

Leica VMHT

Microhardness Tester

Leica

Leica 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.

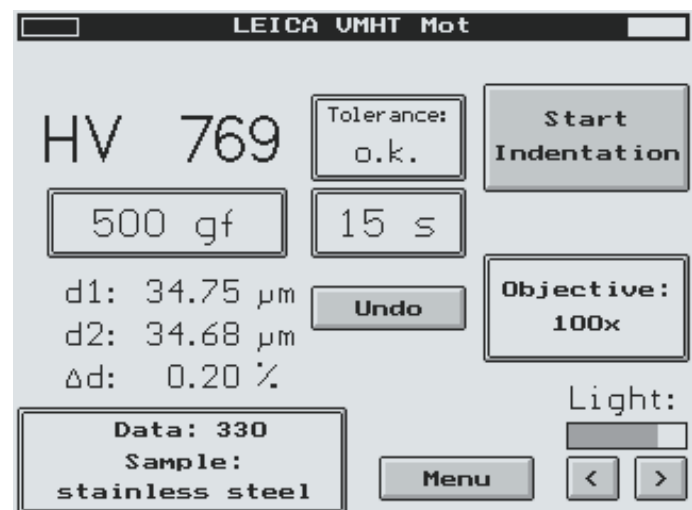
Printer/PC interfaces

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.

Leica VMHT – very impressive!

The new Standard in Microhardness Testing

The new Leica 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.



Leica VMHT/Leica Design by Werner Hölbl

Leica VMHT MOT





Leica

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 Leica VMHT AUTO brings its full capacity.

The operator just orientates the specimen on the motorized stage and defines the test parameters using the Leica Materials Workstation. 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 Leica Materials Workstation (working under the latest WINDOWS™ software) offers a simple working environment. The operator is able to recall previously defined measuring routines.

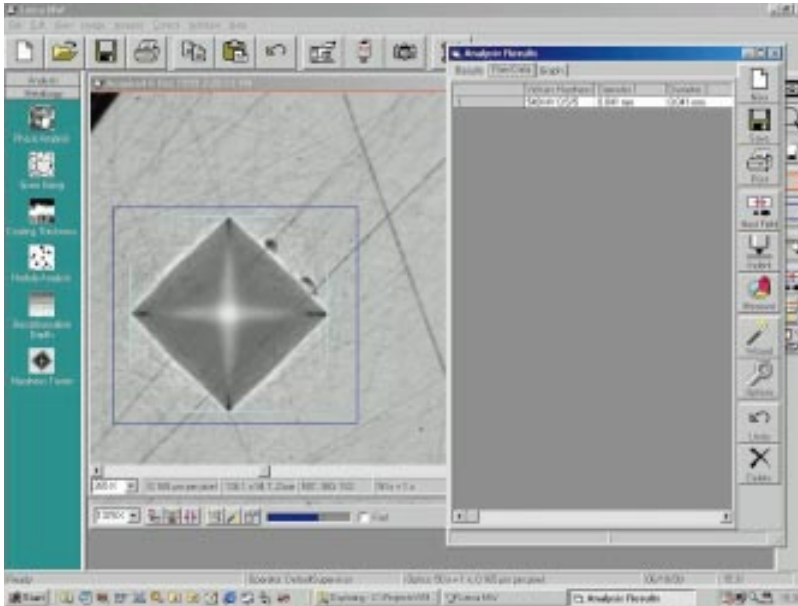
Configuration

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

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 Leica Materials Workstation.
- VMHT AUTO mot – is fully automated and has both motorized stage and focus control including Autofocus function.
A trackball servers for motion control of x/y and focus movement.

Just click!



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 track-ball 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 can be stored in a Microsoft™ Access database. From there the data can be exported to application programmes like Microsoft™ EXCEL. Reporting can be done by using Microsoft™ WORD.

Accuracy

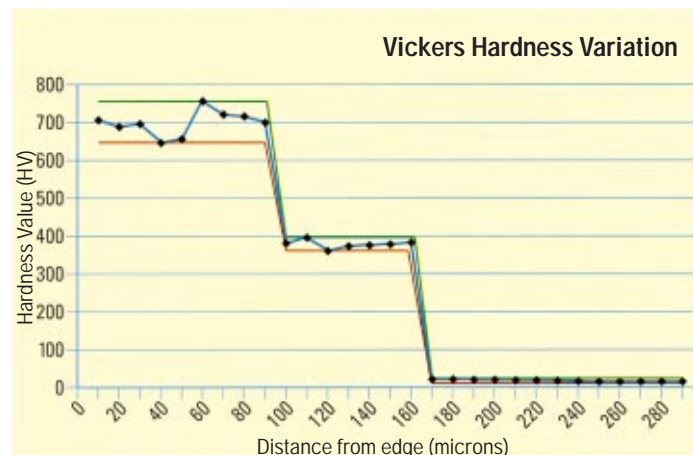
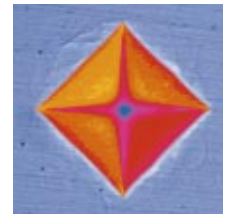
Since a personal judgment caused by the operator is totally eliminated, the imprints are measured permanently under reproducible conditions.

The high resolution TV camera and the stage increment below 1 µm guarantee highest measurement accuracy.

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

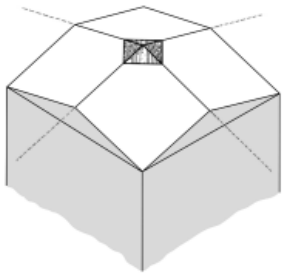
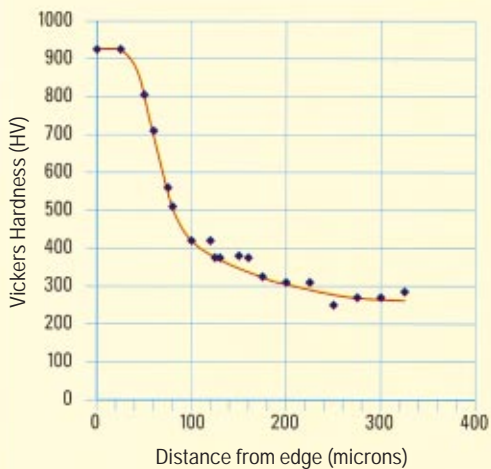
Change of Test Load

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

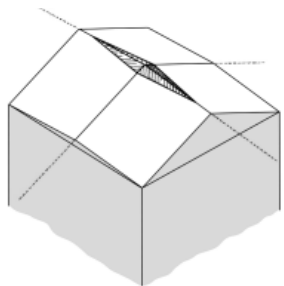


Applications

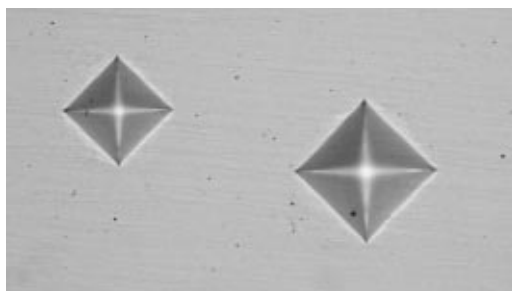
Variation of hardness
through a nitrided steel case



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

	VMHT	VMHT MOT	VMHT AUTO man	VMHT AUTO mot
Internationale standards	ASTM E-384/EN ISO 6507/1-3 EN ISO 4545; CE-approval			
Indenter	Vickers or Knoop (standard) – Brinell (optional)			
Test Force	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 display	via PC	
Optics	Filar measuring eyepiece, magnification 10x		Eyepiece, 10x	
	Field of view 16 mm			
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	Leica DC 100/200; TV adapter (C-mount)		Image analysis via TV and PC (WINDOWS-based)	
Measurement System	Electronic encoder		Semi-automatic: manual stage manual focus control	Fully automatic: motorized stage motorized focus control autofocus (TV-based)
Effective measurable length	800 µm (10x)/160 µm (50x)/80 µm (100x)			
Display resolution	0.1 µm	0.01 µm		
Specimen Stage				
Stage size	135 x 135 mm			
X/Y travel	25 x 25 mm			50 x 50 mm
Positioning increment	0.01 mm			< 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			
Data Display/Handling				
Data entering	via buttons	via touch screen display	via PC	
Data display	Diagonals d1/d2 (µm), hardness value HV/HK, test load (N/gf), dwell time (s), tolerance judgment			
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 (w x h x d)		with TV adapter: 392 x 550 x 533 mm (w x h x d)	
Weight	35 kg (without PC)			

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Leica, the leading brand for microscopes and scientific instruments, developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Yet Leica symbolizes innovation as well as tradition.

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Australia:	Gladesville	Tel. +61 2 9879 9700	Fax +61 2 9817 8358
Austria:	Vienna	Tel. +43 1 486 80 50 0	Fax +43 1 486 80 50 30
Canada:	Willowdale/Ontario	Tel. +1 416 497 2860	Fax +1 416 497 8516
Denmark:	Herlev	Tel. +45 4454 0101	Fax +45 4454 0111
France:	Rueil-Malmaison Cedex	Tel. +33 1 473 285 85	Fax +33 1 473 285 86
Germany:	Bensheim	Tel. +49 6251 136 0	Fax +49 6251 136 155
Italy:	Milan	Tel. +39 0257 486.1	Fax +39 0257 40 3273
Japan:	Tokyo	Tel. +81 3 5435 9600	Fax +81 3 5435 9618
Korea:	Seoul	Tel. +82 2 514 65 43	Fax +82 2 514 65 48
Netherlands:	Rijswijk	Tel. +31 70 4132 100	Fax +31 70 4132 109
Portugal:	Lisbon	Tel. +351 21 388 9112	Fax +351 21 385 4668
Republic of China:	Hong Kong	Tel. +852 2564 6699	Fax +852 2564 4163
Singapore:		Tel. +65 779 7823	Fax +65 773 0628
Spain:	Barcelona	Tel. +34 93 494 95 30	Fax +34 93 494 95 32
Sweden:	Sollentuna	Tel. +46 8 625 45 45	Fax +46 8 625 45 10
Switzerland:	Glattbrugg	Tel. +41 1 809 34 34	Fax +41 1 809 34 44
United Kingdom:	Milton Keynes	Tel. +44 1908 246 246	Fax +44 1908 609 992
USA:	Bannockburn/llinois	Tel. +1 847 405 0123	Fax +1 847 405 0030

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Leica Microsystems Wetzlar GmbH
Ernst-Leitz-Straße
D-35578 Wetzlar (Germany)

Tel. +49 (0) 64 41-29 0
Fax +49 (0) 64 41-29 25 99
www.leica-microsystems.com