echoLAB

Data Sheet

HTV 5D / HTV 10D / HTV 30D / HTV 50D V3.0

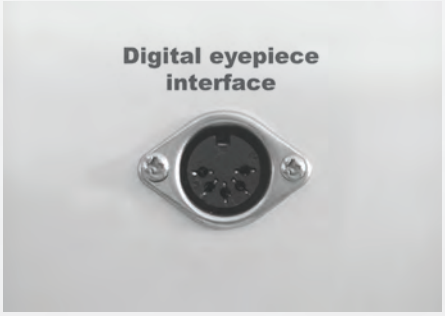
HTV 5D / HTV 10D / HTV 30D / HTV 50D V3.0

Automatic Vickers Hardness Tester

- Automatic Vickers Hardness Tester integrates mechanical displacement, electronic control, digital imaging, image analysis, computer processing. Automatic test table computer control, screen indentation display.
- Automatic reading, accurately measures the HV hardness, hardening depth, film thickness of metals and some non-metallic materials and various films.
- Sample surface morphology detection and rate printing.

Application

- Suitable for ferrous metal, non-ferrous metals, IC thin sections, coatings, ply-metals, glass, ceramics, agate, precious stones, thin plastic sections etc.

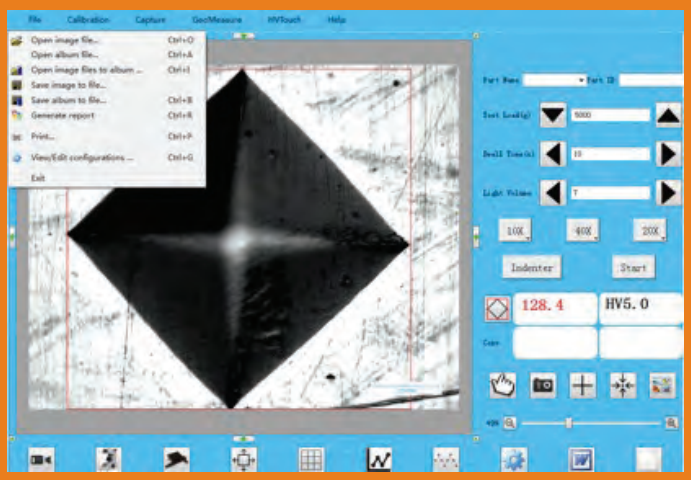


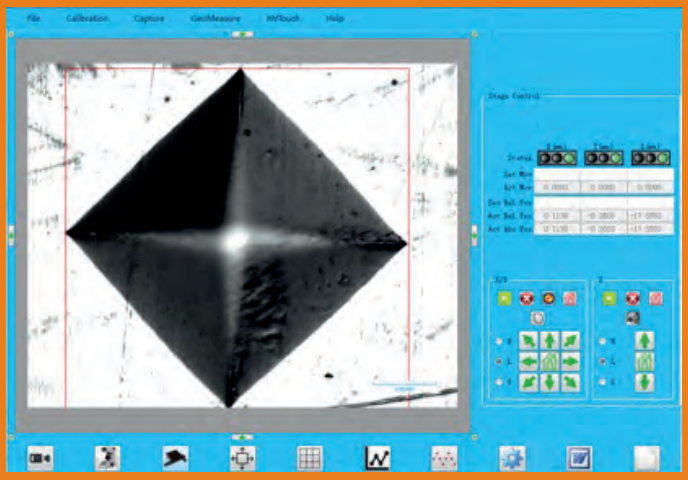
Reference standard

- ISO 6507, ASTM E92, JIS Z2244

Table 1

Standard hardness range	Displayed value repeatability %		
	HV5~HV100	HV0.2~ <HV5	>HV0.2
≤225HV	≤3	≤6	≤9
>225HV	≤2	≤4	≤5





Parameters:

- Operating system: WIN XP, WIN7
- Digital imaging system
- High resolution: 130 million pixel
- High speed acquisition: 1280x1024 resolution, 25 FPS
- High definition: Black and white images are clear and defined
- Target surface size: 1/2”

X-Y automatic test table

- Table size: 100x100x50 mm
- Maximum travel: 50x50 mm
- Minimum step: Less than 1μm
- Movement speed: Adjustable
- Control mode: Manual control, electric control, computer control

X-Y test table - computer control mode

- Location movement: Test table directly moves to the software input coordinates
- Point movement: Selecting a point on the sample, the table moves to place it below the indenter
- Directional movement: Click the eight directions to move the test table with setted up movements
- Arbitrary movement: Click any directions to move the test table with setted up movements for sample surface study
- Variable speed movement: Two speeds (fast and slow) test table moving, adjustable
- Other function: Original position arbitrary setting, automatic reset, mechanical limit, etc.

Table 2

Hardness	Displayed value tolerance %															
	Hardness HV															
	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1500
HV 0.01																
HV 0.015	10															
HV 0.02	8															
HV 0.025	8	10														
HV 0.05	6	8	9	10												
HV 0.1	5	6	7	8	8	9	10	10	11							
HV 0.2		4		6		8		9		10	11	11	12	12		
HV 0.3		4		5		6		7		8	9	10	10	11	11	
HV 0.5		3		5		5		6		6	7	7	8	8	9	11
HV 1		3		4		4		4		5	5	5	6	6	6	8
HV 2		3		3		3		4		4	4	4	4	5	5	6
HV 3		3		3		3		3		3	4	4	4	4	4	5
HV 5		3		3		3		3		3	3	3	3	3	4	4
HV 10		3		3		3		3		3	3	3	3	3	3	3
HV 20		3		3		3		3		3	3	3	3	3	3	3
HV 30		3		3		2		2		2	2	2	2	2	2	2
HV 50		3		3		2		2		2	2	2	2	2	2	2
HV 100				3		2		2		2	2	2	2	2	2	2

1) When the indentation diagonal length is less than 0.020 mm, the table does not display the value.
2) For intermediate values, the maximum allowable error can be obtained by interpolation.
3) About the Micro Hardness Tester value in the table is 0.001mm or indentation diagonal length of the average of 2% of the maximum permissible error given, please select the bigger.

Measuring method

- Automatic mode——Automatic test table moving (X and Y direction) + automatic
- Manual mode 1——Automatic loading + manual eyepiece scribed line measurement
- Manual mode 2——Manual test table moving + manual focus + Automatic / manual measurement

Automatic / manual reading

- Automatic reading time: Single indentation reading time is about 300 ms
- Automatic measurement precision: 0.1μm
- Automatic measurement repeatability: ±0.8%
- Manual reading: Manual pick, automatic search points, 4 points measurement, 2 diagonal measurement

Results save / output

- Save/output: measurement data and parameters, including D1, D2, HV, X, Y, etc.
- Save / output : effective hardening layer depth curve report, image.

Software function:

- System linkage: System - hardness tester linkage through communication interface.
- Pressure linkage: When converting test force, the system percepts the test force change and displays in real time.
- Turret linkage: Software shifting controls between objective and indenter without manual control.
- Loading linkage: Automatic loading control.
- Measuring linkage: The software controls the turret, and after loading,directly reading the Vickers hardness value.
- Light source linkage: Manual focus.
- Image acquisition: Real time indentation display, saving and printing.
- Automatic measurement: Automatically detect the four indentation vertices.
- Automatic point search: The system automatically finds the best vertices, greatly reduce the human error.
- Diagonal measurement: By just one mouse click on the top left and lower right corner of the indentation the hardness value will be displayed.
- Four point measurement: Selecting the four indentation points the hardness value will be displayed.
- Hardness conversion: According to international standard, automatically convert the hardness value between Brinell, Rockwell, Vickers and Knoop with real-time display.
- Graphic report: Automatic record of measurement data, automatic generation of hardness-depth curves, saving or printing reports generated as Word documents.
- Results statistics: Output the multiple measured indentation results in Excel format and automatically counts the measurement number, maximum value, minimum value, average value, variance, etc. of hardness.
- Automatic displacement: Equipped with high precision X-Y automatic test table.
- Automatic identification: Leading indentation automatic identification technology, read D1 / D2 and HV value in 0.3 seconds.
- Stable performance: The indentation of non mirror polishing, uneven light, not in the center can be read automatically.
- Powerful functions: Manual reading, automatic reading, hardness conversion, depth-hardness curve, indentation image, picture and text reports.
- Automatic scanning: Automatically scan the sample edge and shape.

Model	HTV 5D / HTV 10D / HTV 30D / HTV 50D V3.0
Test force control	Load cell closed loop - Load electronic controlled
Load selection	PC and control panel keyboard (in HV mode)
Main loads	HTV 5D V3.0: 0.3kgf, 0.5kgf, 1kgf, 2kgf, 2.5kgf, 3kgf, 5kgf HTV 10D V3.0: 0.3kgf, 0.5kgf, 1kgf, 2kgf, 2.5kgf, 3kgf, 5kgf, 10kgf HTV 30D V3.0: 0.5kgf, 1kgf, 2kgf, 2.5kgf, 3kgf, 5kgf, 10kgf, 20kgf, 30kgf HTV 50D V3.0: 1kgf, 2kgf, 2.5kgf, 3kgf, 5kgf, 10kgf, 20kgf, 30kgf, 50kgf
dwell time	0~60s
Loading time	0.3kgf~5kgf: 8s, 10kgf~50kgf: 10s
Load applying speed (indenter descending speed)	0.04mm/s
Test force tolerance	±1%
Test cycle type	Fully-automatic type: focus, load, dwell, unload, show of the hardness value
Hardness scales	HTV 5D V3.0: HV0.3, HV0.5, HV1, HV2, HV2.5, HV3, HV5 HTV 10D V3.0: HV0.3, HV0.5, HV1, HV2, HV2.5, HV3, HV5, HV10 HTV 30D V3.0: HV0.5, HV1, HV2, HV2.5, HV3, HV5, HV10, HV20, HV30 HTV 50D V3.0: HV1, HV2, HV2.5, HV3, HV5, HV10, HV20, HV30, HV50
Hardness test range	1HV~2967HV
Hardness resolution	0.1HV
Repeatability hef/%	Table 1
Scale conversion	HK, HRA, HRB, HRC, HRD, HRE, HRF, HRG, HRK, HR15N, HR30N, HR45N, HR15T, HR30T, HR45T, HS, HBW - According to ASTM E140
Turret type	Automatic
CCD camera pixel	1.30 Million
Eyepiece microscope	10x
Objectives	HTV 5D V3.0: 20x, 40x HTV 10D V3.0: 10x, 40x HTV 30D V3.0: 10x, 20x HTV 50D V3.0: 10x, 20x
Optical path	2 ways eyepiece
Optical function	Optical diaphram / field aperture / color filter
Microscope min. measuring unit	HTV 5D V3.0: 0.125μm (20x objective), 0.0625μm (40x objective) HTV 10D V3.0: 0.25μm (10x objective), 0.0625μm (40x objective) HTV 30D V3.0: 0.25μm (10x objective), 0.125μm (20x objective) HTV 50D V3.0: 0.25μm (10x objective), 0.125μm (20x objective)
Microscope max. measurement length	HTV 5D V3.0: 400μm (20x objective), 200μm (40x objective) HTV 10D V3.0: 800μm (10x objective), 200μm (40x objective) HTV 30D V3.0: 800μm (10x objective), 400μm (20x objective) HTV 50D V3.0: 800μm (10x objective), 400μm (20x objective)
CCD min. measuring unit	HTV 5D V3.0: 0.05μm (20x objective), 0.025μm (40x objective) HTV 10D V3.0: 0.1μm (10x objective), 0.025μm (40x objective) HTV 30D V3.0: 0.1μm (10x objective), 0.05μm (20x objective) HTV 50D V3.0: 0.1μm (10x objective), 0.05μm (20x objective)

Model	HTV 5D / HTV 10D / HTV 30D / HTV 50D V3.0
CCD max. measurement length	HTV 5D V3.0: 340µm (20x objective), 170µm (40x objective) HTV 10D V3.0: 680µm (10x objective), 170µm (40x objective) HTV 30D V3.0: 680µm (10x objective), 340µm (20x objective) HTV 50D V3.0: 680µm (10x objective), 340µm (10x objective)
Measurable min. indent/ indentation	10µm
Illumination	Halogen lamp
Auto-focus time	3s
Indenters	Diamond Vickers indenter
N. of indenters	1
Nose cone support diameter	6.35mm
Indent measure algorithms	Automatic
Auto reading time	0.3 sec/1 indent
Specimen detection	Yes
Movement program patterns	Zigzag, circle, arc, straight line, random, teaching etc.
Vertical test capacity	170mm
Horizontal test capacity	130mm
Anvils dimensions	Motorized cross test table, size: 110x110mm
Max. weight on anvil	50kg
X-Y travel	50x50mm
X axis speed	High: 1mm/s, low: 0.25mm/s
X axis resolution	0.002mm
Y axis speed	High: 1mm/s, low: 0.25mm/s
Y axis resolution	0.002mm
Z axis movement	Motorized
Z axis resolution	0.00125mm
Z axis speed	High: 1mm/s, low: 0.0625mm/s
Display type	LCD
Display dimensions	4.3”
Input mode	PC and control panel keyboard (in HV mode)
Displayed data	Hardness value, D1, D2, dwell time, test number, conversion scale, test force, date and time, indentation, objective
Statistics or functions	Max, min, average value, report, hardness curve
Data storage	Temporary session memory: 96 tests (only tester) - PC storage (500GB)
Data output	Word, Excel format
Energy saving mode	Yes
Printer	Built-in printer | External ink jet printer
Interfaces	Machine body: 1x RS232, 1x Z interface (15 pin RS232) Control box: 1x USB, 1x XY interface, 1x RS232, 1x Z interface
Safety devices	Emergency switch
Operation temperature	23±5 °C
Operation rel. humidity	≤65%
Weight	35kg
Dimensions	530x280x630mm
Power supply	230V, 50Hz
Voltage variance	±10%
Absorbed power	500W

Standard accessories

Model	Description	Q.ty
VT-DE10x	10x digital measuring eyepiece	1 pc
VT-10XOB	10x objective (HTV 10D V3.0, HTV 30D V3.0, HTV 50D V3.0)	1 pc
VT-20XOB	20x objective (HTV 5D V3.0, HTV 30D V3.0, HTV 50D V3.0)	1 pc
VT-40XOB	40x objective (HTV 5D V3.0, HTV 10D V3.0)	1 pc
VI-136	Diamond Vickers indenter	1 pc
VT-MCTT110	Motorized cross test table 110x110mm	1 pc
HB-700800HV30	Hardness block 700-800 HV30 (HTV 30D V2.0,HTV 50D V2.0)	1 pc
HB-700800HV10	Hardness block 700-800 HV10 (HTV 10D V2.0)	1 pc
HB-400500HV5	Hardness block 400-500 HV5 (HTV 5D V2.0, HTV 30D V2.0, HTV 50D V2.0)	1 pc
HB-700800HV1	Hardness block 700-800 HV1 (HTV 5D V2.0, HTV 10D V2.0)	1 pc
VT-CCDC	CCD camera	1 set
VT-1.5XAD	1.5x adapter	1 pc
VT-JSKAX	Joystick	1 pcs
VT-MTTCB	Motorized test table control box	1 pc
VT-CNCBS	Control cables	1 pc
VT-SDUSB	USB softdog	1 pc
VT- MEASOFT	Measuring software	1 pc
VT-PCMP	Computer (Hard disk: 500Gb, memory: 2G, 19” LCD screen)	1 set
VT-PRNT	Ink jet printer	1 set
VT-RS232CBL	RS232 cable	1 pc
VT-HL1520	Halogen lamp 12V, 15-20w	1 pc
VT-4RS	Horizontal regulating screw	4 pcs
VT-LV	Spirit level	1 pc
VT-PC	Power cable	1 pc
VT-SK	Service keys	1 set
VT-ADC	Anti-dust cover	1 pc

Optional accessories

Model	Description
VT-CTT100100	Cross test table 100x100mm
VT-DCTT100100	Digital cross test table 120x120mm
VT-FLCTT7680	Flat clamping test table 76x80mm
VT-TSTT76	Thin specimen test table ø 76mm
VT-FICTT60	Filament clamping test table ø 60mm
VT-LTT108	Large plane test table ø 108mm
VT-VTT40	V-shaped test table ø 40mm
VT-WB	Work bench
VT-APP	Additional printer paper roll

Vickers hardness blocks

Model	Range
HB-V0.3/200-750	200-750 HV0.3 (HTV 5D V30, HTV 10D V3.0)
HB-V0.5/200-750	200-750 HV0.5 (HTV 5D V3.0, HTV 10D V3.0, HTV 30D V3.0)
HB-V1/200-750	200-750 HV1
HB-V2/175-750	175-750 HV2
HB-V3/175-750	175-750 HV3
HB-V5/175-750	175-750 HV5
HB-V10/175-750	175-750 HV10 (HTV 10D V3.0, HTV 30D V3.0, HTV 50D V3.0)
HB-V20/175-750	175-750 HV20 (HTV 30D V3.0, HTV 50D V3.0)
HB-V30/175-750	175-750 HV30 (HTV 30D V3.0, HTV 50D V3.0)
HB-V50/175-750	175-750 HV50 (HTV 50D V3.0)

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