binocular tube (VM5-112)

#### Example configuration:

**VM5-BO22** Motorized main unit with binocular tube **VM5-112**, measuring software OMS **VM4-OMS**, video adapter with C-Mount 0.5x **VM4-411**, measuring stage **KT9-LSMA** 420 x 300 mm



## Motorized Main Units

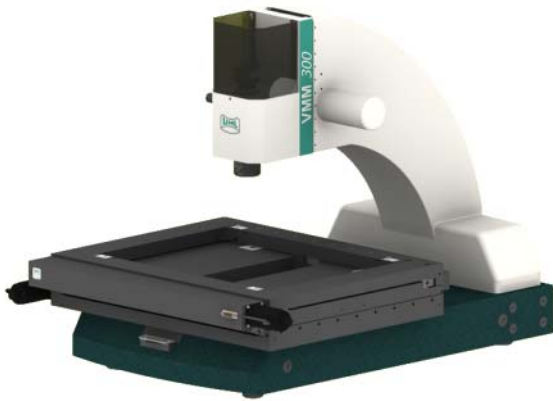


### Main Unit with Video Measuring Tube UHL Measuring Microscope VMM 300

(with measuring stage and without image processing system)

**Order No. VM5-113**

consisting of following components:



1 Base body VMM 300 of granite, vertical column with adjusted guiding (movement 150 mm), fibre optic light guide for transmitted illumination	VM5-002
1 Motorized Z-drive for focusing, with reception for measuring tube	VM4-204
1 Measuring system for coordinate direction Z	VM4-101
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
1 Measuring objective, 2:1, free-working distance $a = 85$ mm	OP1-M02
1 Aperture iris insert for transmitted light	VM4-512
1 Motorized measuring stage 420x300 mm	KT9-LSMA

### Main Unit with Binocular Measuring Tube UHL Measuring Microscope VMM 300

(with measuring stage and without image processing system)

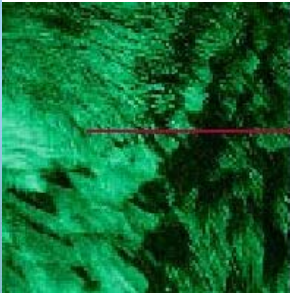
**Order No. VM5-112**

Similar version as above-mentioned (VM4-113) but instead of VM4-303, with:



1 Binocular measuring tube*	VM4-300
2 Eye-pieces, 10x magnification; Order no. for one piece	WF10XU

\* optional with angle-adjustable binocular tube VM4-300S

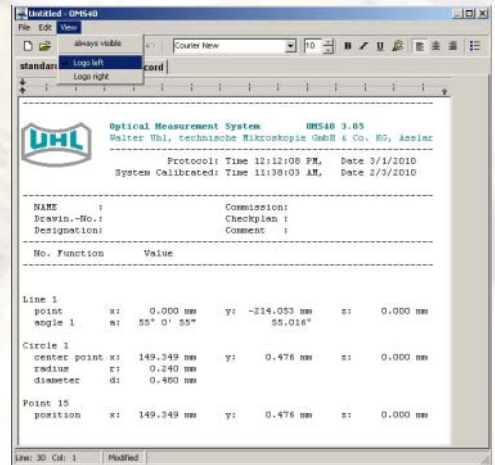
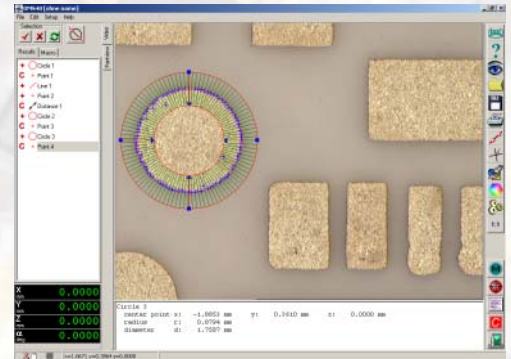


## Motorized Main Units

### 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.

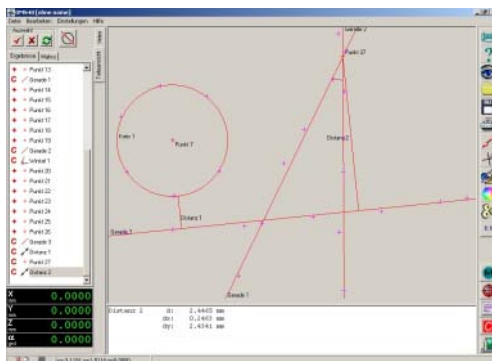


### Measuring Software System UHL OMS Complete system for 3 axes

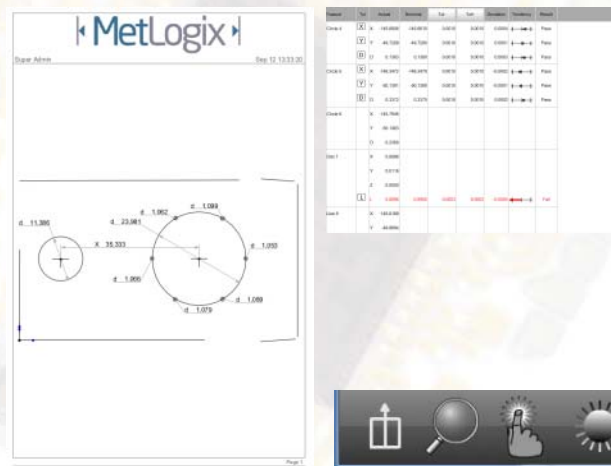
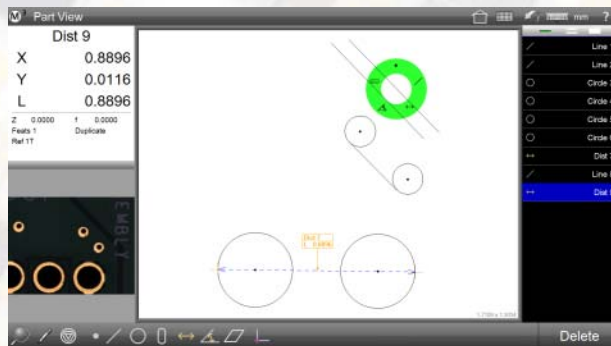
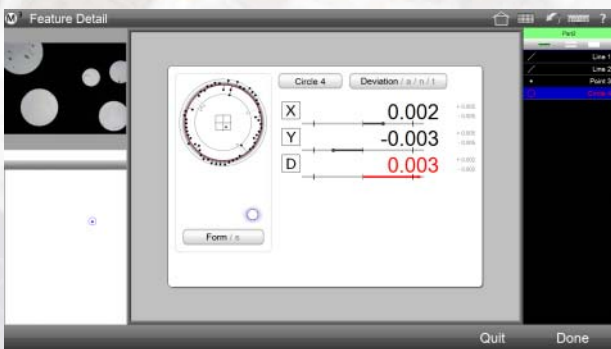
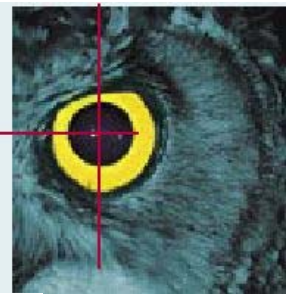
Order No. **VM4-OMS**

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
- 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

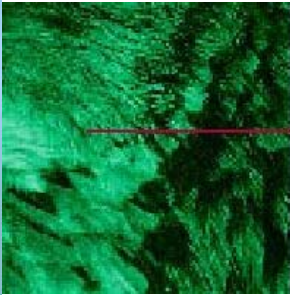
consisting of following components:

- 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

Option: DXF module to compare the measurements with the drawing, good/bad evaluation

M3.DXF





## Accessories

### 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 1x magnification

Order No. **VM4-406**

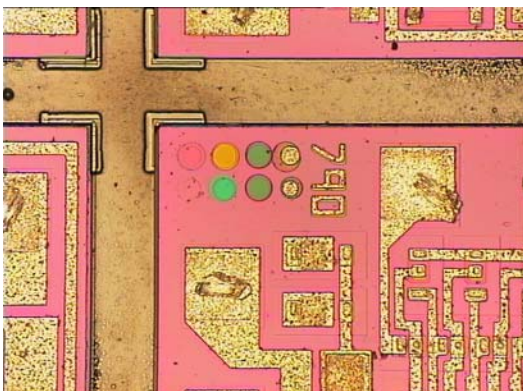
Video adapter with 1x magnification suitable for 1" cameras



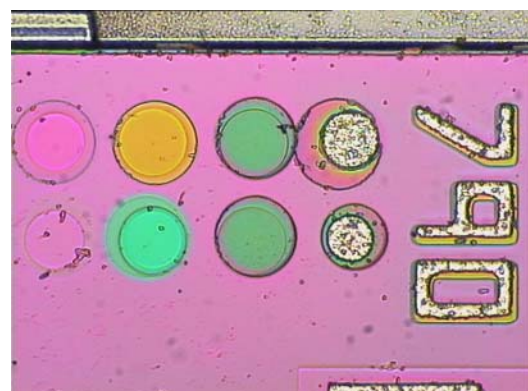
#### C-Mount Adapter with 0.5x magnification

Order No. **VM4-407**

Video adapter with 0.5x magnification suitable for 1/1.8" cameras

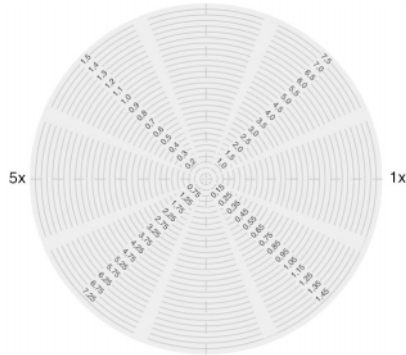
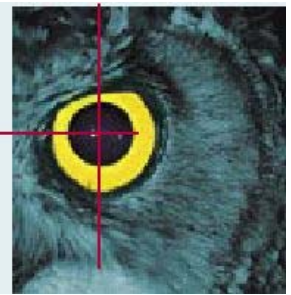


- Semiconductor, bright-field, 20x Plan-Fluor with video adapter 0.4x.



- Semiconductor, bright-field, 20x Plan-Fluor with video adapter 1.2x.





**Field insert with crosshair and concentric circles**

**Order No. VM4-304**

Crosshair 90° with 2 additional lines  $\pm 60^\circ$  as well as each 2 sets of 30 concentric circles

Usable in conjunction with binocular measuring tube VM4-300

Total magnification	Diameter	Increments
10x	0.25 to 7.50 mm	0.250 mm
20x	0.25 to 3.75 mm	0.125 mm
50x	0.05 to 1.50 mm	0.050 mm
100x	0.05 to 0.75 mm	0.025 mm

**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

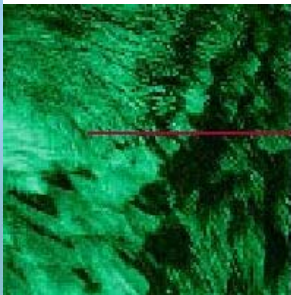


**Illumination Unit for Oblique Incident Light**

**Order No. VM4-503**

Suitable for measuring objectives 1:1 to 10:1, with dual arm fibre optic light guide, swivel holder  $\pm 45^\circ$  around the optical axis, cold light source VMP-GL





## Accessories

### 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**

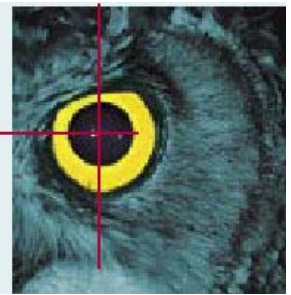


### Automatic LED Cold Light Source

Order No. **VMP-GLL**

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





**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**



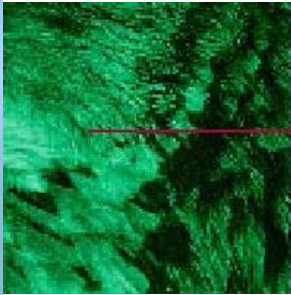
Suitable for all OP1-M measuring objectives, with power supply and intensity control, 80 LEDs

**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



## Accessories

### 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.

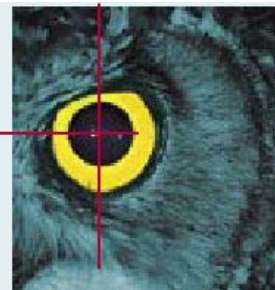
Easily and quickly changeable secured fixing via the bayonet mount.



Lens magnification	Total magnification	Object-field diameter	Numerical aperture	Free-working distance	Sharpness depth	~ Probing accuracy	Order-No.
1 : 1	10-fold	20 mm	0,03	88	0,3	5	<b>OP1-M01</b>
2 : 1	20-fold	10 mm	0,06	85	0,08	3	<b>OP1-M02*</b>
5 : 1	50-fold	4 mm	0,13	62	0,02	1.5	<b>OP1-M05</b>
10 : 1	100-fold	2 mm	0,20	52	0,01	1	<b>OP1-M10</b>

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





\* Reduces the maximum specimen height to 135 mm

### Micro Optical Attachment for 6 micro objectives\*

Order No. **VM4-310**

consisting of:

1 Base body with changer for 6 micro objectives Plan Fluor 1.25:1 to 150:1	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
optional: motor driven	<b>VM4-310M</b>

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

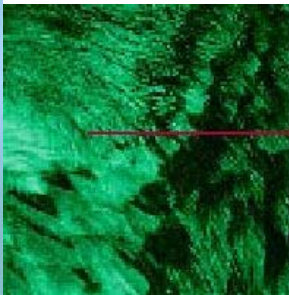
Order No. **VM4-311**

consisting of:

1 Base body with changer for 6 micro objectives Plan Fluor 1.25:1 to 150:1	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
optional: motor driven	<b>VM4-311M</b>



\* 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)

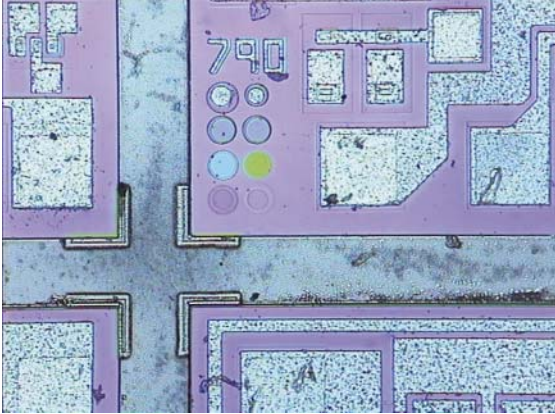
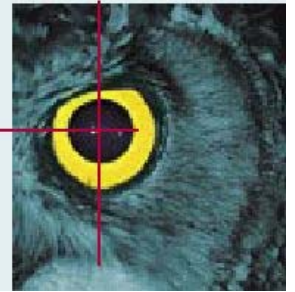
Suitable for both transmitted light and coaxial incident light; for use with the micro optical attachment VM4-311, and additionally usable in conjunction with the single bayonet mount VM4-308, or the micro optical attachment VM4-310. Objectives suitable for differential interference contrast are marked with „IK“ on the engraving.

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

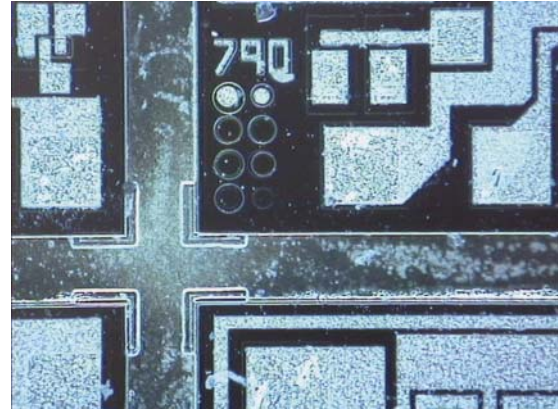
\* not suitable for differential interference contrast



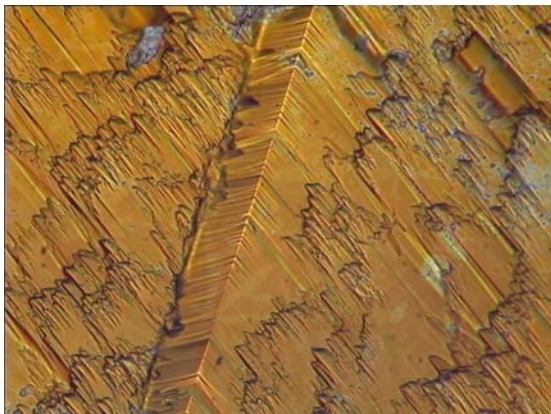
## Accessories



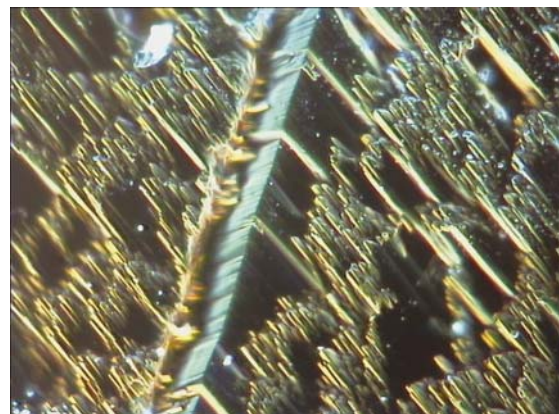
• Semiconductor, bright-field, 20x Plan-Fluor.



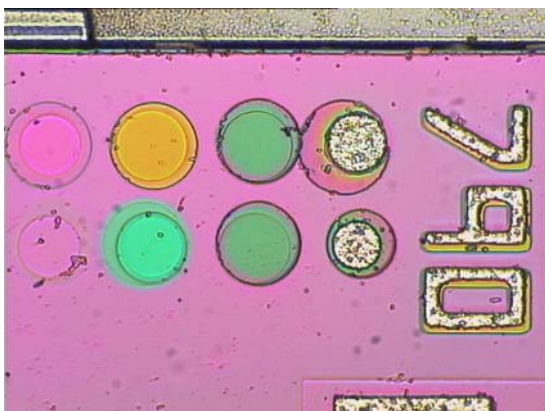
• Semiconductor, dark-field, 20x Plan-Fluor.



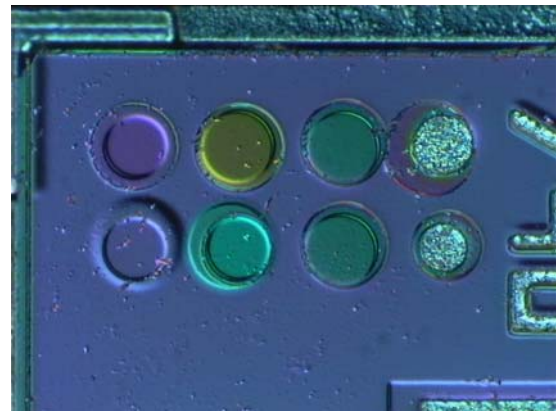
• Solar cell, bright-field, 50x Plan-Fluor.



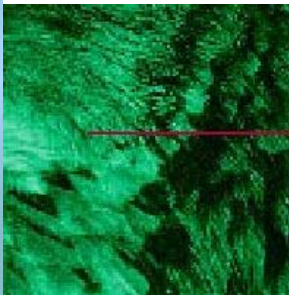
• Solar cell, dark-field, 50x Plan-Fluor.



• Semiconductor, bright-field, 50x Plan-Fluor.



• Halbleiter, bright-field with differential interference contrast DIC, 50x Plan-Fluor.



## Accessories

### Micro Optical Attachment for 4 micro objectives with extra long working distance\*

Order No. **VM4-314**

Revolving attachment for 4 micro objectives 2:1 to 50:1



\* Reduces the maximum specimen height to 115 mm



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

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

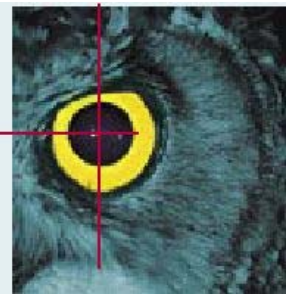
### Ring Light - Illumination Unit

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-GLL.





**LED Ring Light - Illumination Unit**

**Order No. RL8-LED**

Suitable for all OP1-VX objectives,  
16 LEDs

related power supplies:

Transformer with power supply

**TR7-N**

Transformer with power supply,  
remote controlled

**TR7-NU**

Revision No.: 06



**USB digital color camera**

**Order-No.**

Digital cameras for the c-mount  
adapters (not included) to store images  
or view live picture (required for OMS  
or M3 software).

USB 3.0 interface

incl. PC-software for the image acquisition

1/1.8" resolution: 2048x1536 pixel  
(suitable for VM4-407)

**VM4-USB**

1" resolution: 2592 x 2048 Pixel  
(suitable for VM4-406)

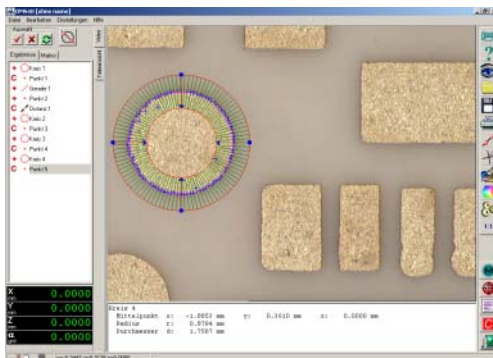
**VM4-USB5**

*optional:*

Easy software to measure samples in the  
video image, movable lines for distance  
measurement, images can be watermarked  
and saved with a comment.

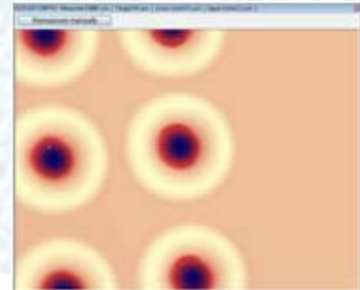
**OMS-LT**

OMS is available in german or english.



Sonderkonstruktionen aus Komponenten unseres Baukastensystems sind jederzeit möglich:

Konstruktion eines Wafer-Messmikroskops mit integriertem Messrechner, Matrix-Code Lesegerät und Weißlichtinterferometer für die geometrische Vermessung von Lasermarkierungen. Messbereich 420 x 310 mm. Die Tiefenmessung der Markierungen hat eine Messgenauigkeit von  $\pm 50$  nm.



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[www.walteruhl.com](http://www.walteruhl.com)

Specifications are about to change without notice!



Technische  
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