



**HDT-MVH1100**

**DIGITAL MICRO-VICKERS HARDNESS TESTER  
OPERATION MANUAL**



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**Note: Before installing and operating the machine, please read this manual carefully, especially the bold parts, otherwise it may cause adverse human damage and the consequences will be borne by oneself!**

## 1 Introduction

### 1.1 Machine Overview

First of all, thank you for choosing our company's products and browsing this manual.

The touch color screen digital micro Vickers hardness tester is suitable for testing metal structures, including small parts, thin sheets, metal foils, wires, thin hardened layers, and electroplated coatings. It can also be used to test non-metallic materials such as glass, jewelry, and ceramics that cannot be tested using the Rockwell test method and other relatively high test forces. Especially, it can follow the structure of metals and test the internal hardness of materials such as induction hardening or carburization.

Digital micro hardness tester is a high-tech product that integrates optics, mechanics, and electronics. The hardness tester has a novel design, good reliability, operability, and repeatability, and is an ideal product for testing micro hardness.

This machine adopts C language programming, high magnification optical measurement system, optical dual channel structure, and new technologies such as optoelectronic and optoelectronic sensing. By pressing buttons, it is possible to input the length of the indentation for measurement, display the hardness value on the LCD screen, convert the scale, test force, test force retention time, and measurement times.

The digital micro hardness tester can also be configured according to the special needs of users, capable of capturing the measured indentation and material metallographic structure, using a visual measurement device and an automatic indentation measurement device, as well as measuring Knoop hardness.

### 1.2 Principles of Vickers hardness and Knoop hardness

#### 1.2.1 Vickers HV

The Vickers hardness test involves using a 136 ° rhombic diamond indenter to press a specified test force (F) into the surface of the tested object. After maintaining the test force for a specified period of time, the test force is removed and the indentation diagonal on the surface of the test piece is measured using a micrometer eyepiece (d). Calculate the average pressure on the conical surface area of the indentation (N/mm<sup>2</sup>), Vickers hardness value. (Please refer to the figure for details 1.1) .

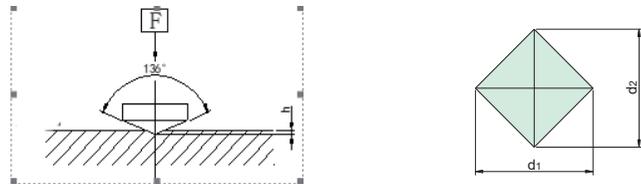


Fig 1.1 Vickers test principle

Vickers hardness calculation formula:  $HV = 0.1891 \frac{F}{d^2}$  formula (1-1)

In the formula:

HV—Vickers hardness

F --N

d-- Indentation of two diagonal lines (d1,d2) Average length, mm

HV The relationship between indentation depth h and diagonal d:  $h=d/7$  formula (1-2)

Note that when the test force is kgf:

$$HV = 1.854 \frac{F}{d^2} \quad \text{(formula 1-3)}$$

1.2.2. knoop HK

The experimental principle of Knoop is the same as that of Vickers, except that the indenter is different from Vickers. Knoop is a pyramid shaped diamond indenter with a diamond base. The indentation perpendicular to the surface of the test piece is a diamond in shape, and the ratio of the lengths of the two diagonal lines is approximately 7:1 (See Fig1.2) . Due to the geometric characteristics of the Knoop indenter, the diagonal accuracy measured at low test forces is relatively high. The depth of the indentation is shallow, approximately 1/30 of the long diagonal. Due to this characteristic, the Knoop test is very suitable for testing the hardness of thin coatings, surface hardened layers, metal flakes, decarburized layers, and hard brittle metals.

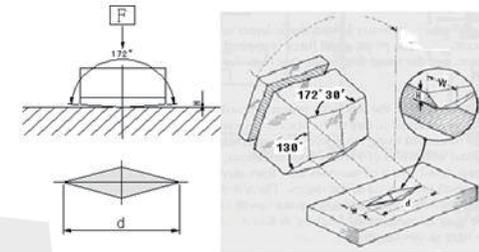


Fig 1.2 Knoop test principle

Knoop hardness calculation formula:  $HK = 1.4509 \frac{F}{d^2}$  (formula 1-4)

In the formula:

HK—Knoop hardness

F --N

d-- Indentation diagonal length, mm

The relationship between HK indentation depth h and diagonal d:  $h=d/30$  (formula 1-5)

Note that when the test force is kgf:

$$HK = 14.229 \frac{F}{d^2} \quad \text{(formula 1-6)}$$

## 2 Main technical parameters

### 2.1 Main parameters of the machine

1 Number of stages of test force:

There are 8 levels of test force: kgf units are used on this machine, as shown in Table 2.1

Table 2.1

Kgf	0.01	0.025	0.05	0.1	0.2	0.3	0.5	1
N	0.098	0.245	0.49	0.98	1.96	2.94	4.90	9.80

So the Vickers scale is: HV0.01, HV0.025, HV0.05, HV0.1, HV0.2, HV0.3, HV0.5, HV1

2 Hardness indication error:

The hardness measurement range of this machine is:5-3000HV, The accuracy meets or exceeds GB/T4340.2, as shown in Table 2.2

Table 2.2

Hardness symbol	maximum error												
	Expressed as a percentage of the specified hardness value for the standard block												
	Hardness, HV												
	5	100	150	200	250	300	350	400	450	500	600	700	800
HV0.01													
HV0.025	8	10											
HV0.05	6	8	9	10									
HV0.1	5	6	7	8	8	9	10	10	11				
HV0.2		4		6		8		9		10	11	11	12
HV0.3		4		5		6		7		8	9	10	10
HV0.5		3		5		5		6		6	7	7	8
HV1		3		4		4		4		5	5	5	6

NOTE:

- When the diagonal of the indentation is less than 0.020mm, no error value is given in the
- For intermediate values, the maximum allowable error can be obtained by interpolation method .
- The median value in the table is given with a maximum error of 0.001mm or 2% of the average diagonal value of the indentation, whichever is greater .

The content in the table is extracted from GB/T4340.2.

3. Optical system: see table 2.3

Table 2.3

objective	10× (observe)	40× (measure)
eyepiece	10×	
total magnification	100× (observe)	400× (measure)
measurement resolution	0.025μm	
Lamp brightness	Level 20 adjustable	

**Note: When the machine has not operated for more than 5 minutes, the light will be turned off and any key can be pressed to wake up.**

- Test force application method: Automatic loading and unloading test force
- Test force holding time: 5~60s
- Maximum height of specimen: 90mm
- Distance from the center of the pressure head to the outer wall: 120mm
- Host weight: 40Kg
- Power supply: AC220V/50Hz
- External dimensions: (length × wide × High) (490×290×530)mm
- XY Platform

XYPlatform parameters are shown in the table 2.4

Table 2.4

size	100×100mm
trip	25×25mm
resolution ratio	0.01mm

- The difference between touch color screen digital display manual turret and touch color screen digital display automatic turret:

The observation, testing, and measurement position switching of the touch color screen digital display manual turret micro Vickers hardness tester is completed by manual turntable.

The observation, testing, and measurement position switching of the touch color digital display automatic turret micro Vickers hardness tester is completed by the automatic turret, which can also meet the needs of manual and inching operation of the turret.

### 3 Installation and debugging of instruments

#### 3.1. Working conditions of hardness tester

- Within the range of room temperature (23 ± 5) °C;
- Horizontal placement on a stable foundation;
- In a vibration free environment;
- There is no corrosive medium around;

e The indoor relative humidity shall not exceed 65%.

### 3.2 Unpacking and installation

The names of each component on the host are shown in the table 3.1

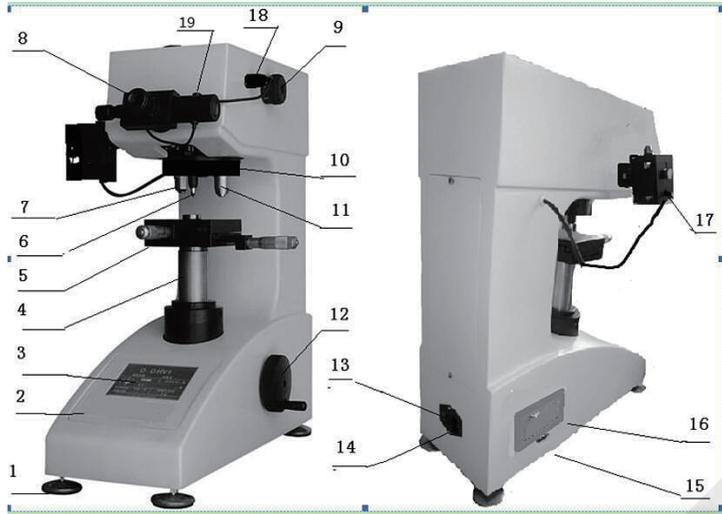


Fig 3.1 Appearance of hardness tester host  
Table 3.1 Name of each component

1. Horizontal screw	2. Note: This model does not have	3. touch screen	4. Note: There are two optional configurations for the lifting screw and the lifting handwheel	5. Cross test bench
6. Pressure head	7. 10x objective	8. micrometer eyepiece	9. Changing the handwheel	10. Turret
11. 40x objective	12. Focusing handwheel	13. power switch	14. outlet	15. RS232 (Optional)
16. printer	17. LED Lamp chamber	18. Encoder connector	19. Measurement button	

The installation and debugging steps are as follows:

- Remove the outer packaging box and remove the hardness tester host and accessory box (see Figure 3.1).
- Place the hardness tester on a dedicated workbench, remove the horizontal screw (1) from the accessory box, and screw it onto the bottom of the host.
- Remove the upper cover (12) and unscrew four screws and shockproof screws from the machine (Figure 3.2).

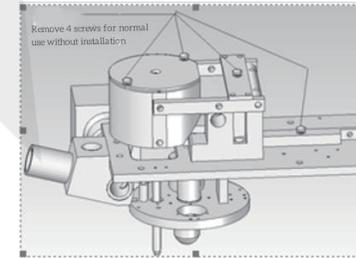


Figure 3.2 Location of Removing Four Screws

- Rotate the change handwheel (9) to 1kgf.
- Remove the weight cover, take out the weight shaft and weight from the accessory box, and fit six weights from small to large onto the weight shaft. During installation, the weight shaft and weight should be wiped clean first to prevent contamination.
- Grasp the top of the weight shaft, place it inside the weight housing, and rotate the weight shaft to place its transverse pin in the V-groove (Figure 3.3). Align the holes on the end cover with the weight shaft, so that the steps are installed inside the weight housing and can rotate.

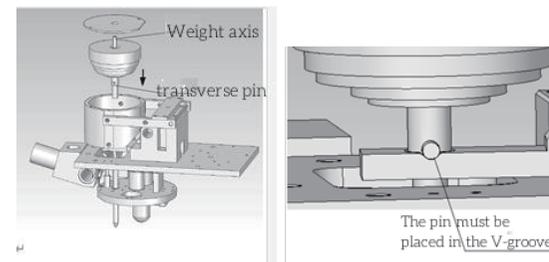


Figure 3.3 Weight Axis and Placement of Weights

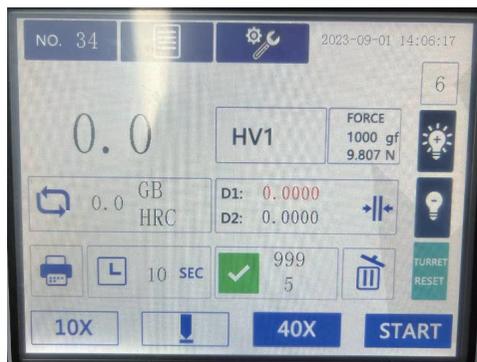
- g. Rotate the transformation handwheel (9) to make the weight shell flexible up and down in the positioning groove. Then cover the upper cover (12).
- h. Pull out the dust cover, take out the micrometer eyepiece (8) from the accessory box, follow the installation direction (Figure 1) and insert it into the hole, and insert it to the bottom.
- i. Remove the cross test bench (5) from the accessory box and wipe off the rust proof oil on it. Insert its shaft into the hole of the lifting screw (4) and lock the screw.
- j. Remove the level gauge from the accessory box and place it on the cross test bench (5). Adjust the screw (1) to make it level (with the water bubble centered).

## 4 Introduction to Panel Key Functions

### 4.1 Functions of each key

- 1) Figure 4-1 shows the front panel of the touch color screen digital microhardness tester. The part in the figure is an LCD, and its details will be explained in later chapters of this manual. This chapter will provide a detailed explanation of the functions of each key on the interface (this book only introduces the Chinese interface, and the same applies to English operations).

#### 2) Introduction to Main Interface Functions:



Normal operation interface

Press the face key to automatically switch between

10, the indenter, the 40x objective, and the indenter; Press the face key or key to increase or decrease the brightness of the light; Pressing the face button to print will print out all current test data; will print out all current test data; Pressing the face key data will display all current measurement data. Pressing the face key hardness conversion key can select the conversion scale, pressing the face key can set the holding time, pressing the face key can set the upper and lower limit values, and pressing the face key current measurement data; Pressing the reset button serves as a reset function during digital measurement and a reset function during data input; Press the setting interface key Press the setting interface key, Press the start button to automatically enter the loading and testing state of the machine. When clicking on d1 and d2, a digital dialogue window will be displayed. Input the diagonal length to display the measured value (not required for digital S models).

#### 3) Introduction to menu interface and functions:



1. Load holding time setting: After pressing the load holding time surface key, a number surface key will be displayed. When the time is less than 10, directly press the number surface key you want to adjust (for times of 10 and above, press the individual

digits and 10 digits in order), and then press the confirm surface key. (Time in seconds)

2. Control hardness setting: Press the control hardness surface key to enter the menu, and all convertible hardness value units will be displayed. Press the desired conversion surface key, and then press the return key.

3. Hardness mode setting; Load unit setting; Language settings; The method for setting and selecting 1K and 2K objective magnification is the same as in (2).

4. Current data: Press the button below to view all current measurement data. If you need to save, press the save button in the upper right corner. If not saved, the shutdown will automatically reset to zero.

5. Storage data: Press the following key to enter the menu, where you can view all saved grouped storage data, which can be printed or exported via USB.

#### 4.2 Selection of experimental force

When you rotate the test force change handwheel on the instrument to select a new test force, the test force value in the upper right corner of the main menu immediately changes. After selecting the test force, the new test force is loaded into the system.

#### 4.3 Energy saving mode

After 5 minutes of use, this hardness tester will automatically enter energy-saving mode and turn off the light source. Users can activate the energy-saving mode of the hardness tester by pressing any key on the operating keyboard for normal testing.

### 5 Use of hardness tester:

#### 5.1 The operation and use of the hardness tester:

The working process of measuring hardness with a hardness tester is shown in the figure below 5.1

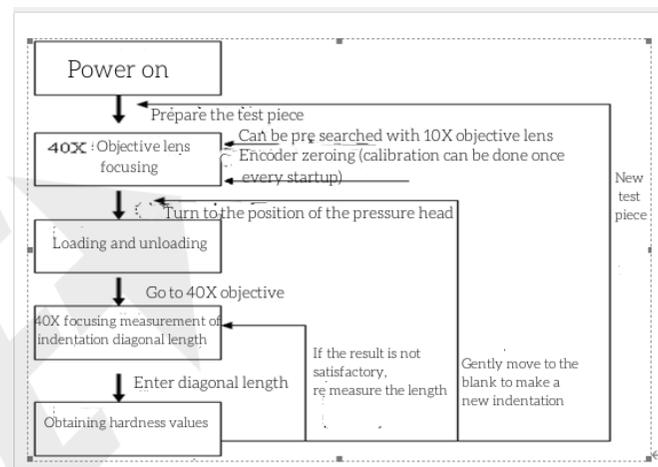


Figure 5.1 Measurement process of the display dimensional hardness tester

The following is a specific introduction to the operation process of the touch color screen digital display manual turret model and the touch color screen digital display automatic turret model

#### 5.1.1 Test process of touch color screen digital display manual turret model:

- 1) Plug in the power and turn on the power switch. The interface appears on the screen, at which point the data can be modified.

For example, selecting hardness scales (HV, HK), hardness conversion, holding time, and light on/off can meet the requirements by pressing the button.

- 2) Rotate the change handwheel (9) to ensure that the test force meets the selection requirements. The force value of the change handwheel (9) is consistent with the force value displayed on the screen. When rotating the handwheel (9), it should be done carefully and slowly. When rotating to the maximum force of 1kgf, the rotating position is already at its full stop and cannot continue to rotate forward. Instead, it should be rotated in the opposite direction; When turning to the minimum force value of 0.01kgf, the rotation should also be

reversed.

- 3) 10s is the most commonly used test force holding time, and you can also select the holding time from the menu as needed.
- 4) If the field of view light source is too dark or too bright, the required brightness can be adjusted by directly pressing+Yes to increase or decrease on the main interface.
- 5) Rotate the turret (10) to 40 × The objective lens (11) is in the forward position (the total magnification of the optical system is 400 ×, In the measurement state).
- 6) Place the standard test block or test piece on the cross test bench (5), rotate the rotating wheel (12) to raise the test bench. When the test piece is about 1-2mm away from the lower end of the objective lens (11) (do not touch the objective lens), then observe with your eyes close to the eye mask of the micrometer eyepiece (8). A bright spot appears in the field of view of the micrometer eyepiece, indicating that the focusing surface is about to arrive. At this point, the test bench should slowly rise or fall slightly until a clear image of the sample surface is observed in the eyepiece, and the focusing process is completed. Due to the very smooth surface of the standard test block, it is difficult for beginners to find the surface of the test piece. Therefore, you can turn the test piece over (with the rough surface facing upwards) and wait until the surface of the test piece is found before turning it back to the test surface.

If you want to observe a large field of view on the surface of the sample, you can use 10 × When the objective lens (7) is turned to the forward position, the total magnification of the optical system is 100 ×, In an observational state.

**Note: When testing irregular specimens, be careful to prevent the indenter from hitting the specimen and damaging it.**

- 7) Turn the indenter (6) to the forward position and feel that the turret (10) has been positioned. When rotating, it should be done carefully and slowly to prevent rapid impact. At this time, the distance between the top of the indenter and the focused specimen plane is about 0.4-0.5mm.
- 8) Press the START button, apply the test force (motor starts), and a loading and unloading progress bar will appear on the screen; When the progress bar is

completed and the motor work is completed, a beep will sound, and d1:0 will appear on the screen waiting for measurement.

**Warning: When the motor is in working condition, it is not allowed to move the test piece or rotate the turret again. It must wait for the loading and unloading to end before moving, otherwise it may damage the instrument.**

- 9) Add 40× Turn the objective lens (11) to the front, and then measure the diagonal length of the indentation in the micrometer eyepiece (8). If the indentation is not clear, slowly raise or lower the test bench to make it clear; If the two lines inside the micrometer eyepiece (8) are blurry, the eye mask on the micrometer eyepiece can be adjusted according to each person's vision.
- 10) Rotate the right drum wheel and move the reticle in the eyepiece, gradually bringing the two reticles closer together. When the inner side of the reticle is infinitely connected Near term (the inner side of the reticle is in a critical state without light gap, but the two reticles must not overlap). See Figure 5.3

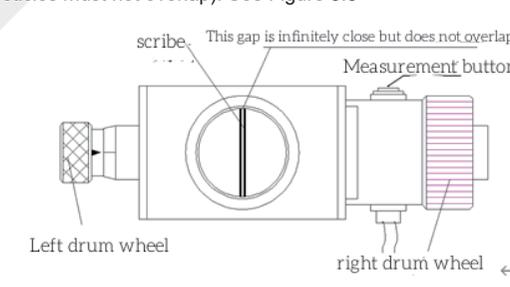


Figure 5.3 Measurement eyepiece

Press the "CLEAR" reset key, and the d1: value on the main screen will be zero, which is the zero position in the terminology. Then the diagonal length of the indentation can be measured in the eyepiece. (Every time the machine is turned on, it must be reset to zero position)

- 11) Rotate the right drum (20) to separate the scoring lines, then move the left drum (16) to move the left scoring line, When the inner side of the left scoring line is tangent to the intersection point of the left contour of the indentation, move the right scoring line again to make the inner side tangent to the intersection point of the indentation contour, as shown in Figure 5.4.

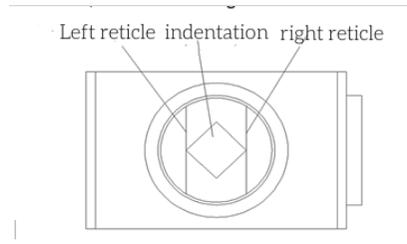
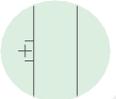


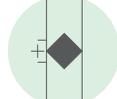
Figure 5.4 Long measurement indentation diagram

Press the measurement button (19) on the eyepiece to complete the measurement of the diagonal length d1; Rotate the eyepiece (9) 90 ° and measure the diagonal length d2 using the above method. Press the measurement button (19), and the screen will display the displayed values for this measurement and the converted hardness values. If you believe there is an error in the measurement, you can repeat the above procedure to measure again.

The specific measurement methods for indentation are listed below: please refer to Table 5.1

Table 5.1 Specific measurement methods for indentation

<p>1. Observe the two lines in the field of view from the eyepiece and rotate the eye mask to make the lines clear. Note: Rotating the eye mask may cause blurry imaging of the indentation. After the two notches are clear, rotate the lifting wheel to make the imaging of the indentation clear, as shown in Figure 5.5;</p>	 <p>Figure 5.5</p>
<p>2. Rotate the drum wheels on both sides of the micrometer eyepiece to make the inner sides of the two lines infinitely close, that is, when the light transmission between the inner sides of the two lines gradually reaches a critical state of light and no light, press the "Clear" key. At this time, the D1 value on the main screen is zero, which is the zero position in the terminology. (Each time the machine is turned on, it must be reset to zero position) as shown in Figure 5.6;</p>	 <p>Figure 5.6</p>
<p>3. Rotate the two drum wheels of the micrometer eyepiece in reverse, gradually separating the two notches. Rotate the left drum wheel of the eyepiece so that the inner side of the left notches is tangent to the left edge of the</p>	

<p>indentation, as shown in Figure 5.7</p>	<p>Figure 5.7</p>
<p>4. Rotate the right measuring drum so that the inner side of the right scoring line is tangent to the edge on the right side of the indentation, as shown in Figure 5.8. Press the measurement button (19) D1 on the eyepiece to complete the measurement.</p>	 <p>Figure 5.8</p>
<p>5. Rotate the micrometer eyepiece by 90 ° (note that it should be tightly attached to the eyepiece tube during rotation), rotate the drum so that the inner side of the lower scoring line is tangent to the edge of the lower edge of the indentation, as shown in Figure 5.9;</p>	 <p>Figure 5.9</p>
<p>6. Rotate the measuring drum to make the inner side of the upper scoring line tangent to the edge of the indentation, as shown in Figure 5.10. Press the measurement button (19) D2 on the eyepiece to complete the measurement. The instrument automatically calculates the hardness value and displays it. The number of tests automatically increases by one, and one measurement is completed.</p>	 <p>Figure 5.10</p>

5.1.2 Test process of touch color screen digital display automatic turret model

**When using this machine, please always be careful not to touch any objects when rotating the turret**

- 1) Power on
- 2) You can press to turn the turret to the desired objective position .
- 3) Place the test piece on a cross workbench and focus to find the focal plane .  
When the focal plane is found, if the specimen is irregular, please manually rotate the turret. The pressure head should not touch any objects before continuing with step 4.
- 4) Press START to start, and the pressure head will turn to the front and start

testing regardless of its position. At this time, do not take any action and wait for the testing to be completed.

- 5) After loading and unloading, the turret will automatically rotate to a 40x objective lens. At this point, the hardness value can be obtained by measuring diagonally. The measurement method refers to the touch color screen digital display manual turret model.

## 6 Maintenance and operation precautions of hardness tester

### 6.1. Light source maintenance

When the light bulb is broken, please replace it with a new one as follows:

- 1) Please cut off the power first to avoid electric shock;
- 2) Loosen screw 1 counterclockwise; See Figure 6.1
- 3) Gently push the back cover in the direction of arrow 1, then rotate in the direction of arrow 2 to remove the back cover; See Figure 6.2.
- 4) Pull out the faulty bulb and replace it with a new one; See Figure 6.3.
- 5) Wipe the surface of the new bulb clean with a soft cloth, and do not touch the surface of the bulb with your hands;
- 6) Gently push the rear cover in the direction indicated by arrow 1, then rotate in the direction indicated by arrow 2 to cover the rear cover. See Figure 6.4.
- 7) Turn on the power switch.
- 8) Observe the micrometer eyepiece, tighten and adjust screw 1 clockwise to ensure uniform light in the field of view. (If necessary, loosen and adjust screw 2 up and down.) See Figure 6.5

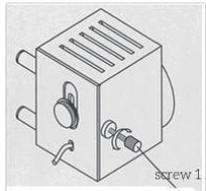


Figure 6.1 Loosening the screws

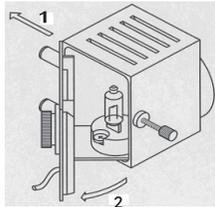


Figure 6.2 Removing the Rear Cover

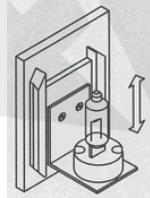


Figure 6.3 Replacing with a new light

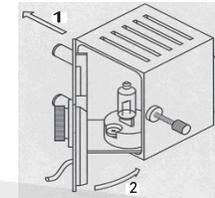


Figure 6.4 Closing the Rear Cover

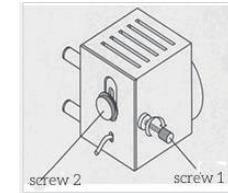


Figure 6.5 Adjusting screws

### 6.2 Replacement of fuses

**When the machine fuse is broken, please replace it as follows:**

- 1) Cut off the power supply, unplug the power cord from the socket, insert a flat screwdriver into the middle of the connector as shown, and pry out the fuse holder.
- 2) Remove the fuse holder from the incoming connector. Take out the fuse and check if the fine wires inside are broken. If you cannot determine whether the fuse is broken, you can use an ohmmeter to check if the fine wire is good
- 3) Replace with a new fuse and install it properly. The fuse is installed in the fuse holder to protect the hardness tester from damage caused by power voltage or internal short circuits. If there is any situation that causes the fuse to repeatedly burn out, please contact the maintenance personnel immediately.



Figure 6.6 Knocking on the fuse holder



Figure 6.7 Replacing the fuse

### 6.3 Diamond Indenter

- 1) The pressure head (7) and pressure head shaft are very important parts of the instrument, so be very careful not to touch the pressure head during operation.

2) To ensure testing accuracy, the indenter should be kept clean. When it is contaminated with oil or dust, a degreased cotton can be dipped in alcohol (industrial use) or ether, and the tip of the indenter should be carefully wiped clean.

3) If you want to replace the pressure head, please do not disassemble it yourself. Please contact a repairman

#### 6.4 micrometer eyepiece

1) Due to the disparity of each person, the lines in the field of view of the observation micrometer eyepiece may be blurry. Therefore, when changing people, the observer should first slightly rotate the eye mask on the eyepiece to make the lines in the field of view clear.

2) When inserting the micrometer eyepiece into the eyepiece tube, it should be inserted to the bottom without leaving any gaps, otherwise it will affect the accuracy of measurement. When measuring the diagonal of the indentation, the vertex must be measured, and then rotated 90 ° before measuring another pair of vertices.

3) Zero point: Every time the machine is turned on, it must be reset to zero point. Refer to page 13.

#### 6.5 sample

1) If you suspect that the machine hardness is not accurate, you can use a standard hardness block for proofreading. When proofreading, the hardness block should face upwards and the oil stains on the hardness block should be wiped out before measurement. Generally, the first test point is not counted, and the second point is only effective.

2) The surface of the sample must be clean. If there is grease and dirt on the surface, it will affect the measurement accuracy. When cleaning the sample, alcohol or ether can be used to wipe it.

3) When the sample is a fine wire, thin piece, or small piece, it can be clamped using a fine wire clamping platform, a thin piece clamping platform, and a flat mouth clamping platform respectively, and placed on a cross test bench for testing; If the test piece is too small to grip, the test piece should be embedded and polished before proceeding with the test.

4) To ensure the correctness of the test, it is necessary to ensure the thickness of the sample. According to national standards, the thickness of the test piece

must not be less than 8-10 times the depth of the indentation. So how do you know if the test piece meets the specified requirements? Here are several methods to introduce.

a) Direct observation method:

Test the specimen according to the specified requirements, and observe whether there are any signs of deformation on the edges and back (support surface) of the specimen after the test is completed. If there are traces, the test results are invalid. The thickness of the test piece is too thin to meet the requirements of the test. There are two options: one is to remake the test piece, and some parts cannot be changed. The second option is to choose a smaller test force, which can only be carried out within the specified requirements.

b) Formula calculation method:

The calculation formula for the thickness of Vickers hardness specimens:  $h=d/7$ .

#### 6.6 Selection of force and indentation size

When measuring Vickers hardness, as long as the conditions of the specimen allow, try to use a large test force, and the measurement is relatively accurate. Generally, hard materials require significant testing force; Soft materials require less testing force.

According to convention, measuring the diagonal length of the indentation is most convenient when it is around 50um, but also considering the thickness of the material.

Reference: Material thickness  $\geq 1.5 \times$  Indentation diagonal length

For example, if the material thickness is 0.1mm, the diagonal length of the indentation cannot be greater than 0.066mm.

Here:  $0.1 \geq 1.5 \times 0.066$ .

#### 6.7. printer

The body of the digital micro hardness tester is equipped with a thermal printer. The external structure of the machine is shown in Figures 6-8.

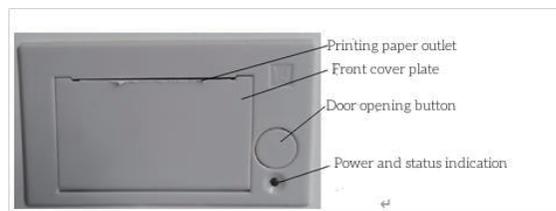


Figure 6-8 Printer Appearance Structure

When the power of the hardness tester is turned on, the power indicator light will be illuminated.

When the paper shortage indicator light flashes, the printing paper has been used up, please replace it.

Replacing Printing Paper:

Printing paper specifications Thermal paper roll, paper width 57.5±0.5 mm

- ◇ Inner paper roll with outer diameter less than  $\phi 35$  mm,
- ◇ Paper thickness 0.065 mm, Paper 53-64 g/m<sup>2</sup>

1. Open the front cover of the printer, as shown in Figures 6-9.



Press this paper loading button to open the front cover

Figure 6-9 Opening the front cover of the printer

2. Remove the paper roll from the printer. If there is already a paper roll on the printer, skip this step to step 4.
3. Place the new paper roll on the paper roll and press it into the guide slot of the printer.
4. Cut the paper end into a pattern as shown in Figure 6-10.

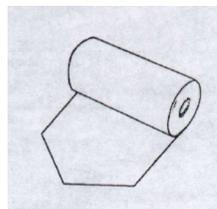


Figure 6-10 Paper End Style

Figure 6-11 Place the paper back cover on top of the front cover

5. Pull the printing paper end out of the paper outlet on the front cover of the printer and close the front cover. As shown in Figure 6-11, it can be used normally.

Note: If there is only paper output without printing records during printing, you may have loaded the printing paper backwards. You need to remove the paper roll and turn it around, and then follow the above steps to reinstall it.