Vision Vickers Hardness Tester
VH-10 Series
Operation Manual

Sinowon Innovation Metrology Manufacture Limited

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Preface

1. Carefully read the Operation Manual before you use the hardness tester and get to know thoroughly the operation procedure and the usage precautions so as to avoid the damages to the hardness tester and the safety accidents caused by the improper operation.

2. All the bands and the anti-shock tapes should be carefully removed before the hardness tester is installed and calibrated.

3. The single-phase 3-pin socket should be used for the power source of the hardness tester and the ground connecting cable should meet the safety requirements.

4. It is strictly prohibited to tamper with the installed position of all the electric component parts, switches, and sockets of the hardness tester without permission, otherwise it will cause accident.

5. Our company tries to improve the quality of the hardness testers and renew their structure. In case the contents in the Operation MANUAL are a bit different with the actual structure of the instrument, it is hoped and apologized for the fact that the further notice will not be given.

Contents

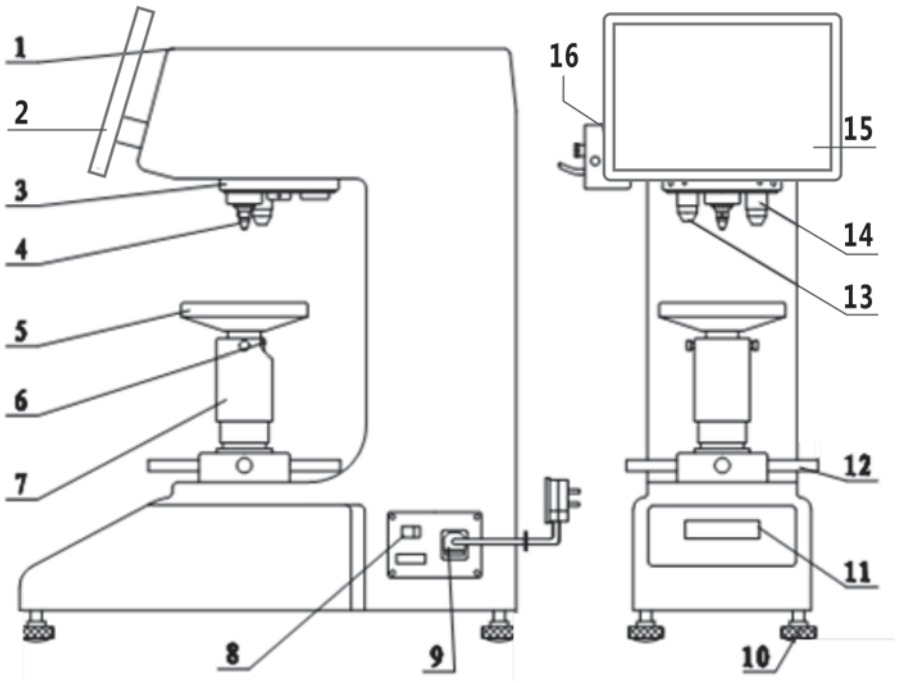
1 Hardness Introduction

- Vickers Hardness Tester is a new and high-tech product combining the optical, mechanical and electronic techniques, with a good aesthetic aspect, operational functions and reliability, and hence it is an ideal instrument for the testing of Vickers hardness.
- Close-loop control: Equips with close-loop loading sensor, ensure loading force more precision.
- Button input for operation panel:
  1) Automatic switch the indenter and objective lens;
  2) Freely choose testing force ;
  3) Preset test force holding time;
  4) The adjustment of enhancement (weaken) Measuring Light Source.
- The hardness tester is applicable to measure small, thin specimen, surface infiltration, plating parts after. Can also be used for determination of agate, Vickers hardness brittle materials, is the scientific research units, universities, enterprises and production testing agencies for the ideal hardness testing instrument research and testing.
- The hardness tester can also configure the CCD device according to the user's special requirements.
- VicVsion is an all-in-one Vickers hardness meter intelligent instrument, using visual sub-pixel measurement technology, software automatic measurement of the indentation, automatic measurement and measurement report. The output histogram eliminates the pointing error, artificial measurement of indentation reading error, the look-up table error and error measurement records, improve work efficiency, reduce labor intensity operator.
- Mainly used for hardness testing and scientific research of metal materials.
- VicVison can test from very soft material (a few HV) to very hard material (3000HV).

2 Technical Specification

Product Name		Vision Vicker Hardness Tester		
Product Model		VH-10	VH -30	VH -50
Product Code#		821-210V	821-220V	821-230V
Test Force	Kgf	0.3、0.5、1、2、2.5、3、5、10	0.5、1、2、2.5、3、5、10、20、30	1、2、2.5、3、5、10、20、30、50
	N	2.94、4.9、9.8、19.6、24.5、29.4、49.0、98.0	4.9、9.8、19.6、24.5、29.4、49.0、98.0、196、294	9.8、19.6、24.5、29.4、49.0、98.0、196、294、490
Optical System		Observe and Measure Objectives：10x/40x	Observe and Measure Objectives：10x/20x	Observe and Measure Objectives：10x/20x
Test Range		1HV-2967HV		
Turret		Auto Rotating Turret		
Loading Control		Auto loading dwell and unloading		
Dwell Time		5-60s adjustable		
Illumination		LED / Halogen adjustable		
Measuring System		iVicky 3.0 Auto Measuring Vickers System		
PC System	Operation System	Win10		
	Screen size	10.6"		
	CPU	Intel I3		
	USB	Double USB (could insert USB and soft dog)		
	RAM	2GB		
	Hard Disc	32GB		
	Camera	1.3MP Pixel, 1/2" CMOS Color Camera		
Max Height of Specimen		170mm		
Instrument Throat		130m		
Power Supply		AC220V/50Hz; AC110V/60Hz		
Dimension		530x225x630mm		
Packing Dimension		630x460x710mm		
Gross /Net Weight		77Kg/56Kg		
Execution Standard		ISO6507，ASTM E92，JIS Z2244，GB/T4340		

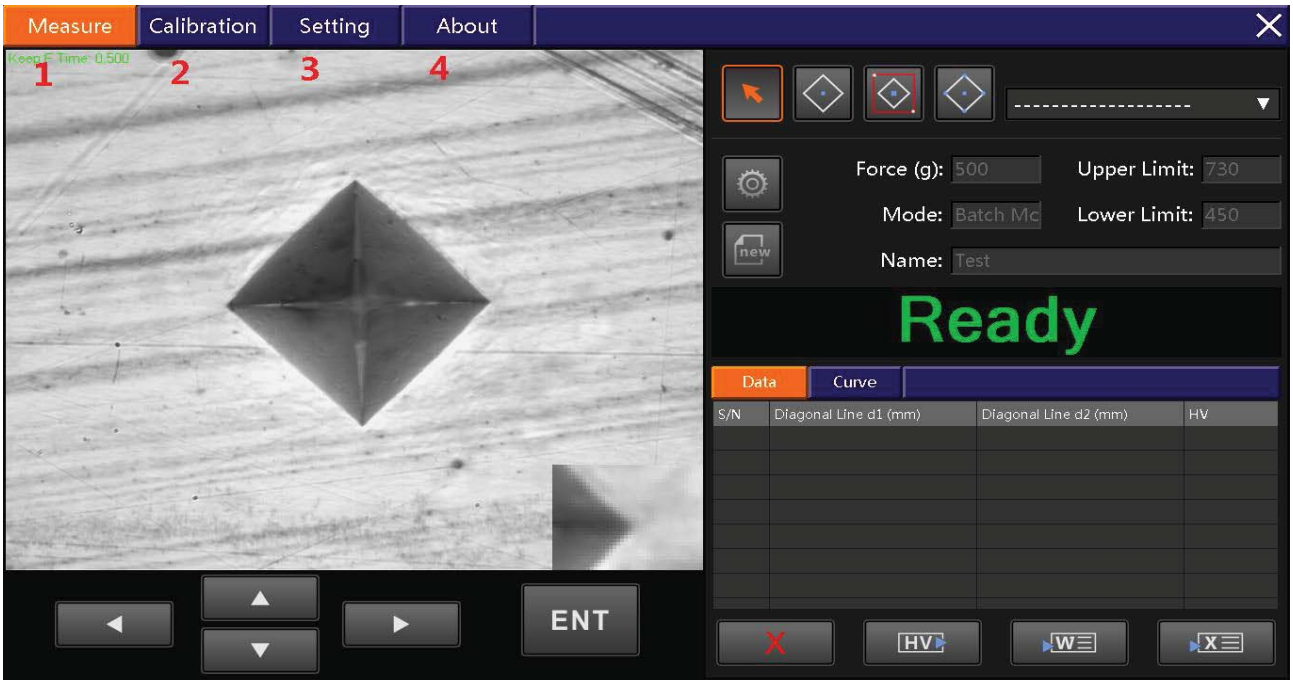
3 Structure



1. Up Cover	2. Display Panel	3. Turret	4. Indenter
5. Working Table	6. Screw	7. Up and Down Lead Screw	8. Power Switch
9.Fuse and Power cable	10. Regulating Screws	11. Operating Panel	12. Hand Wheel
13. Observation Objective	14. Measuring Objective	15. Screen	16. Measuring Source

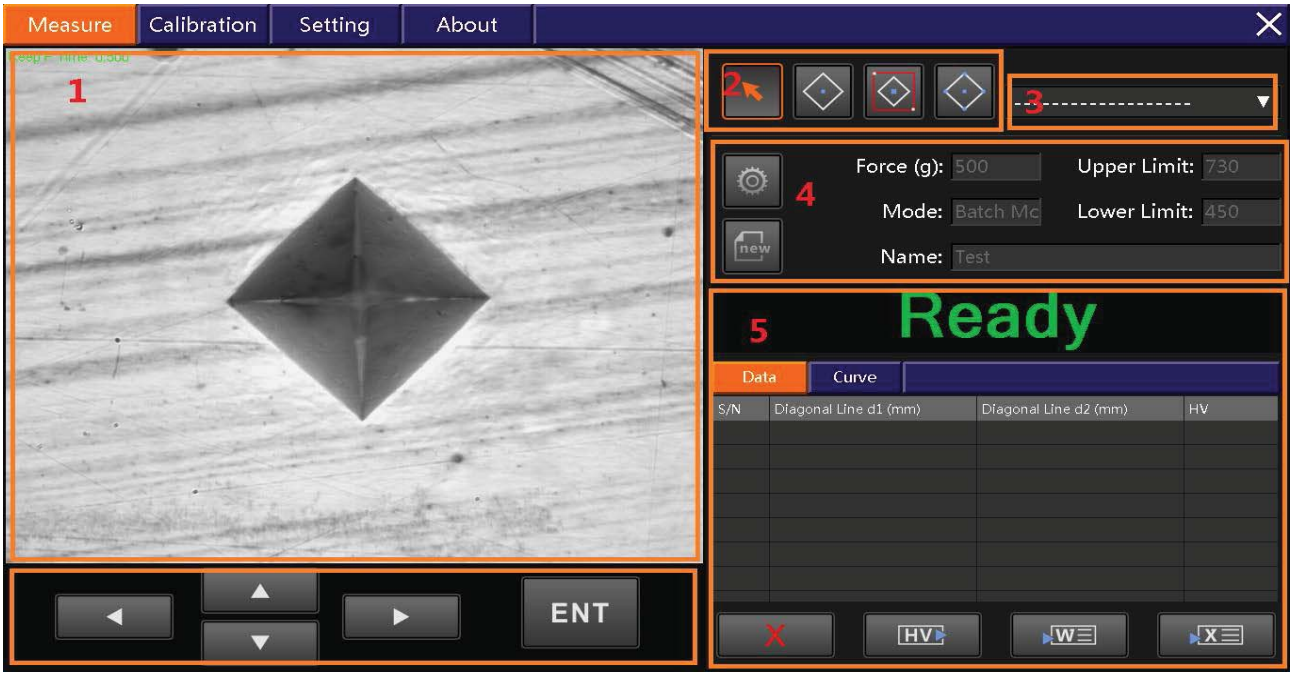
4 Operation

4.1 Main Menu：Measure Page;Calibration Page; Setting Page; About Page.



4.1.1The Ivicky3.0 Measure Menu is realized the testing of Vickers Hardness, setting the measure parameter, display the test data and output the result of testing.

Including Six Region: 1. Video; 2.Measuring Instrument; 3.Calibration; 4.Setting and display the parameter of measure; 5. Display testing result and output; 6.Operating Measure.



4.1.1.1 **Video Display**：Display the real-time image of indentation, It is capable of setting point and testing on the region and confirmation the result of measurement.

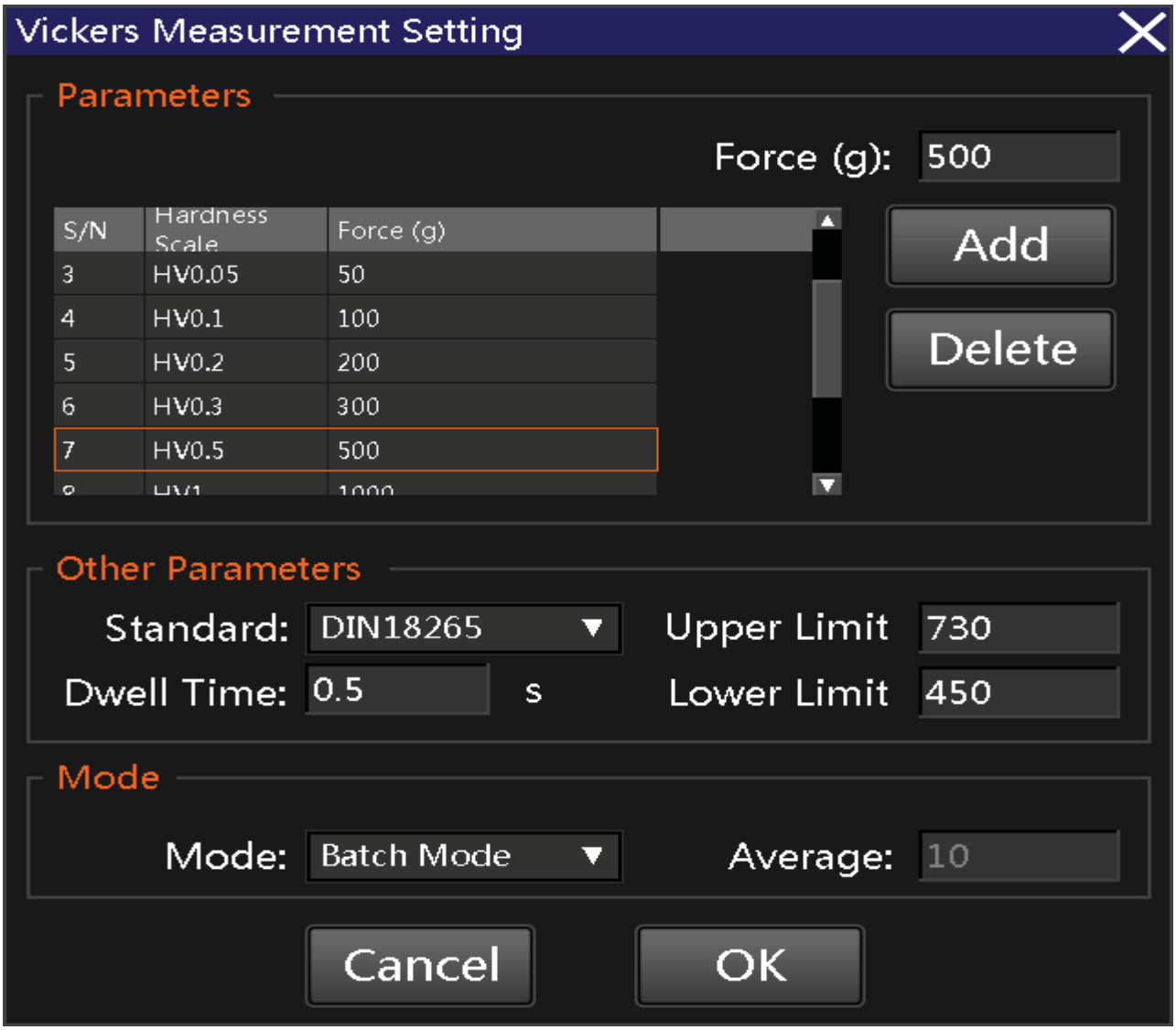
4.1.1.2 **Measure Instrument** :

- **Auto measure diamond:** Click "ENT", the system could automatic find the four point of diamond shape and measurement.
- **Frame select diamond:** During the video region select diamond shape then click "ENT", the system could auto finding the four point of diamond shape and measurement.
- **Select four point measure diamond:** During the video region, click the four point of diamond shape then please click "ENT", confirm measure diamond shape.

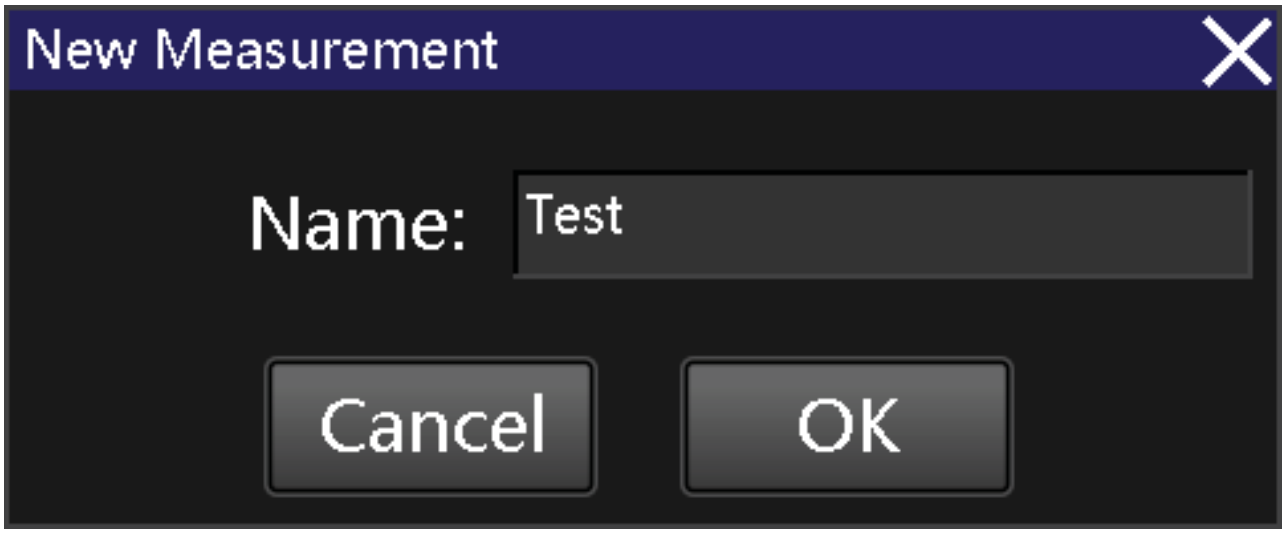
4.1.1.3 **Calibration Option**：Option different magnification calibration (this magnification have been calibrated).

4.1.1.4 Vickers Measurement Setting: Including setting parameter and building new measure.

1）Setting Parameters：Please click "  " as follow include Indentation Force, Conversion Standard, Dwell Time, Upper Limit, Lower Limit, Mode, Average.

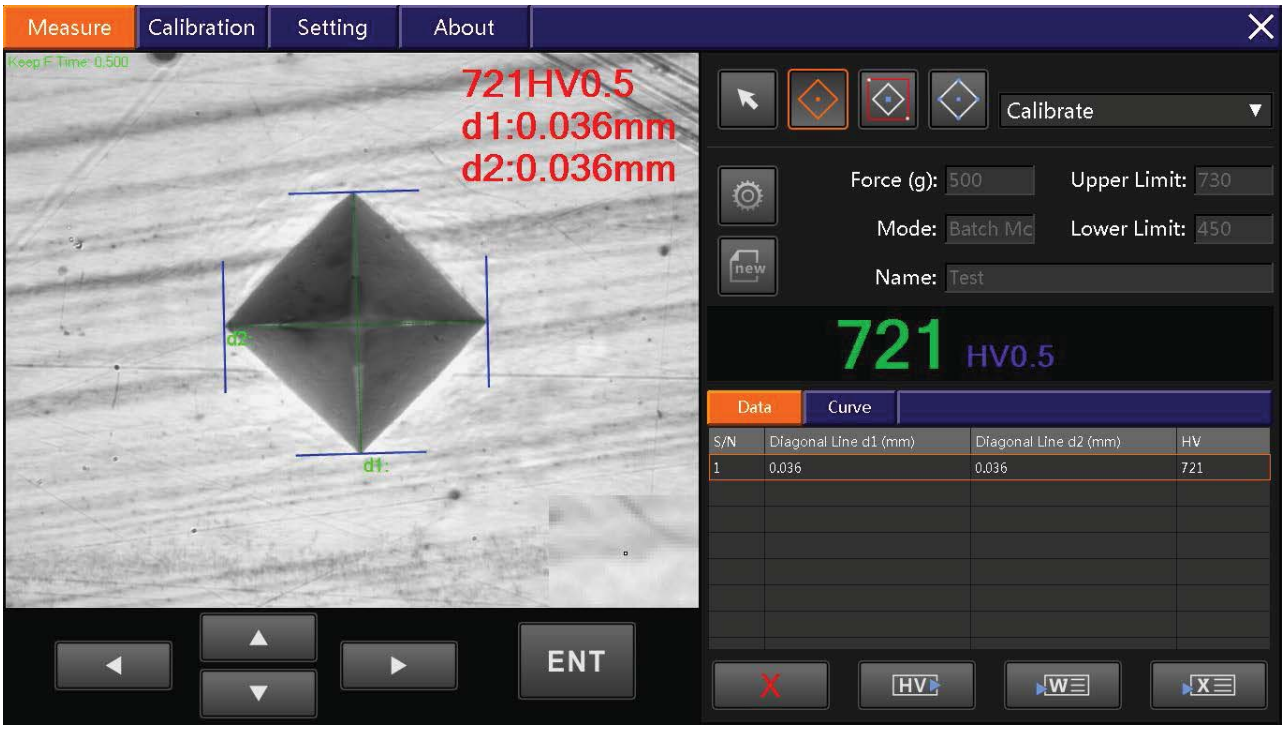


2）New Measurement：Click New Measurement as follow：



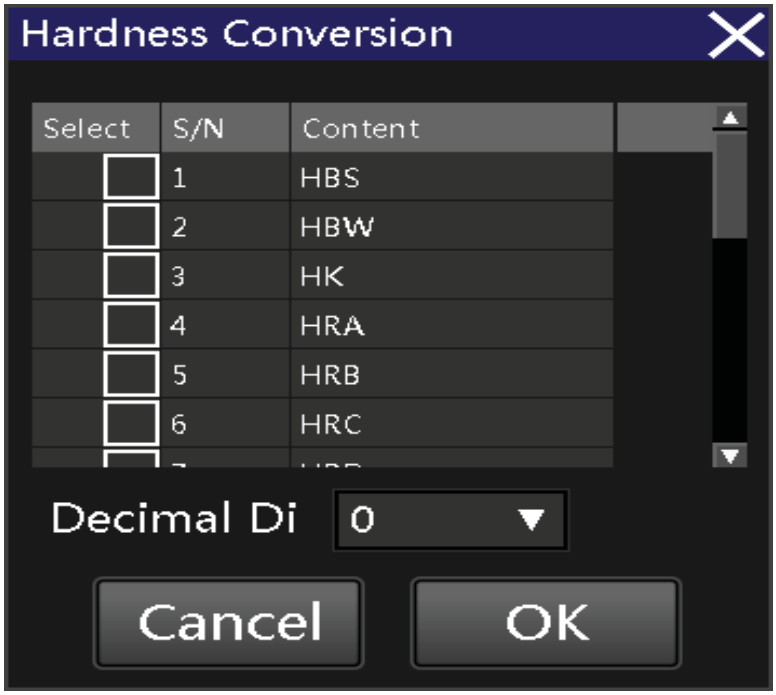
输入测量名称，按“确定”按钮后，会新建一个测量，前面的测量数据将会被删除。

4.1.1.5 Display Measure Result and Output



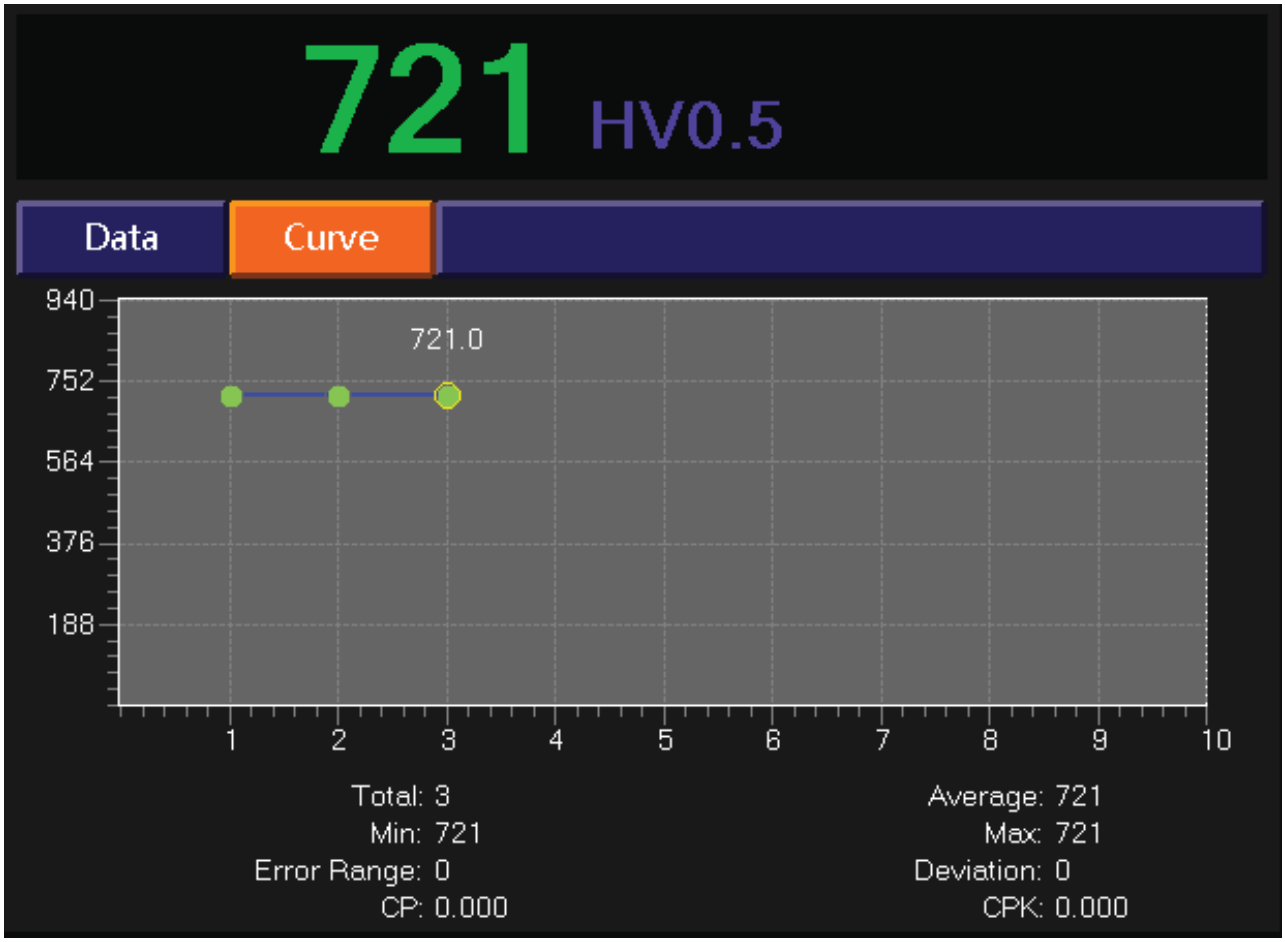
4.1.2.1 Delete：Delete last record.

4.1.2.2 Hardness Conversion：Click Hardness Conversion as follow (contain 17 Hardness Content):



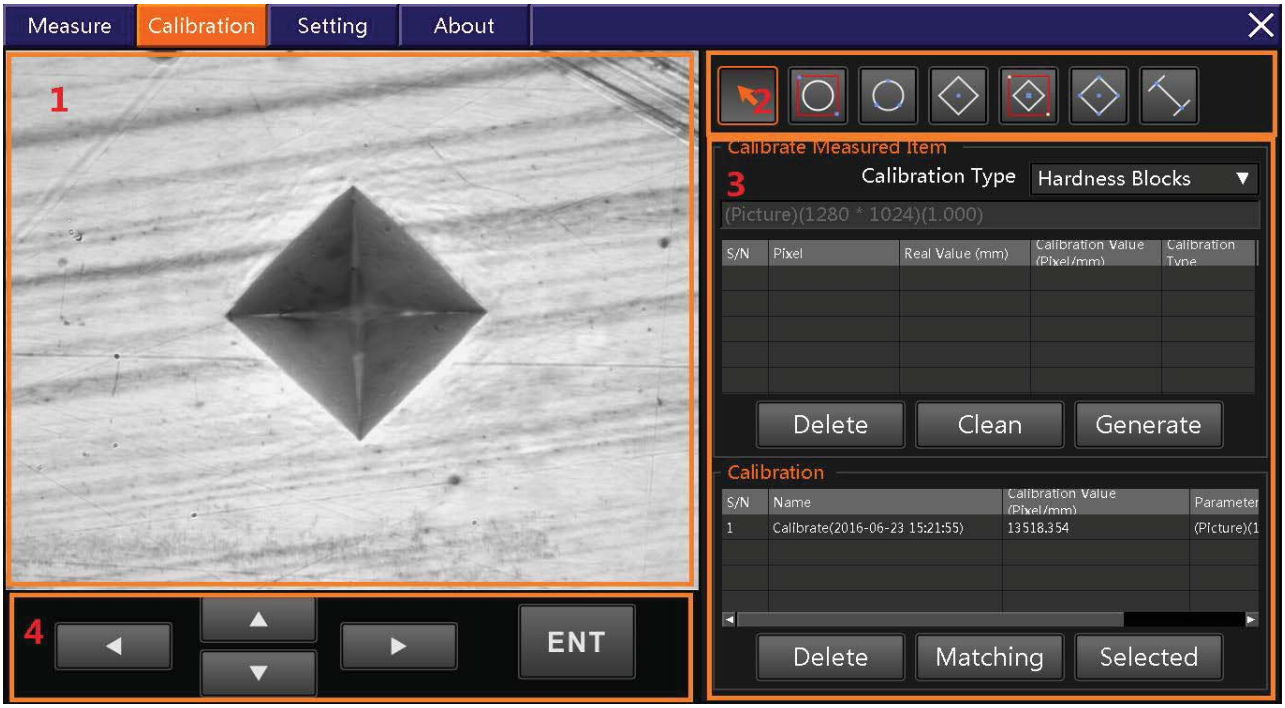
4.1.2.3 Output Word and Excel Data.

4.1.2.4 HV Curve is display the measurement result by curve, include CPK and Error range CP etc. as follow.



4.1.2.5 Operation Menu：This region main measure, UP and Down, Lift and Right could control the measure points, ENT mean confirmation measurement.

4.1.3 Calibration Page : This menu mean calibrate the different magnification.(It is important to make sure calibration accuracy). 1.Video; 2.Testing instrument;3. Calibration operate 4. Measure operate.



4.1.3.1 Video Display：Display the real-time image of indentation, It is capable of setting point and testing on the region and confirmation the result of measurement.

4.1.3.2 **Measure Instrument**

1) Select measurement roundness: during the video display region please select circular and click the right. Then measure circular diameter.

2) Three point drawing circular: click three point and click right .

3) Auto measure diamond: Click “ENT”, the system could automatic find the four point of diamond shape and measurement.

4) Frame select diamond: During the video region select diamond shape then click “ENT”, the system could auto finding the four point of diamond shape and measurement.

5) Select four point measure diamond: During the video region, click the four point of diamond shape then please click “ENT”, confirm measure diamond shape.

4.1.3.3 Calibration Operate

1) Calibration Method: By calibration screen and HB block.

2) Calibration Item: One testing data one item.

3) How to creative calibration: By testing item and AVG.

4) Calibration: a camera and a magnification correspond a calibration record.

5) Automatic Calibrate and Manual Motive Calibrate.

4.1.3.4 Operation Menu :This region main measure, UP and Down, Lift and Right could control the measure points, ENT mean confirmation measurement.

4.1.4 Setting Page：System Setting; Camera Setting; Drewing Setting

4.1.4.1System Setting：

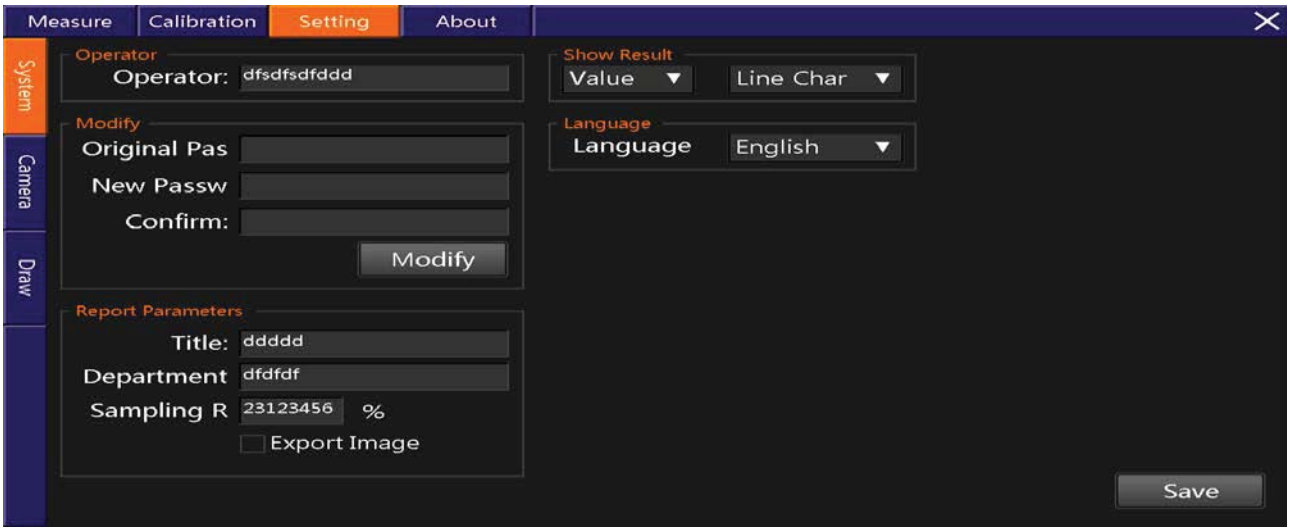
1) Operator Name Setting: Using operator name is ok.

2) Passport Setting: some important authority need set passport.

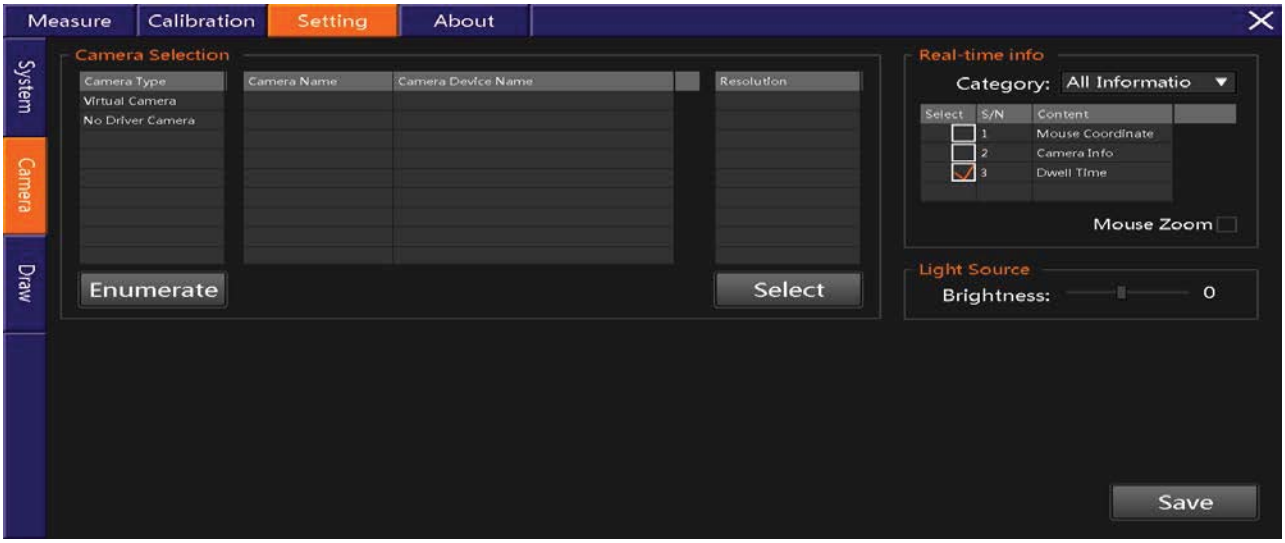
3) Report Parameters Setting: setting some data you want to output.

4) Show Result: Bar graphic and curve graphic.

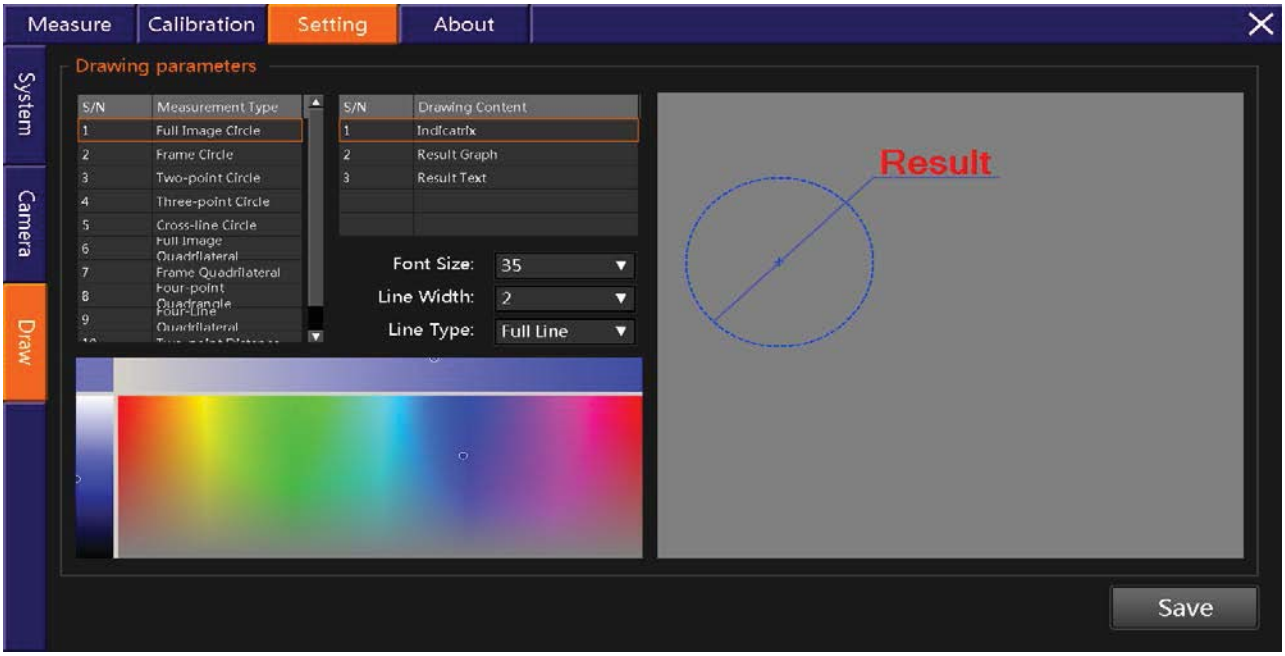
5) Language: Chinese and English.



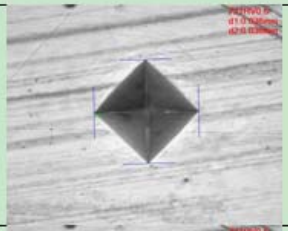
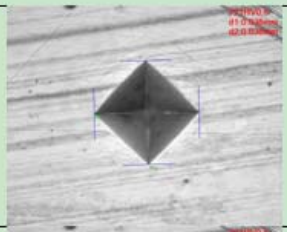
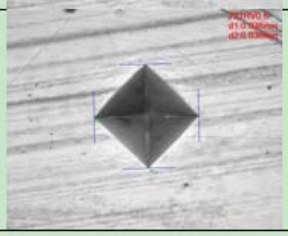
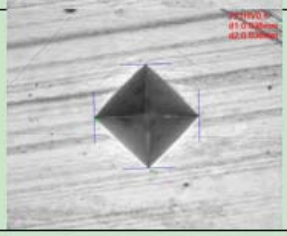
4.1.4.2 Camera Setting：Contain Settings : Camera Type; Virtual Camera; Real-time information; Light Source.



4.1.4.3 Drew Setting：Include Font Size, Line Width, Line Type as follow:



4.1.5 Output Data：

	A	B	C	D	E	F	G	H	I	J
1										
2	Vickers Hardness Measurement Report									
3	Department:	DepartmentA			Date:	2016-06-23		Operator:	OperatorA	
4	Specimen:	Test			Quantity:	4		Sampling Rate:	100%	
5	Parameters:	Force (gf)	Lower Limit	Upper Limit	Dwell Time	K=0.102F/D2		Standard		
6		500	450	730	0.5s			DIN18265		
7										
8	S/N	Diagonal Line d1 (mm)	Diagonal Line d2 (mm)	HV	--	--	--	--	MPa	NG/Pass
9	1	0.036	0.036	721						Pass
10	2	0.036	0.036	721						Pass
11	3	0.036	0.036	721						Pass
12	4	0.036	0.036	721						Pass
13										
14	1				2					
15										
16										
17										
18										
19										
20										
21										
22	3				4					
23										
24										
25										
26										
27										
28										
29										
30										
31	Total	Average	Min	Max	Error Range	Deviation	CP	CPK		
32	4	721	721	721	0	0	0	0		
33										
34										

5 Installation

5.1 Working Condition

5.1.1Room temperature within (23±5)℃;
5.1.2Installed in a horizontal position on a solid basement;
5.1.3In an environment without any shock or vibration;
5.1.4In a surrounding without any corroding agent;
5.1.5Relative room humidity inferior to 65%.

5.2Unpacking and Installation

5.2.1Cut the packing belt ; take out the anti-shock cushion from the instrument and then take out the instrument and the accessories kit out of the packing box;
5.2.2Place the instrument on the prepared solid working table ;(for the construction of the table ,see Fig 2)

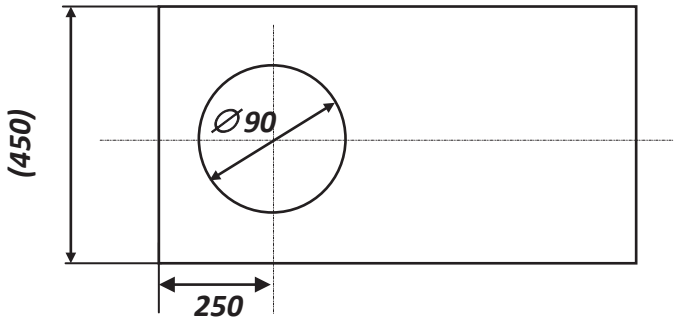
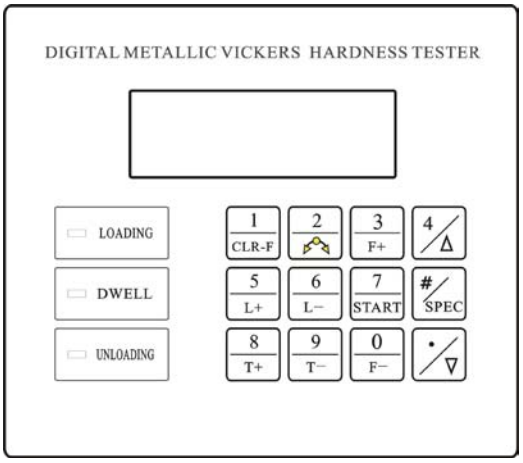


Fig 2

5.2.3Take out the 4 horizontal regulation screws out of the accessories kit and screw them in the holes on the base panel of the instrument ;
5.2.4Unpack the gauze band wrapped on the vertically-moved filament pole, which should be wrapped with some light lubrication oil when the pole is dry;
5.2.5Rotate the protection cover to make the indenter face the front direction and then tear lightly the anti-shock sticking paper on the indenter with both the hands .Clean the indenter lightly with the lens-cleaning paper dipped with some ether;(just move the lens-cleaning paper on the indenter several times by holding the paper on both ends with hands);
5.2.6Open the upper cover and screw off the two screws on the weight lever and the lever;(see Fig 2)

6 Key Functions



Fig

1
CLR-F

Up Shift：Numbers
Down Shift :Zero Setting ;Click it, the test force will be setting Zero.

2

Up Shift: Numbers
Down Shift: Press this key to switch between the objective lens and the indenter.

3
F+

0
F -

Up Shift:Numbers.
Down Shift:Increment (or decrease) of the test force. Each press, the test force increases (or decreases) a file.

5
L+

6
L -

Up Shift:Numbers.
Down Shift:The key of enhancement (weaken) eyepiece light source brightness.

3
T+

0
T -

Up Shift:Numbers.
Down Shift:Load time increment (or decrease) key. Each press increments (or decrements) for 5 seconds.

4

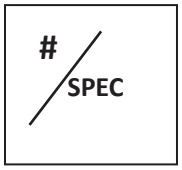
Up Shift:Numbers.
Down Shift:Click <SPEC>, then click this button again and it shows the Up Shift is effect, the cursor will glint.

•

Up Shift:Decimal point.
Down Shift:Click <**SPEC>**, then click this button again and it shows the Up Shift is effect, the cursor will disappear.

7
START

Up Shift:Numbers.
Down Shift: Start，Press this button motor rotation, it will increase the test force.

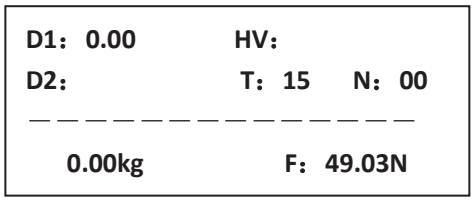


Second confirmation key: The first measurement of the indentation of the diagonal value of the input D1, press the second after the confirmation, the same method input D2, and then press the second confirmation after the key, the screen shows the hardness value (HV)

Special Function Keys: Press this key, then press the <△> key to indicate that the up digit key is active and the cursor is flashing. If you press the <▽> key to indicate that the lower key is active, the cursor disappears.

7 How to Test

□ The power cord is connected with the durometer, and the power switch is turned on so that the measuring light source and the display screen are on at the same time. The indenter and the objective lens will automatically rotate and the objective lens will be turned to the front working position (the objective lens and the specimen are in the focused state). The display shows as follows:



- D1/D2： Diagonal Line Length；HV：Vickers Hardness Value；T：Loading Time；N：Test Number；F：Select the test force(N)
- The selection of Test Force:

□ The Down Shift on the panel is valid when switching on.

□ According to the <F> or <F> button, select the test force (98.07N)

- The selection of micro-light source
- Press the <L+> or <L-> key to select the light and dark of the light source
- The selection of Test Force Dwell Time

□ Press the <T+> or <T-> key to modify the dwell time of the test force

8 Light Source Adjustment

- Turn on the power switch of the hardness tester and observe the light source of the eyepiece.
- Fasten the Screw Two in clockwise direction to make the light beam in the vision field equality. (You can loosen the Screw Three and then fasten the Screw Two if it is necessary.)
- Loosen the Screw One and move it up and down.

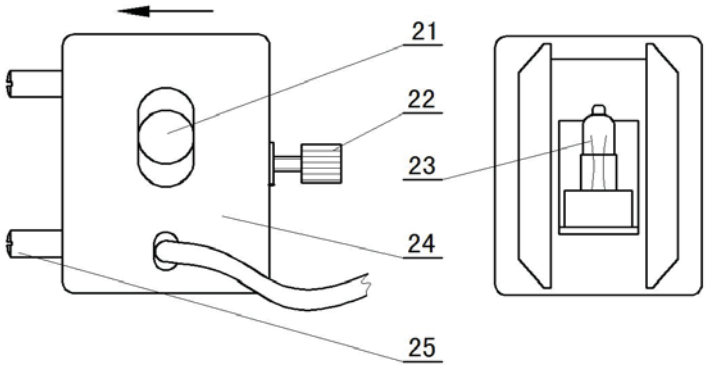


Fig 6

21.Screw one 22.Screw two 23.Halogen lamp 24.Back cover 25.Screw three

1) Lamp replacement

□ New lamp (a halogen lamp, 12V, 15~20W)

□ Dry and soft cloth

2) Unscrewing the Screw two in anti-clockwise direction, push the Back Cover in left direction as arrowhead marked and move the Back Cover down.

3) Take out the bad lamp and replace on a new lamp and clean the lamp surface with a soft cloth.

4) Equip the Back Cover returned as above mentioned procedure.

NOTE:

1. The power switch of the hardness tester must be shut off before the lamp replacement, because there is dangerous voltage in the inside of hardness tester.

2. The replacement lamp and original lamp must be the same size and model. It will damage the circuit of hardness meter if the improper lamp is equipped.

9 Attention

9.1 Diamond Indenter

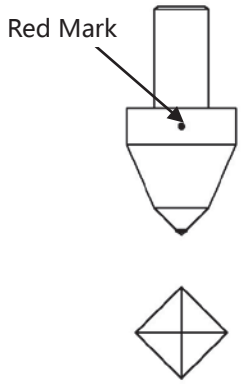


Fig7

9.1.1The diamond indenter and the indenter shaft are important parts of the instrument , and hence it is necessary to take care not to touch the indenter during the operation;

9.1.2In order to assure the precision of the measurement, it is important to keep the indenter clean. If it is covered with grease or dust, it should be cleaned carefully with absorbent cotton dipped with alcohol or industrial ether, especially the tip of the indenter.

9.1.3The round column of the indenter is marked with a red dot. If the indenter is once unloaded, take care to make the red dot face the frontal direction when it is reloaded, and the focus of the diagonal line of the indentation should be aligned with the red dot. It is possible to make the alignment of the cross-shaped in the microscope line with the diagonal line of the indentation. If the indentation observed is not aligned with the cross-shaped line ,please unscrew the screw on the indenter , turn the indenter a bit and the fasten the screw, and then make the alignment again through tests until the alignment is all right to your satisfaction (See Fig 7)

9.2 Specimen

9.2.1The surface of the specimen must be clean, as the grease or the dirt on the surface would make the edge of the image of the indentation vague, thus affecting the precision of the measurement.

9.2.2When thin filaments, thin pieces and small parts are used as the specimens, the fine wire testing table, thin specimen testing table and the fork-shaped testing table should be used to hold the specimens respectively on the Cross Testing Table for the measurement. If the specimen is too small to be held by the testing table, the specimen should be inlayed and polished for the measurement.

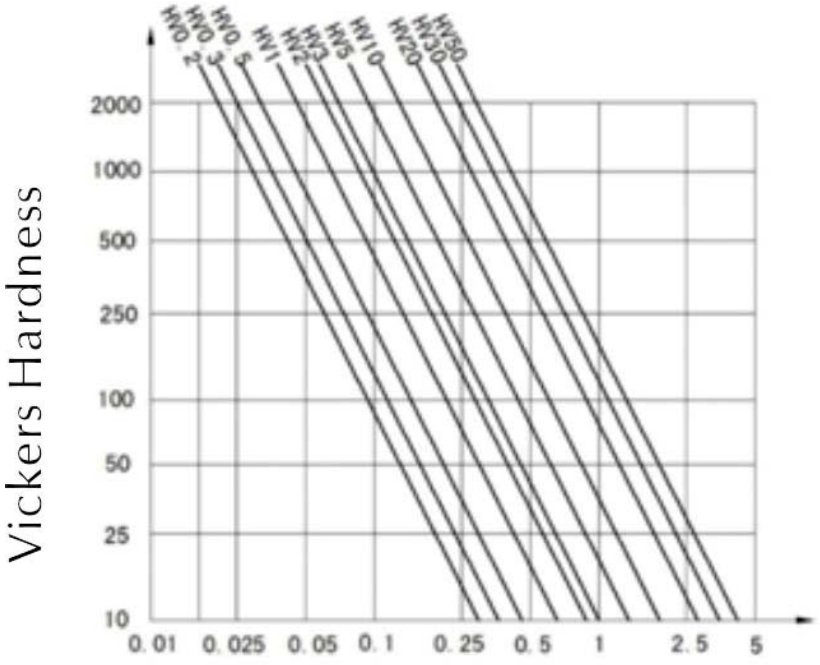


Fig 8

10 Attached Lists

10.1 Repeatability

Table 1

Hardness Field of Hardness/Block	Repetitiveness of Value (%)	
	HV0.2~ HV5	< HV0.2
≤225HV	≤12	≤12
> 225HV	≤8	≤10

10.2 Error

Table 2

Hardness Symbol	Hardness tester error of the largest allowed ±%															
	Hardness HV															
	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1500
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.

11 Storage/Transportation/ Attention

- Storage should be far away from the vibration, corrosion, moisture, dust, also should be stored at a normal temperature and humidity. Please put in the original packing box before transportation to avoid any damage
- Avoid rough handling in transit, so as not to cause damage to the instrument
- Transportate under the guaranteed status of the original packaging, in three levels of normal transport on the road.

SINOWON®

ISO 9001:2015 Certified Company

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