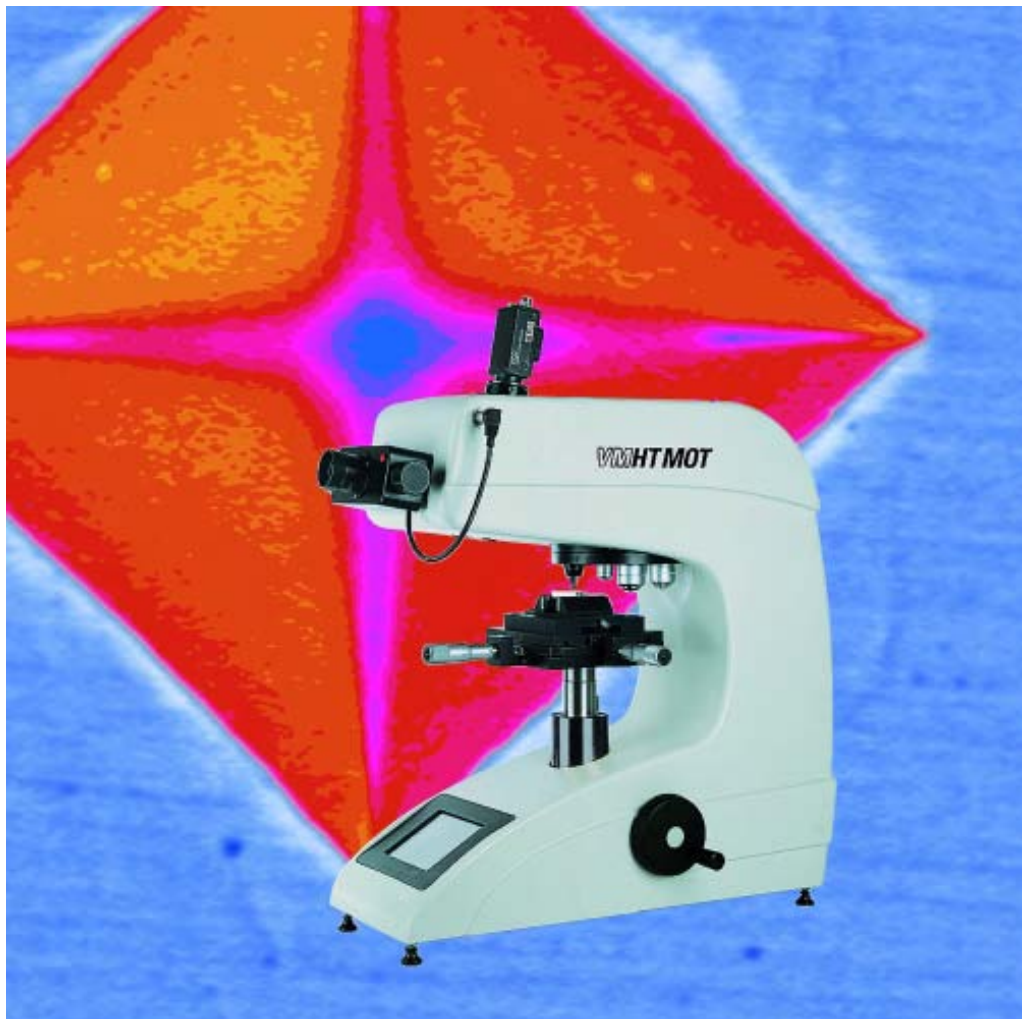


# UHL VMHT

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## Microhardness Tester



Revision: 02

Measuring instruments for manual, semiautomatic or fully automatic microhardness testing.



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Technische  
Mikroskopie

# UHL VMHT - straight to the point!

## Test forces

All the instruments offer 12 steps of test force: 1, 5, 10, 15, 25, 50, 100, 200, 300, 500, 1000, 2000 p (gf) covering the range of test forces required by the standards ASTM E-384, EN ISO 6507 and EN ISO 4545. At the touch of a button, the test force is automatically selected. The test force can also be changed by the computer when running automated measurement cycles and as a consequence allowing different test forces in the inspection.

## Focus finder

The newly introduced focus finder is available with all 3 Leica Plan objectives and enables the operator to detect the focus position very quickly. This is particularly helpful in cases of highly polished samples with few details such as steel etc.

## Approach velocity

For specific applications depending on elastic and plastic properties of the material, the approach velocity of the indenter can be selected between 25 and 60  $\mu\text{m/s}$ .

## Optics

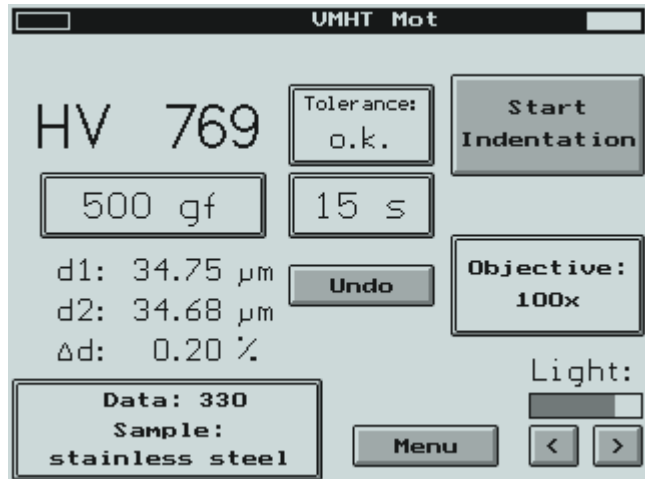
The infinity corrected Leica Plan objectives 10x and 50x are used according to International Standards, objective 100x is optional. The measuring eyepiece with field of view 16 mm offers an optimized, ergonomic working position. Easily exchangeable aperture diaphragms enable the operator to optimize the contrast according to his applications.

## Printer/PC interfaces

According to the desired peripheral instrument (PC or printer), both RS 232 and Centronics interfaces are offered.

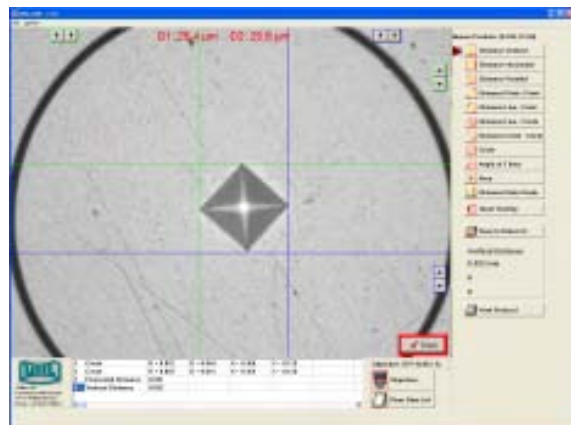
## Results and data storage

For each test, the measured diagonal lengths and the hardness value with test force are given as well as tolerance judgement, statistics (mean value, maximum/minimum, standard deviation). The test results can be stored as well as the specimen description and operator name.



## Motorized turret

With the models VMHT MOT and VMHT AUTO, the turret is motor driven. After choosing the indentation spot, the indenter is brought into its working position at the touch of the button "Start indentation". After finishing the indentation process, the previously chosen objective is automatically swiveled in and measurement (either by the operator with measuring eyepiece or by PC with image analysis) can immediately start.



The manual hardness testers VMHT and VMHT MOT can be optionally equipped with a USB camera (**VM4-USB**). In combination with this camera a measuring software for measuring the hardness by horizontal and vertical lines and saving the video images is available: **VMS-VMH**.



# UHL VMHT - very impressive!

## The new Standard in Microhardness Testing

**The new UHL VMHT not only has an exceptional new design, it makes microhardness testing more convenient for the user than any other instrument:**

- 12 steps of test force yield more than the range required by ASTM E-384/EN ISO 6507/EN ISO 4545.
- Motorized selection of test force offers full control via touch panel display there is no mechanical dialing knob necessary.
- Selectable approach velocity prevents bouncing effects on specific materials.
- Focus finder helps to quickly determine the focal plane especially in case of highly polished samples.
- Especially in the fields of testing laboratories and materials research, the outstanding performance of the VMHT and VMHT MOT can be appreciated.
- The VMHT is a cost-effective instrument with manual turret movement and is push button controlled.
- The VMHT MOT offers a motorized turret and a touch panel display for more comprehensive information and interaction.
- Due to the outstanding optics it can be used as a simple brightfield metal microscope.



VMHT Order no.: **VMH-001**

VMHT MOT Order no.: **VMH-002**





VMHT AUTO mot Order no.: VMH-I04

# UHL VMHT AUTO

## Fully Automated Measurements

In case of many similar samples like in production sites with high capacities or where the test parameters have to be applied always in the same reproducible condition, the VMHT AUTO brings its full capacity.

The operator just orientates the specimen on the motorized stage and defines the test parameters using the Interactive Measuring Software IMS-VMHT. Consecutively, the system performs the measurements fully automated without any further attendance.

## Enhanced Labour Productivity

Since the VMHT AUTO is destined to perform its measurements unattended, it leaves the personnel capacity free for other tasks, e.g. sample preparation.

## Ease of Use

No extensive elaborate training or programming knowledge is required to operate the system. The Interactive Measuring Software IMS 4 (working under WINDOWS™ 2000) offers a simple working environment. All necessary information is shown on one screen. The operator is able to recall previously defined measuring routines.

## Configuration

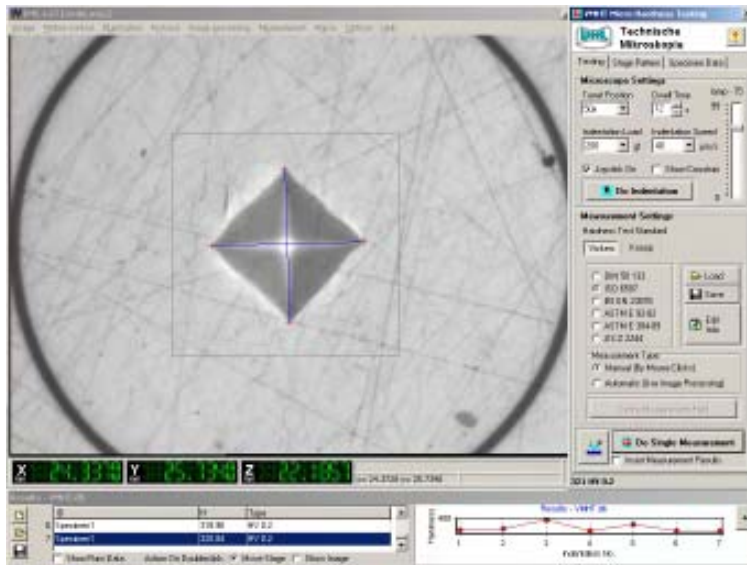
The VMHT AUTO comes completely configured and calibrated including the Performance Station PC with 17" TFT color display.

The system is available in 2 configurations:

- VMHT AUTO man – is a semiautomated system with manual stage and focus control. The image is acquired via TV camera and evaluated by means of the Interactive Measuring Software IMS-VMHT.
- VMHT AUTO mot – is fully automated and has both motorized stage and focus control including Autofocus function. A joystick serves for motion control of x/y and focus movement.



# Just Click!



## Accuracy

Since a personal judgment caused by the operator is totally eliminated, the imprints are measured permanently under reproducible conditions.

The high resolution TV camera and the stage increment of 0.1  $\mu\text{m}$  guarantee highest measurement accuracy.

Another advantage linked with automated measurements is the avoidance of fatiguing the operator thus introducing measurements errors.

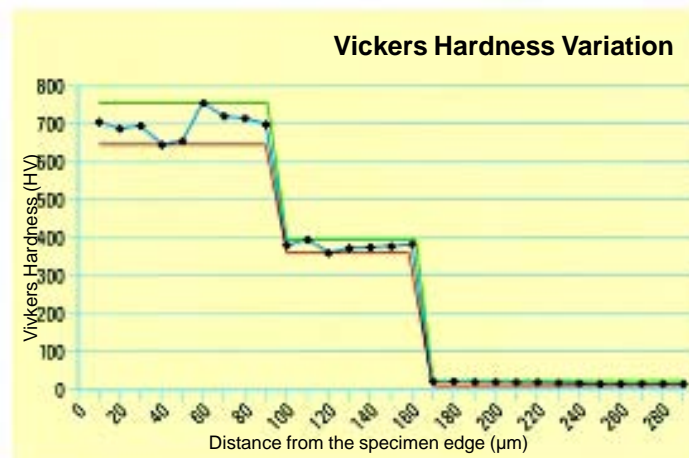
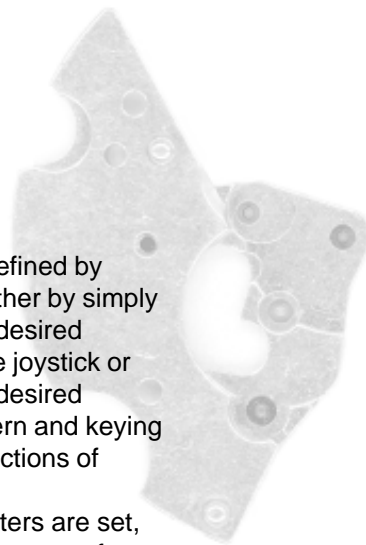
## Change of Test Load

All of the VMHT models have motorized selection of the test forces. As a consequence, the test force can also be changed by the IMS-VMHT software. This offers the unique possibility of creating e.g. hardness profiles based on different test forces.

## Measurement Process

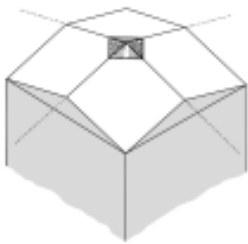
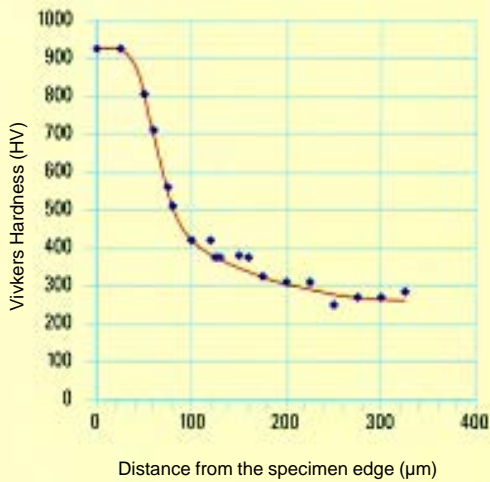
The pattern can be predefined by different methods, i.e. either by simply moving the stage to the desired indentation spots using the joystick or moving the stage to the desired starting point of the pattern and keying in the distances and directions of consecutive imprints.

When all testing parameters are set, the system automatically moves from spot to spot, focuses the specimen by calculating the optimum focus position (integrated Autofocus function). The high resolution TV camera acquires the image via frame grabber board and the sophisticated measuring software routine calculates the diagonal lengths and the resulting hardness value based on the chosen test force. All results are immediately listed in a table and is stored in a dBASE™ database. From there the data can be exported to application programmes like Microsoft™ EXCEL. Reporting can be done by using Microsoft™ WORD.

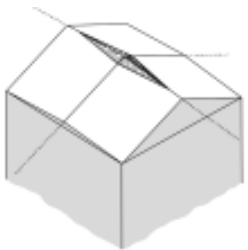


# Applications

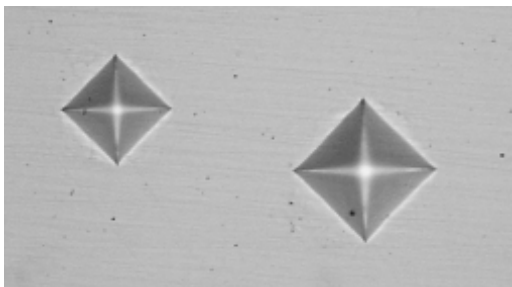
Variation of hardness through a nitrided steel case



Vickers indenter



Knoop indenter



## Metallography

### Surface phenomena – surface treatment

- Case-hardening of steels
- Surface hardening of titanium
- Electrodeposited coating: hardness, brittleness, adhesion
- Effects of various mechanical and thermal treatments on the surface layers

### Study of Alloys and Alloy Constitution

- Quantification of transition areas

### Determination of the Effect of Thermal Treatment

- Heat treatment of steels, non ferrous alloys, precipitation treatments and age-hardening
- Segregation and coring, rates of diffusion
- Recrystallisation

### Materials science

- Brittleness: ratio hardness/toughness
- Elastic/plastic properties
- Correlation with Young modulus
- Paint films – hardness of painted surfaces

### Tribology Research

- Work hardening
- Estimate mild wear losses
- Correlation hardness number – wear resistance

### Metal Powder Particles

- Mechanical properties
- Durability and performance of alloy components

### Ceramics

- Determination of the hardening degree of glaze



# Specifications

Order no.	VMHT VMH-001	VMHT MOT VMH-002	VMHT AUTO man VMH-I03	VMHT AUTO mot VMH-I04
<b>International standards</b>	ASTM E-384; ASTM E-92; EN ISO 6507/1-3; EN ISO 4545; JIS Z 2244; JIS Z 2251; CE-approval			
<b>Indenter</b>	Vickers or Knoop (standard) – Brinell (optional)			
<b>Test Force</b>	12 steps: 1 - 5 - 10 - 15 - 25 - 50 - 100 - 200 - 300 - 500 - 1000 - 2000 (p)/(gf)			
Loading procedure	automatic			
Selection of indenter	manual turret	motorized turret		
Dwell time	6 - 99 s	5 - 99 s		
Approach velocity	50 µm/s	25 to 60 µm/s (selectable in steps of 5 µm/s)		
Motorized selection of test force	via buttons	via touch screen	via PC	
<b>Optics</b>	Filar measuring eyepiece, magn. 10x Field of view 16 mm		Eyepiece, 10x	
Standard objectives	C PLAN 10x/0.22 – 7.8 mm free working distance N PLAN 50x/0.75 – 0.37 mm free working distance (spring loaded)			
Optional objective	–	N PLAN 100x/0.90 – 0.27 mm free working distance (spring loaded)		
Maximum number of objectives	2	3		
Light source	20 W, adjustable			
Focus finder	Special diaphragm in conjugated image of field aperture			
Aperture diaphragm	Easily exchangeable for reproducible conditions of measurement			
Color filters	Green (other filters on request)			
Camera options	MS2-403 or VM4-USB with VMH-401 TV adapter (C-mount)		Image analysis via TV and PC (WINDOWS-based)	
optional measuring software VMS-VMH	only with VM4-USB camera, measuring in the video image, saving images			
<b>Measurement System</b>	Electronic encoder		Semi-automatic:	Fully automatic:
Effective measurable length	800 µm (10x), 160 µm (50x), 80 µm (100x)		manual stage manual focus control	motorized stage motorized focus control autofocus (TV-based)
Display resolution	0.1 µm	0.01 µm		
<b>Specimen Stage</b>				
Stage size	135 x 135 mm			
X/Y travel	25 x 25 mm		50 x 50 mm	
Positioning increment	10 µm		0.1 µm	
Maximum specimen height on stage	90 mm		75 mm	
Maximum specimen depth from center of indenter	116 mm			
Maximum opening of vise	59 mm			
Leveling	built-in spirit level			
<b>Data Display/Handling</b>				
Data entering	via buttons	via touch screen	via PC	
Data display	Diagonals d1/d2 (µm), hardness value HV/HK, test load (N/gf), dwell time (s), tolerance judgement			
Statistics	Mean value, maximum/minimum value, standard deviation			
Data memory	max. 99 test data	max. 999 test data	PC	
Interfaces	Centronics (printer) RS 232 (optional)	Centronics (printer) RS 232 (PC)	RS 232	
Accessories	Various fixtures for clamping different types of specimens			
Power supply	Wide range power supply: 100 V to 240 V AC/50 to 60 Hz			
Measures	392 x 536 x 533 mm (w x h x d) with TV adapter: 392 x 550 x 533 mm		with TV adapter: 392 x 550 x 533 mm (w x h x d)	
Weight	35 kg (without PC)			

Revision: 02



# UHL

## technische Mikroskopie

- competence in microscopy  
and measuring applications.

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*Wir entwickeln, konstruieren,  
fertigen, montieren und vertreiben  
feinmechanische und optische Bauteile  
und Geräte zum Positionieren,  
Messen und Prüfen.*

*We develop, design,  
produce, assemble and distribute  
precision mechanical and optical components  
and instruments for positioning,  
measuring and testing.*

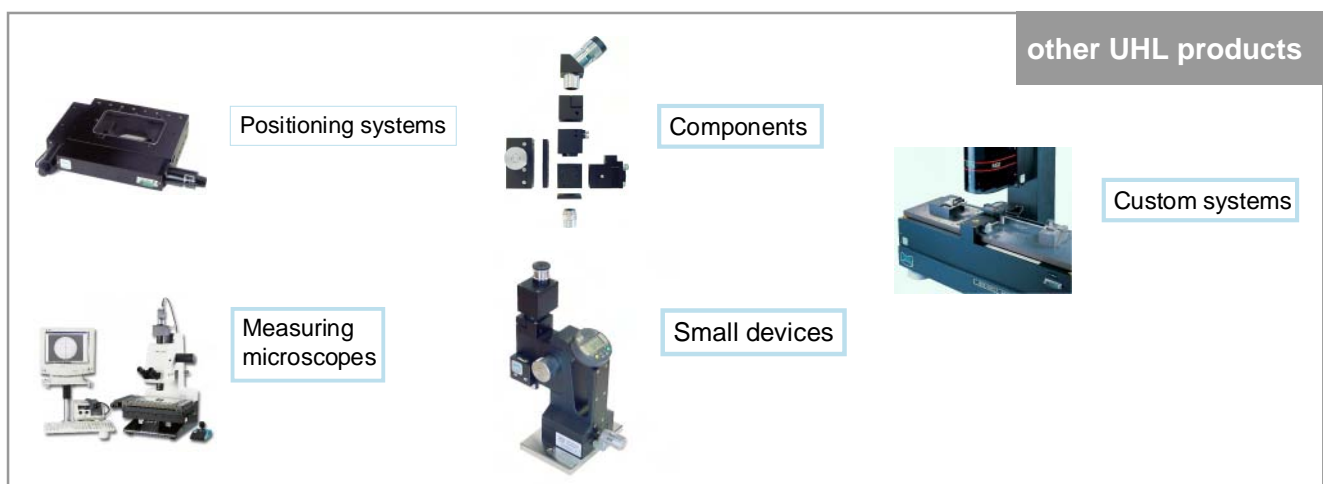
UHL - A traditional company of precision mechanic technology was founded by Oskar Uhl 1943. More than 90% in-house manufacturing ensures high quality and flexibility.

By the years we have increased our product range with positioning systems, complete micro assembly systems and measurement microscopes (manual up to fully automatic) with our own measuring software.

All systems are designed to fit in our component system. This component system is based on tube elements for microscopy applications. The standard size is 40 x 40 mm. In combination with linear-, X/Y- or rotary-stages we provide complete solutions for any technical application where highest precision is required.

After taking over the Leica VMM measuring microscope series in the year 2000, we spread out our product range with the Leica VMHT microhardness tester in 2006.

Together with worldwide representatives we provide service & support.



Specifications are about to change without notice!



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