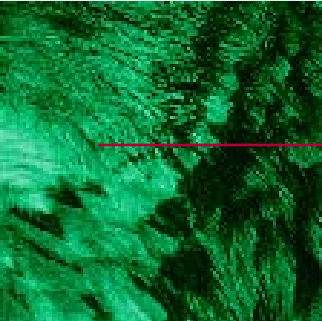


Measuring Microscope VMM 200





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 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 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 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

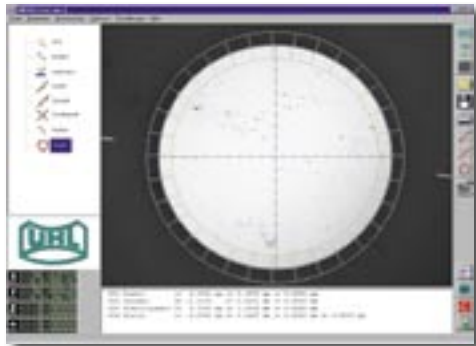
Processing of measured values

The matching software for each application.

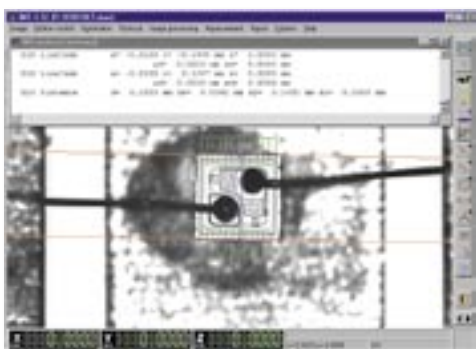


- **QC200**
The compact Digital Read-out unit with Up/Down counter and integrated calculating functions for quick measurements but without image processing.

- **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 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 200 Main Unit with Measuring Stage

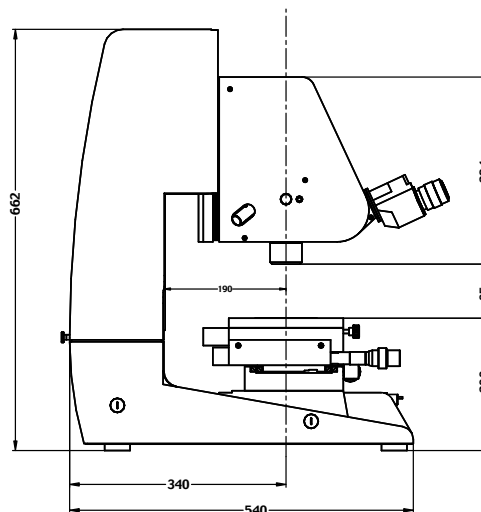
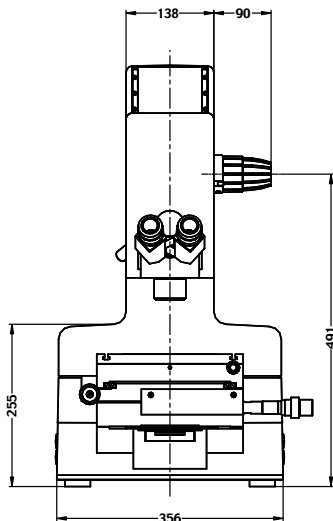
Main unit:	grey cast iron, massive
Optics holder:	guided roll bearing, height variable via turning knobs for fast and fine adjustment of focus; prepared additionally to receive an opto-electronic measuring system, movement 150 mm
Measuring stages:	
Measuring range:	150 x 100 mm and 250 x 150 mm
Guiding:	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 0,0001 mm
Resolution:	
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 through fibre optic light guide
Light supply:	

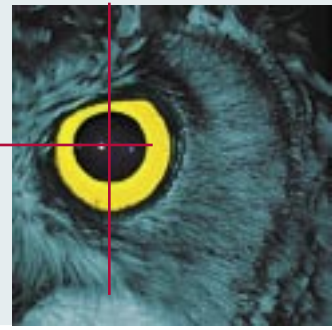
Optical System

Measuring tube:	binocular with dioptic compensation with eye cups
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



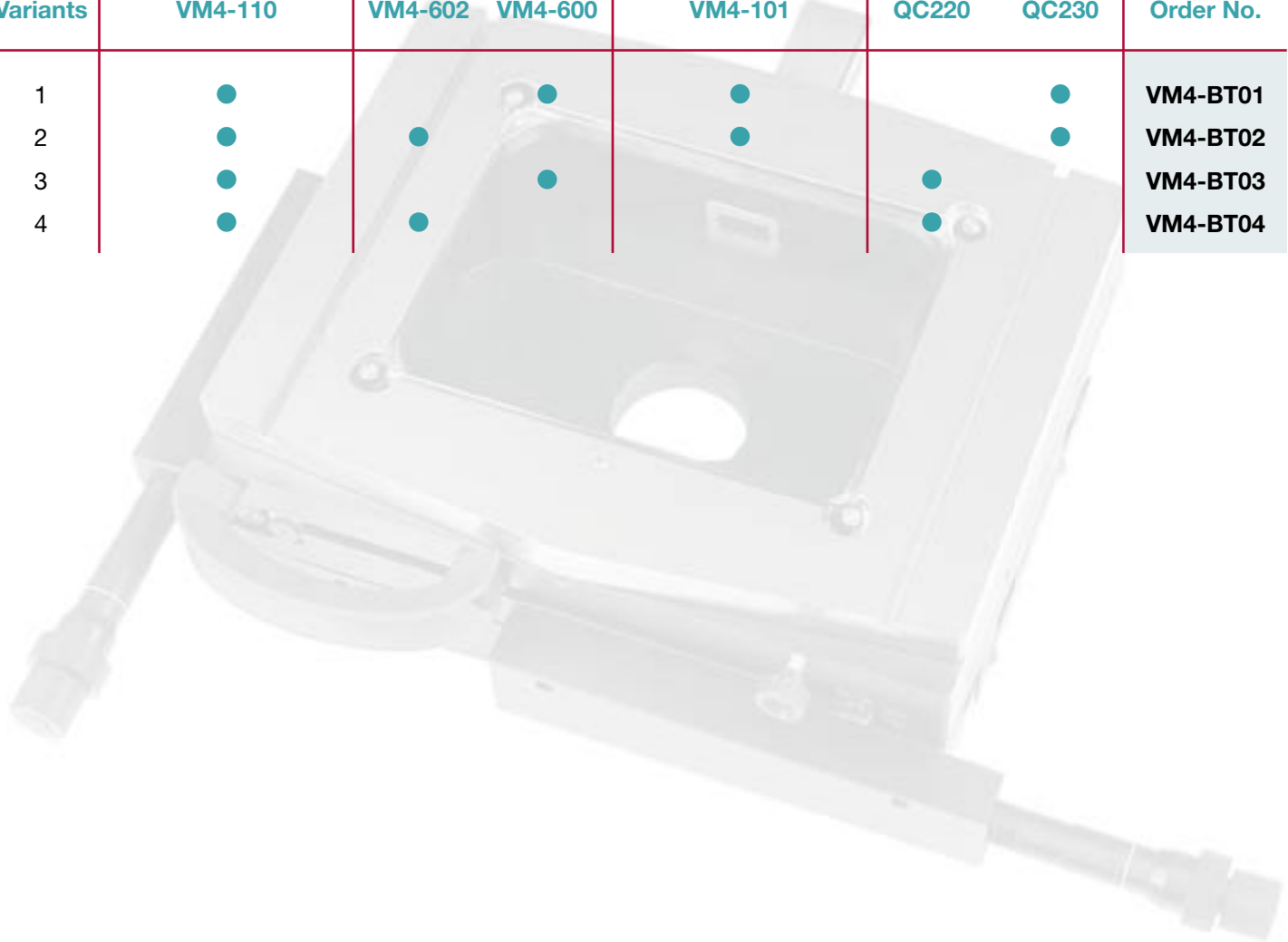


Manual-operated Measuring Microscopes

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



Variants	Main unit with binocular measuring tube	Mea. stage/Mea. range		Measuring system coordinate direction Z	Digital Read-out QUADRA-Check		Order No.
	VM4-110	150x100 mm	250x150 mm		VM4-101	QC220	
1	●		●	●		●	VM4-BT01
2	●	●		●		●	VM4-BT02
3	●		●		●		VM4-BT03
4	●	●			●		VM4-BT04



Manual Main Units

Main Unit with Binocular Measuring Tube UHL Measuring Microscope VMM 200

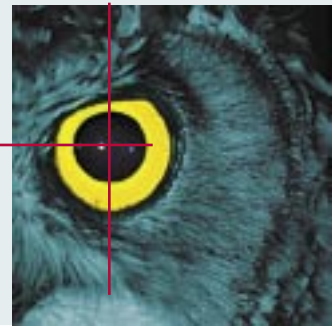
(without measuring stage and digital read-out)

Order No. VM4-110

consisting of following components:

- 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 VM4-001
- 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; Order no. for one piece WF10XL
- 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 Cold light sources with reflective halogen lamp, 30 W, stepless brightness control VMP-GL





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 $\pm 5^\circ$ 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

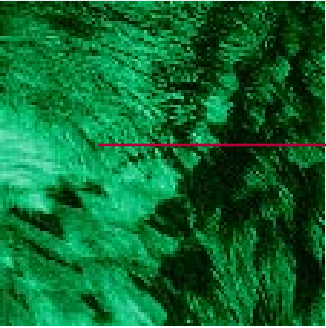
Measuring system for coordinate direction Z

Order No. VM4-101

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



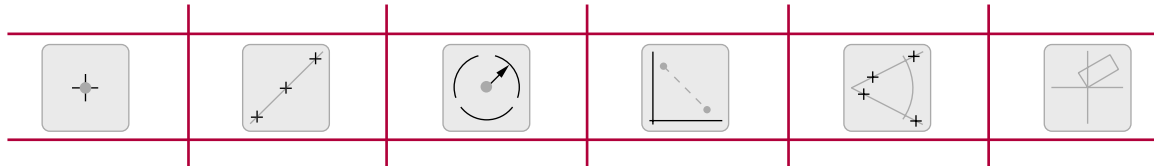
Manual Main Units



Processing of measuring signal and result output

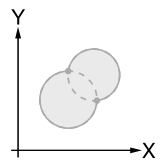
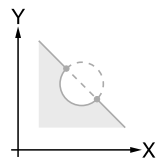
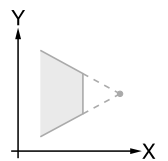
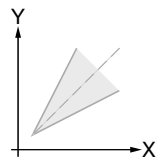
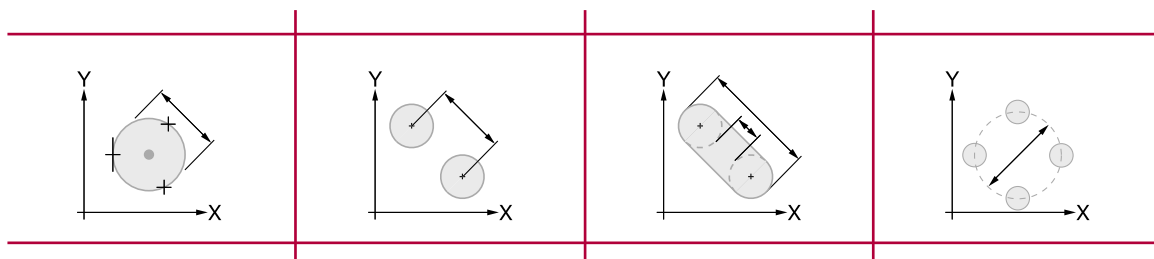
- Compact Digital Read-out units with Up/Down counter for 2 and 3 coordinating directions.
- Numerical and alphanumeric displays for functions.
- Numerical interval 0.0001 mm.
- Selectable languages:
German, French, English, Italian and Spanish.
- Calculable alignment of work-pieces.
- Calculating functions 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

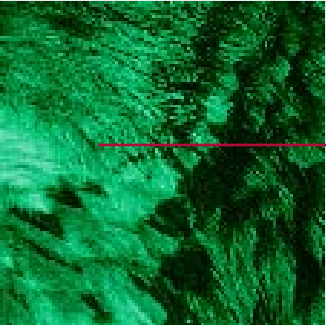


Motorized Measuring Microscopes

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

Variants	Motorized main unit w. binocu. tube	Motorized main unit w. video tube	Video adapter		Image Processing System			Order No.
	VM4-111	VM4-112	C-Mount 1.2x VM4-410	C-Mount 0.4-1.2x VM4-411	OMS VM4-OMS	IMS VM4-IMS	QC5300 VM4-QC53	
1		●				●		VM4-AI01
2		●					●	VM4-AQ01
3		●			●			VM4-AO01
4	●		●		●			VM4-BO01
5	●			●	●			VM4-BO02
6	●		●			●		VM4-BI01
7	●			●		●		VM4-BI02
8	●		●				●	VM4-BQ01
9	●			●			●	VM4-BQ02





Motorized Main Units



Main Unit with Video Measuring Tube UHL Measuring Microscope VMM 200

(without Image Processing System)

Order No. VM4-112

consisting of following components:

- | | |
|---|---------|
| 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 |
| 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 250 x 150 mm | VM4-601 |



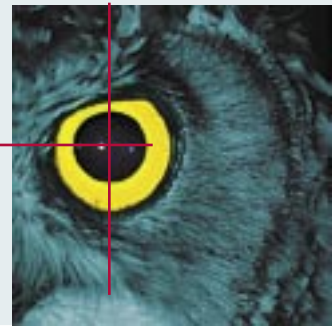
Main Unit with Binocular Measuring Tube UHL Measuring Microscope VMM 200

(without Image Processing System)

Order No. VM4-111

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 |



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 |
| 1 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 1/2" cameras | VM4-401 |
| 1 C-Mount camera connecting piece | VM4-402 |



Image Processing Systems

QC5300

with following standard functions:

- Metric/inch conversion.
- Parts programming.
- Interactive graphical part view.
- Form/Statistic display.
- Unlimited feature storing.
- Engineering or defining of elements.
- Cartesian or polar coordinating systems.
- CAD interface (Export to .DXF).
- Data exporting (DDE).
- Group tolerancing tests.
- Up to 9 coordinating systems.
- 3D Measure Magic®.

Measuring Software System Quadra-Check QC5000 Complete system for three axis

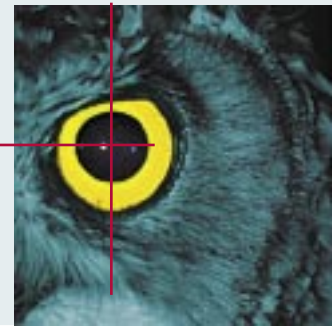
Order-No. **VM4-QC53**

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



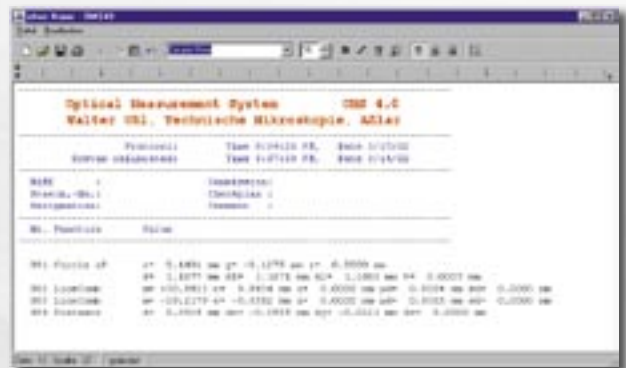
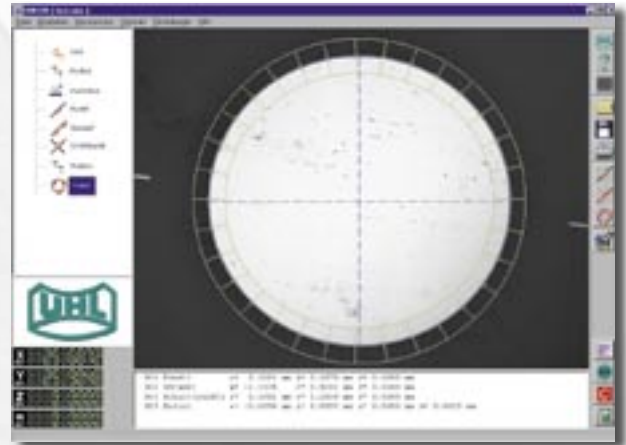
Image Processing System



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

Order-No. **VM4-OMS**

consisting of following components:

- | | |
|--|---------|
| 1 Desktop-PC with a 17" Monitor | DPC-N7E |
| 1 Software Package OMS | VMP-OMS |
| 1 3-axis stepping motor control system with Joystick | F9S-3-M |
| 2 Cold light sources 30W | VMP-GL |
| 1 B/W Camera | MS2-403 |



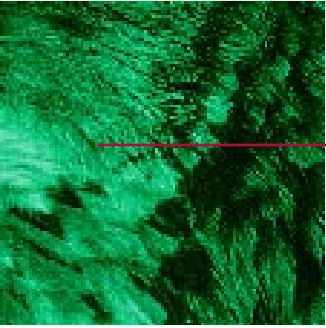
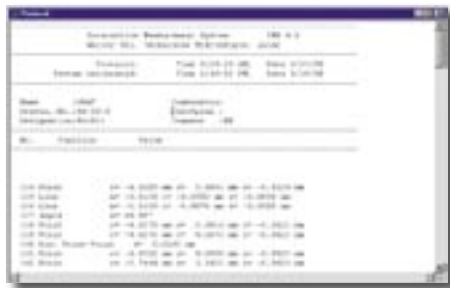
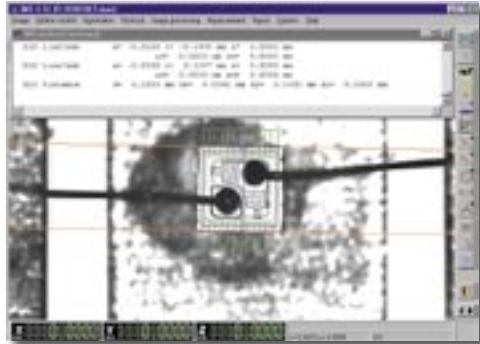


Image Processing System



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.



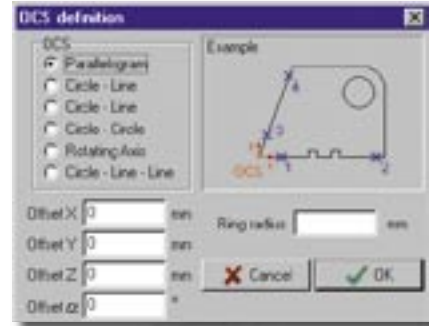
Measuring Software System UHL IMS
Complete system for three axis

Order-No. VM4-IMS

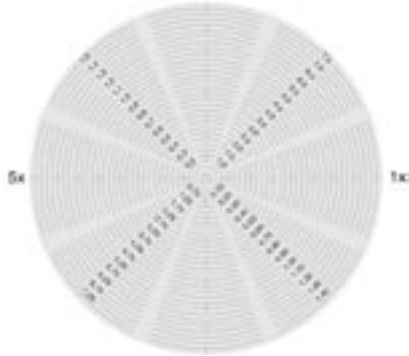
consisting of following components:

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

- DPC-NFE
- VMP-IMS
- F9S-3-M
- VMP-GLS
- MS2-403



Accessories



Field insert with crosshair and concentric circles

Order-No. **VM4-304**

Crosshair 90° with 2 additional lines ± 60° 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 - 7.50 mm	0.250 mm
20x	0.25 - 3.75 mm	0.125 mm
50x	0.05 - 1.50 mm	0.050 mm
100x	0.05 - 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-division, usable in conjunction with binocular measuring tube VM4-300

Measuring objectives

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

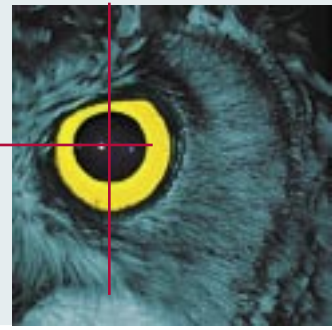
Large working distances for measuring test objects e.g. disturbance edges or in bore holes.

Easily and quickly changeable secured fixing via the bayonet mount.

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



Lens magnification	Total magnification	Object-field diameter	Numerical aperture	Free-working distance	Focusing depth	Order-No.
1 : 1	10x	20 mm	0.03	88 mm	0.3 mm	OP1-M01
2 : 1	20x	10 mm	0.06	85 mm	0.08 mm	OP1-M02*
5 : 1	50x	4 mm	0.13	62 mm	0.02 mm	OP1-M05
10 : 1	100x	2 mm	0.20	52 mm	0.01 mm	OP1-M10
20 : 1	200x	1 mm	0.35	30 mm	0.002 mm	OP1-M20



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:

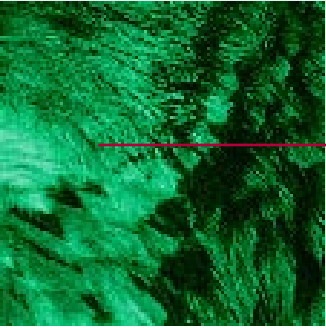
Upon purchase of the measuring microscopes, the set-up for interference line measuring process of diameter measuring, consisting of centre support, aperture iris insert and interference slit insert, should be taken into consideration. A supplementary assembly requires definite knowledge.

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 $\pm 45^\circ$ 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

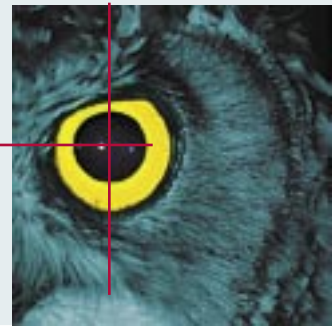


Automatic Cold Light Source

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.

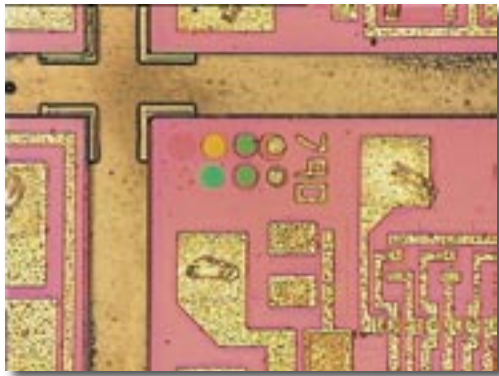


Micro Optical Attachment for 6 micro objectives

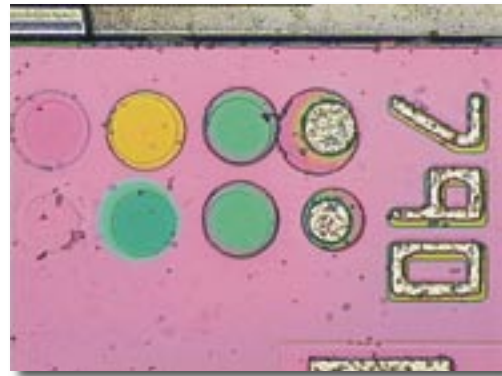
Order-No. VM4-310

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 |



- 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

Order-No. VM4-308

Adapter for micro objectives 2.5:1 to 100:1, suitable for coaxial incident light and transmitted light (without coaxial dark-field incident light)

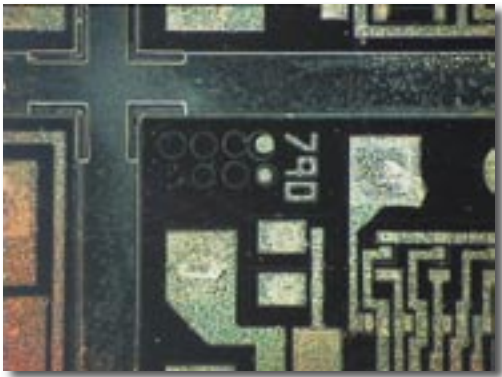


Accessories

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).

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

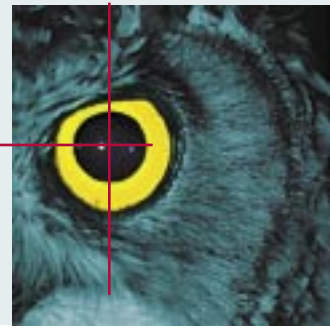


- Semi-conductor, dark-field 20x Plan Fluor, video adapter with 0.4x.



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

Bright-field and Dark-field Surveying



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
- 1 Fibre optic light guide
- 1 Triple illumination module (assembled in base body) for coaxial incident light (bright-field and dark-field)
- 1 Polarisation insert
- 1 Plug-in unit for differential interference contrast (DIC) with adjustable Wollaston-Prism

VM4-306

GF7

VM4-307

VM4-363

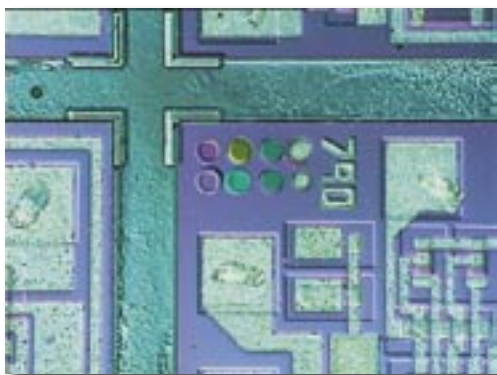
VM4-364



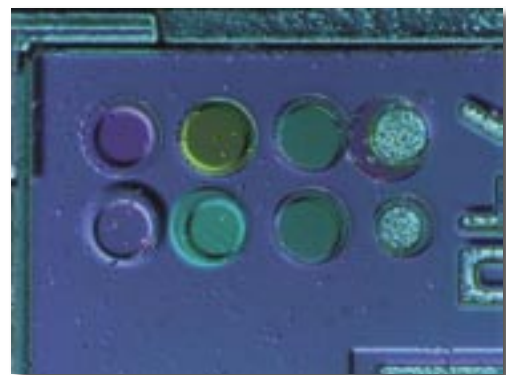
Micro Objectives LEICA Plan Fluor for image viewing with and without polarised light as well as differential interference contrast (DIC)

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.

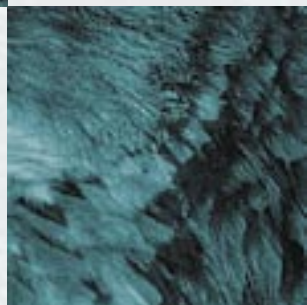
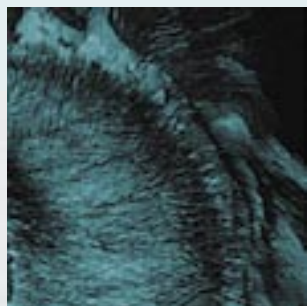
Lens magnification	Total magnification	Object-field diameter	Numerical aperture	Free-working distance	Order-No.
10 : 1	100x	2.0 mm	0.20	10.50 mm	OP1-L10P
20 : 1	200x	1.0 mm	0.40	10.50 mm	OP1-L20P
50 : 1	500x	0.4 mm	0.60	3.60 mm	OP1-L50P
100 : 1	1000x	0.2 mm	0.70	3.60 mm	OP1-L99P



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



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



Walter Uhl
Loherstraße 7
D-35614 Aßlar
Germany

Tel. ++49 6441 88 603
Fax ++49 6441 85 71 8

www.walteruhl.com

