

MICROBUL 10-AT Auto Turret Low Load Vickers Hardness Testers



OPERATION MANUAL

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1 Main description

The hardness tester is suitable for measuring the micro hardness of micro, thin, surface coating specimens, and determination of glass, ceramics, agate, artificial gemstones such as more brittle and hard materials Knoop hardness. It is an ideal hardness testing instrument for scientific research institutions, enterprises and quality inspection departments to study and test.

2 Technical specifications

Touch screen interface, easy to operate ;

Boot that is used, no need to install the weight, no need to install and debug ;

Electric loading, closed loop control ;

Indenter and objective can shift automatically, the test point is automatically positioned accurately

Hardness value can be calibrated by scales or standard blocks

The test force is automatically corrected and the force accuracy is increased by an order of magnitude

Test data saved forever for database query ;

English

Twin objectives to test, increase the testing range

Modular design, easy maintenance;

Hardness value conversion according to the standard ASTM

Software is available to connect to the computer, computer can control the hardness tester, can edit images and data, can update to semi-automatic Vickers hardness tester.

Seven test force can be customized ten test force

0.3kgf (2.94N) 、 0.5Kgf (4.9N) 、 1.0Kgf (9.8N) 、 2.0(19.6N) 、
3.0Kgf (29.4N) 、 5.0Kgf (49.0N) 、 10Kgf (98.0N)

The magnification of the microscope : 200×,100×

Hardness test range : 8HV~2900HV

Minimum detection unit : 0.01μm

Tester force duration time : 0~99s

Maximum height of specimen : 180mm

Distance from indenter center to outer wall : 160mm

Weight of the main hardness tester : about 55Kg

Power Supply AC220V/50Hz

Exterior dimension : (600×220×700)mm

3 Installations and Regulation (Debugging)

3.1 Operational Conditions

Room temperature 10 to 35°C; ;

Installed in a horizontal position on a solid basement;

In an environment without any shock or vibration;

In a surrounding without any corroding agent;

Room relative humidity less than or equal to 65%.

3.2 Unpacking and installation

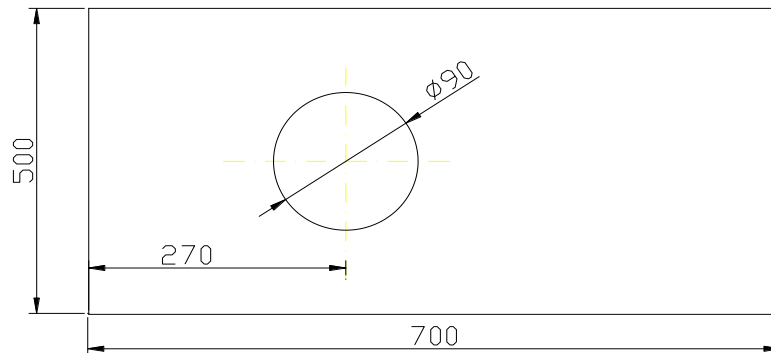
Remove the outer packing box, lift the box, take out the accessory box.

Raise the bottom plate, with the wrench unscrewed the two M10 bolt under the floor, the hardness tester and the bottom plate are separated, take out the hardness tester (pay attention to safety).

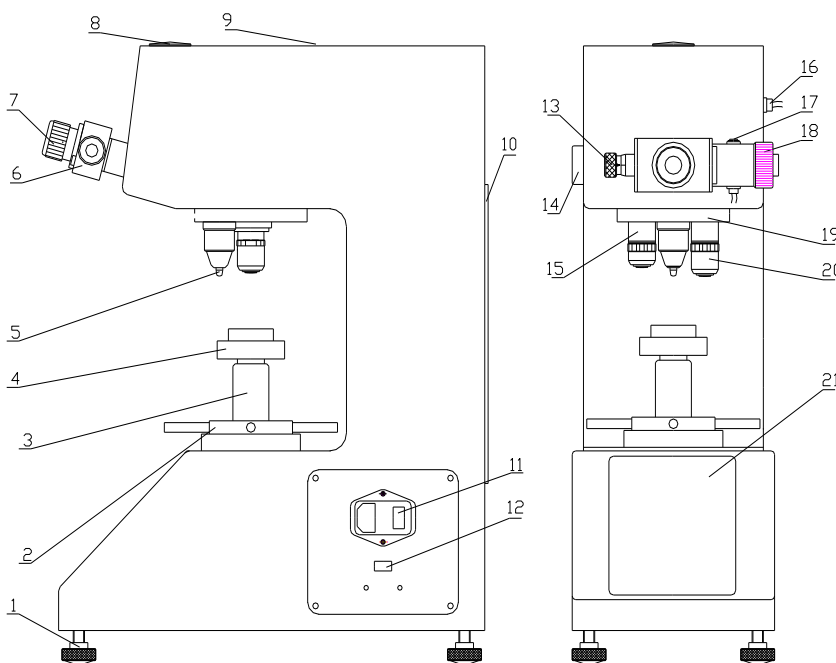
Put the hardness tester on the stable working table. At the same time, open hole on the proper position of the working platform. (Fig.1) , make the screw work normally

Remove the adjustment screw (1) from the accessory case and screw it to the bottom of the main body (Fig. 2) and transferred to the level ;

Turn the wheel (2) make the screw (3) down smoothly through the work table opened hole The specific size of the hole is



(Fig 1)



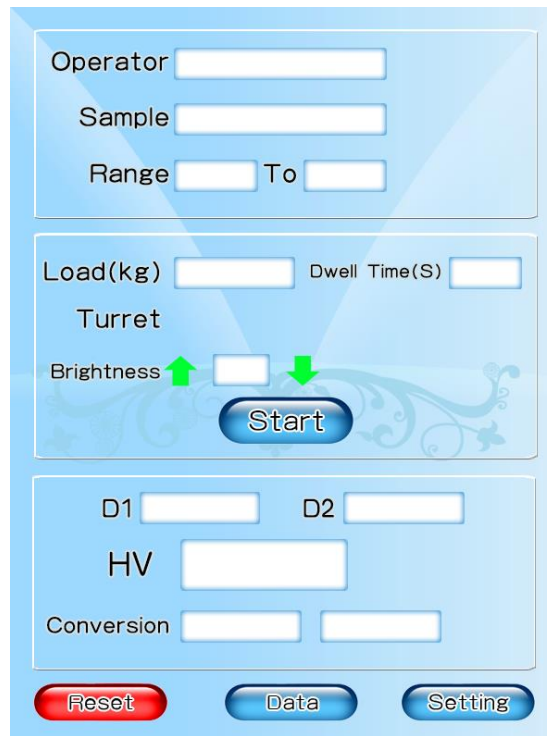
(Fig 2)

- 1. Adjusting screw 2. Wheel 3. Lifting Screw (protection cover) 4. Testing Table 5. Indenter 6. Micrometer eyepiece 7. Eye Patch 8. Camera cover plate 9. The Upper Cover 10. The Back Cover 11. Power Socket and Switch 12. U disk Socket 13. The Left Drum Wheel 14. Light source 15. 20×Objective 16. Eyepiece socket 17. Measuring button 18. The Right Drum Wheel 19. Turret 20. 10×Objective 21. Touch screen**

Remove the test stand (4) from the accessory box and place it in the hole of the screw (3) Insert one end of eyepiece (6) into the hole of eyepiece tube and make sure it is fixed at the bottom. The eyepiece wire plug is inserted in the eyepiece socket (16).

4 Operator panel and menu description

Connect the power cord and turn on the power switch (11), then plug in U disk, Operation interface open(fig.3).




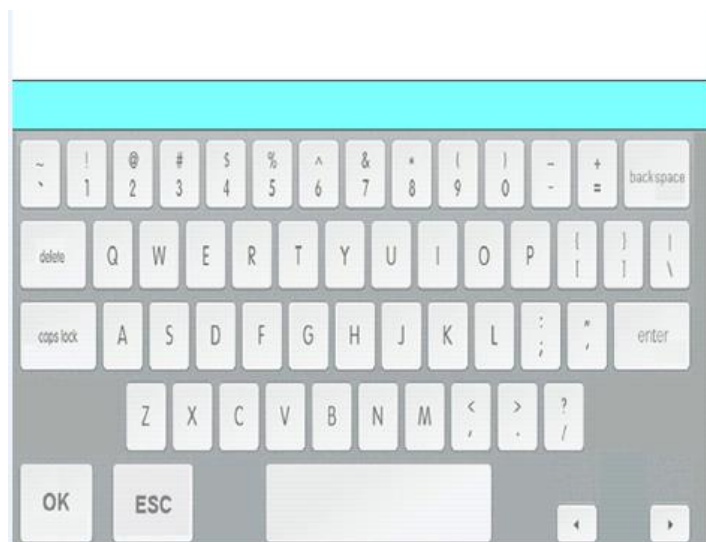
(Fig 3)

“Tester, sample name, qualification range, stress, dwell time, conversion “Those text box on the right side of the text is clicked for information entry. The operation method is as follows: the single point with finger and entered into the corresponding input interface.

4.1 Information input


Input Operator and Sample

Click the Textbox to the right of “Operator “and” Sample” .Then pops out a keyboard in the screen. Input the name of Operator and Sample and click “OK”. If don’t want to change the name that already exists on the screen, click “ESC”. As shown in fig.4:



(Fig 4)


4.2 Method of inputting Tolerance and Dwell time

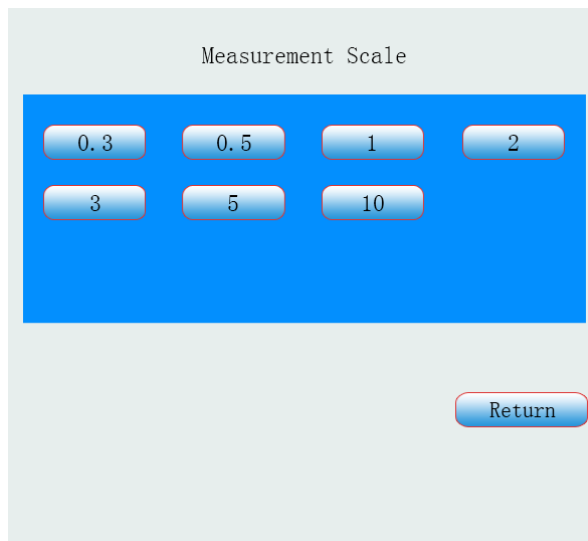
Click the Textbox to the right of “Tolerance” and” Dwell time” .Then input the number as shown in fig.5 And click “OK”. If want to cancel, click “ESC”.




(Fig 5)

4.3 Test force selection


Click “” on the right side of force type and choose the force. Click on test force as shown in fig 6

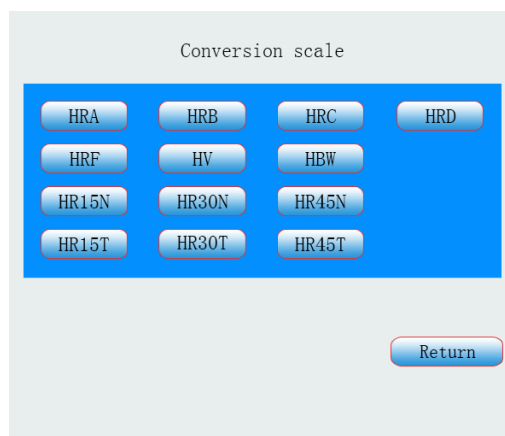


(Fig 6)

Choose dwell time. Click the  on right side of Dwell time to select dwell time. If there is no need to modify, click Return back to main interface.

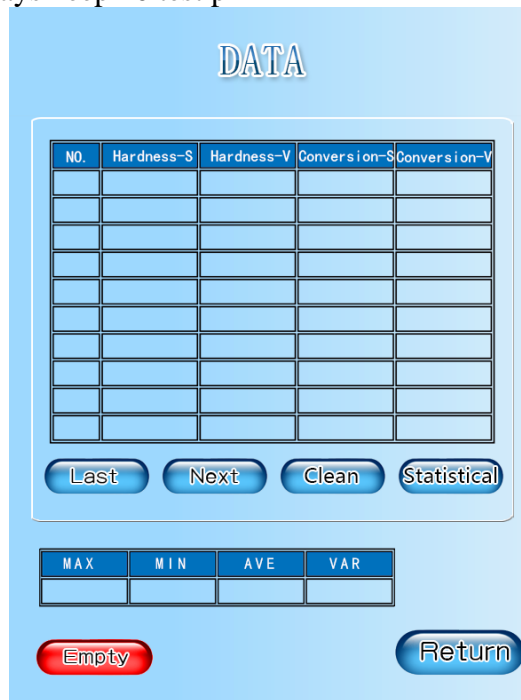
Click up and down arrow keys (↑、↓) to adjust lightness.

Click “Conversion” and choose the scale. If there isn’t need to modify, click Return(). As shown in fig. 7:



(Fig 7)

Click “Data”, shows data processing menu: hardness type, hardness value, conversion type, conversion value, maximum, minimum, average and variance value. Totally save 20 test points, will auto delete first point when exceed 20 points, always keep 20 test points. Click “Return”

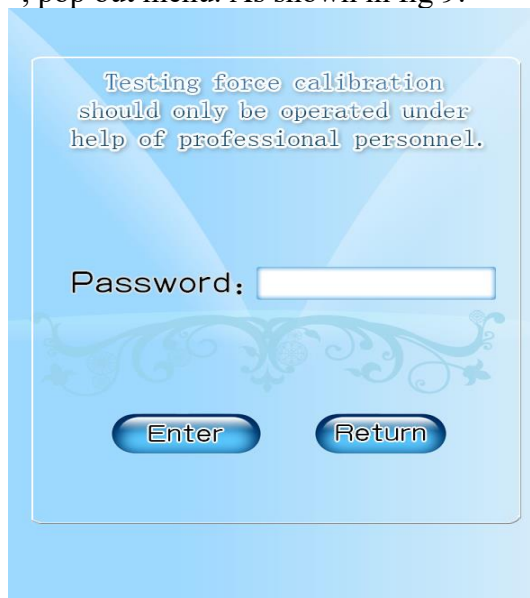


(Fig 8)

4.4 Language selection

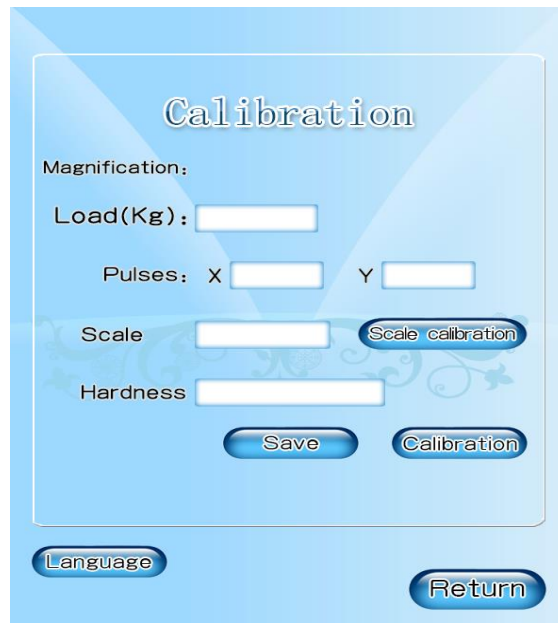


Click “Setting”, pop out menu. As shown in fig 9:



(Fig 9)

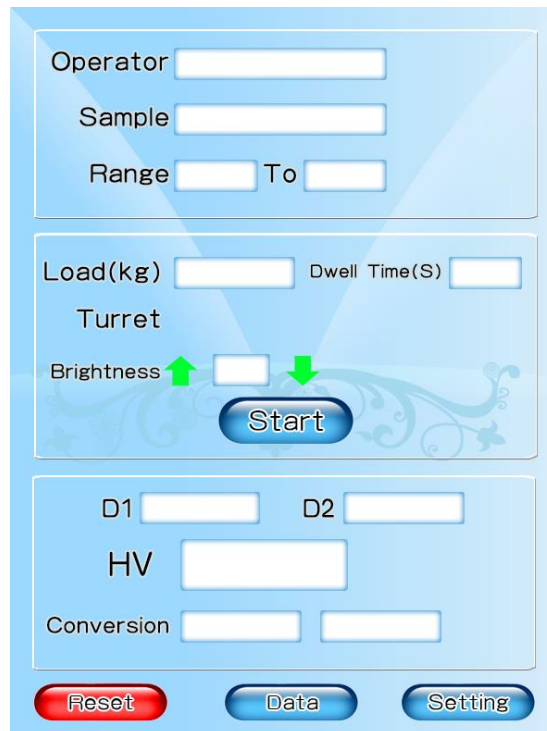
Click “”, pop out numeric keypad, input 12345678, click “”, pop out interface as shown fig 10:



(Fig10)


Click “”, English shift, click “”, go back to the main interface.

5 Usage of the hardness tester




(Fig 11)

For example: test 10kgf scale

Click loads on the screen , click 10

Click dwell time  input 10s, click OK.

Click , indenter (5) turns to the front position

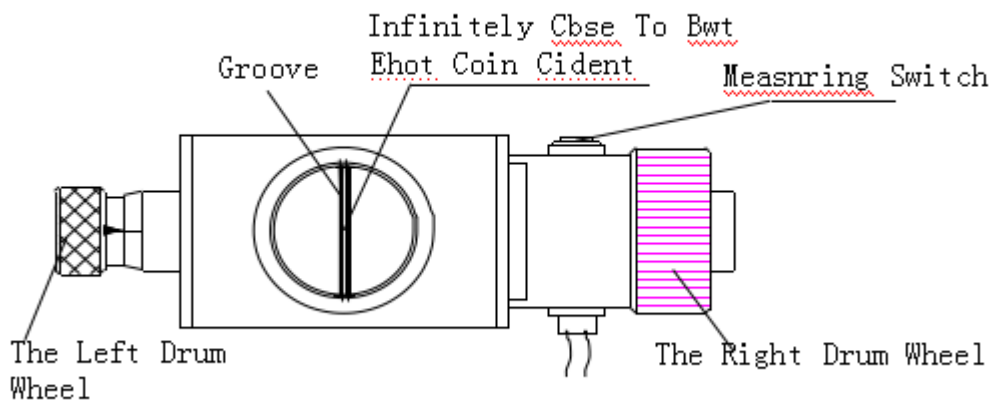
Place the standard block or test piece on the test table (4), Rotation The wheel (2) makes test table rise
 When the distance between test piece the lower end and the indenter is about 0.5 ~ 1mm, press 20X, 20X objective (20) turn to front. At this time, the general magnification of light path system is 200x. Put eyes close to the Eyepiece (6) to observe. When a bright spot appears to the vision field in Eyepiece (6), it shows

the focusing plane will come closely. At this time, raise the Test Table up slowly and slightly until the surface of specimen forms a clear image, at this point, the focusing process is completed. If cannot find the specimen's focal plane, turn the 10X objective to the front position, at this time, the general magnification is 100X, it is easy to find the focal plane after reducing the magnification.

press "start" button, the indenter automatically comes forward and test force is applied, "↓" appears on screen which shows the test force is loading. "DWELL" means to keep the test force. When loading and unloading of test force is completed, the indenter back to its origin position, and turn the 20× Objective (20) to front, the main screen will back to operating page.

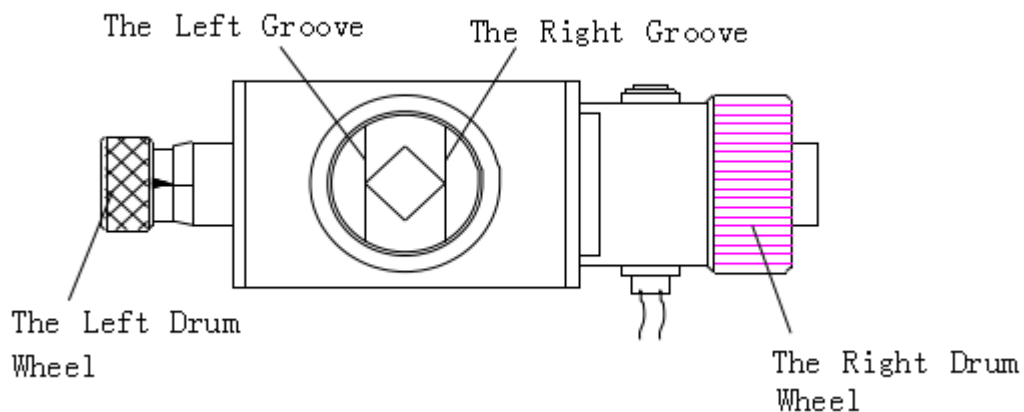
Caution: If choose 10X objective to test, click 10X, 10x objective (15) turn to the front to test Indentation can be seen in the micrometer eyepiece field of view, then you can measure the indentation diagonal's length in the micrometer eyepiece. If the indentation is not clear, you can slowly turn the rotary wheel (2), move up and down the test sets (4) till the image of the Indentation is the clearest. If two graduated lines seem vague in the Eyepiece, adjust the Eye Guard (7) till the graduated lines are the clearest, this is according to personal vision.

Rotate the Right Drum Wheel (17) to move the graduated line of eyepiece, enable two graduated lines to be close. When inner side of two graduated lines are closely without limit (the inner side of graduated lines reach critical state with no space between them to allow the light penetrate, but two graduated lines are prohibited to overlap each other), press "Reset", at this time, the d1: 0000 value on the main screen is zero (FIG.12), at the zero position for technique term. Now the length of diagonal line of indentation can be measured in the Eyepiece.



(Fig 12)

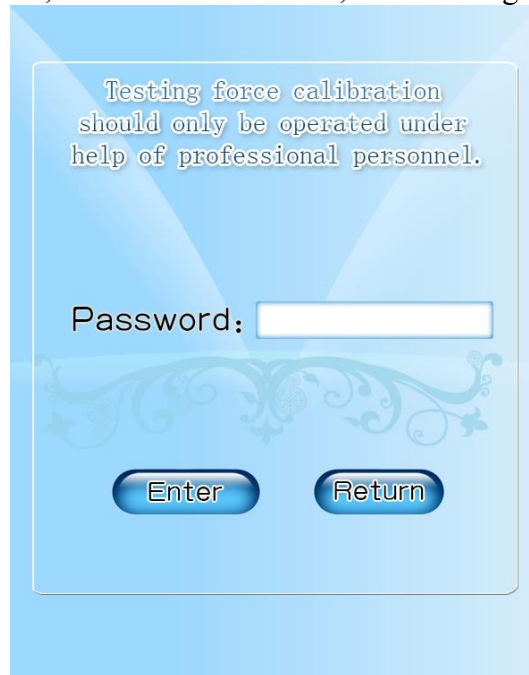
Rotate the Right Drum Wheel (17) to let graduated lines separate each other, turn the Left Drum Wheel (12) to move the left graduated line until it's inner side tangent to the intersecting point at left outside of the indentation, and then move the right graduated line until it's inner side tangent to the intersecting point at right outside of indentation (Fig13).



(Fig 13)

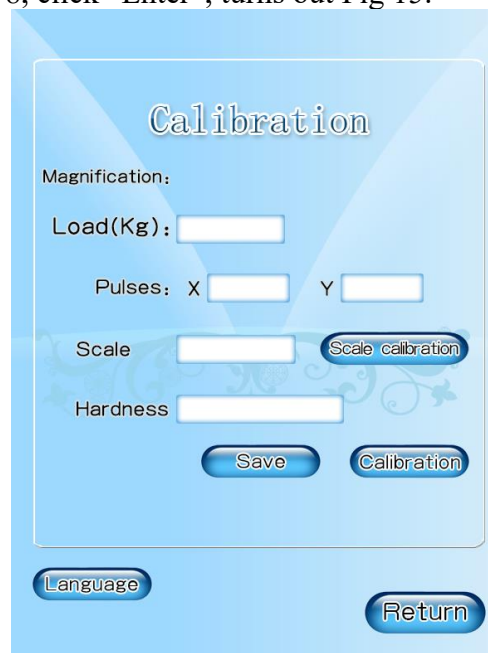
5.1 Calibration of hardness value

The precision of the hardness displaying value of the hardness tester is just calibrated before the instrument is turned out of the factory. If an error is caused due to the transportation or according to the various requirements of the client, the hardness value may be revised by pressing input keys. The method is as following: Load on a hardness block, then click” Calibrate”, turns out Fig 14,



(Fig 14)

click the text box to input 12345678, click “Enter”, turns out Fig 15.



(Fig 15)

Click Hardness , input the standard block’s hardness value in the numeric keypad, then measure the indentation, click the start button, the measurement of diagonal d1 is completed. Turn the objective to 90, measure the length of diagonal d2 as the above way, after measurement, click save, the hardness is finished calibration. Click return to go back to the main interface.

6 Calibration for test force

Test force is calibrated before the instrument turned out of the factory, there is no need to calibrate if no special situation. If the re-calibration is necessary, please contact the manufacture, and calibrate under the guidance by specialized person.

6.1 Maintenance and precautions of hardness tester

It is necessary to read carefully the usage instruction manual before the operation of the instrument in order to know the operational procedures and the precautions so as to avoid the damages to the instrument caused by the incorrect operation.

It is prohibited to dismount and alternate without permission all the electric component parts, the switches and sockets as well as their fixed positions; otherwise, the instrument could malfunction and trigger accidents.

It is prohibited to move the sample during loading and unloading, otherwise it would damage the instrument. Only after testing force has been unloaded and the screen returns to operating page, then the sample can be rotated.

Turn on the power, it is necessary to reset before testing

The Diamond Indenter (5)

The 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.

In order to assure the precision of the measurement, it is important to keep the indenter clean. If it is covered with grease or dust, the tip of indenter should be cleaned carefully and lightly with absorbent cotton wetted with a little alcohol (industrial use) or ether.

6.2 The Eyepiece (6)

Owing to personal difference of visions, the graduated lines observed in the vision field of the eyepiece may seem vague. And accordingly, the observer should turn slightly the Eye Guard (7) on the eyepiece so as to observe the graduated line in the vision field clearly.

The Eyepiece should be inserted to the bottom of eyepiece tube and keeping without any space between them, otherwise it would affect the correctness of the measurement. When testing the length of diagonal line of indentation, it is necessary to measuring the tip points of diagonal line, then turn the Eyepiece by 90° and test other a pair of tip points for diagonal lines.

6.3 The specimen

The surface of the specimen must be clean, as the grease or the dirt on the surface would affect the precision of the measurement. Please clear the specimen with alcohol or ether.

The measurement for Knoop Hardness (force of 1 kgf (9.8 N) or less can switch between Vickers and Knoop)

6.4 Exchange the Indenter

Loosen the screw fixed on the Indenter (5) with a screwdriver to take the Indenter out, change the Knoop Indenter for replacement. Note the direction when assembling. The red point of the indenter should be in face to front direction, the long diagonal line of indentation (the shape of indentation is a long rhombus) should be in parallel with testing table. It may be to regulate the center of indentation in vision field after install Knoop Indenter.

6.5 Testing hardness value

The hardness testing method of Knoop is mainly same as that of Vickers, besides it is only required to measure the length of long diagonal line for indentation. Press the Measuring Button to confirm, then the HK hardness value will display on the screen.

