Portable Leeb Hardness Tester Manual

1、Overview ：

This instrument is a portable measuring instrument, it can quickly, lossless, high accuracy of the hardness of common metal materials measurement. It can be used in both laboratory and engineering sites. Through the instrument measurement condition setting, it can meet a variety of measurement demands. This instrument can be used in manufacturing, metal processing industry, chemical industry, commodity inspection and other testing fields. It is a necessary instrument for non-destructive hardness testing of materials. The instrument meets the following standards:

——《JJG 747-1999 Leeb Hardness Tester》

——《ASTM A956-06 Standard Test Method for Leeb Hardness Testing of Steel Products》

2、Feature：

1、Small and portable
The instrument is compact, portable and integrated without connecting cables, which have high reliability.

2、Industrial bright OLED display
It can also be displayed under direct sunlight clearly, suitable for various light conditions

3、The accurate and high-precision measuring circuit ensures that the value error is ±0.5%(HLD=800) and the value repeatability is 0.8%

4、 Support a variety of hardness
HLD、HRC、HRB、HRA、HB1、HB2、HV、HSD

5、Automatic calculation
The average hardness can be calculated automatically

6、Hardness
Support "forged Steel" material
When the D-type impact device is used to test the "forged steel" sample, the HB value can be read directly without manual table reference.

7、Convenient charging

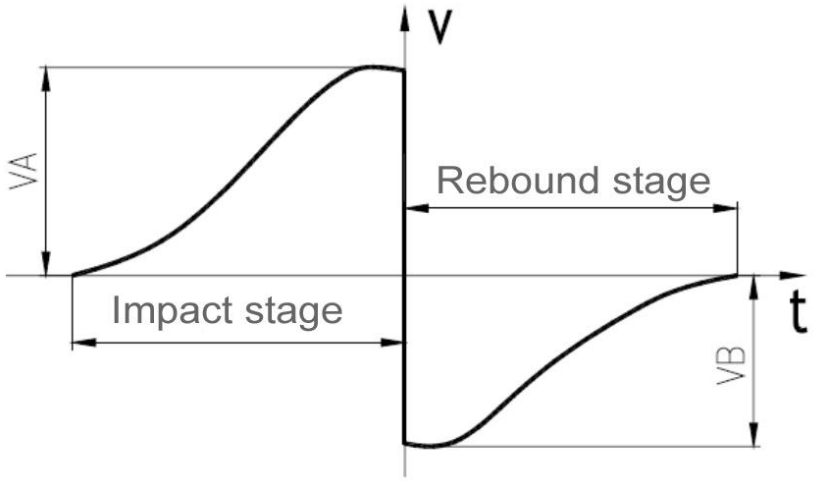
USB charging, compatible with most mobile phones and other digital product interface

3、Principle of measurement

With the specified quality of the impact body under the action of elastic force, with a certain speed of impact on the surface of the sample, with the punch 1mm away from the surface of the sample rebound speed and impact speed ratio of the hardness value. The calculation formula is as follows:

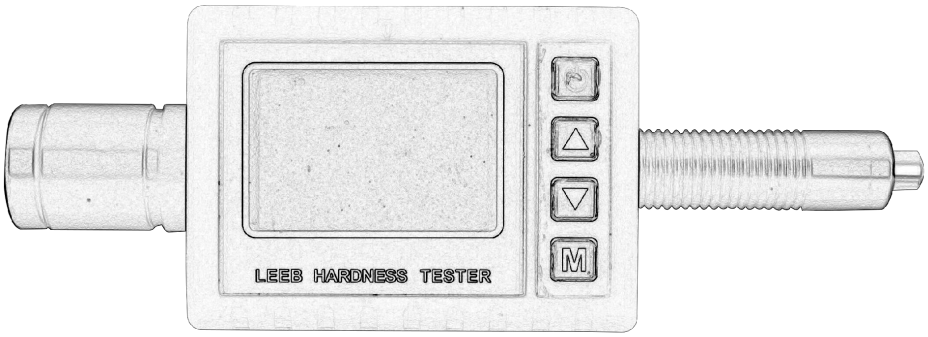
HL=1000×VB/ VA
Leeb Hardness Range
Rebound
Impact speed

The schematic diagram of the output signal of the impact device is as follows:



4:Instrument appearance and display：

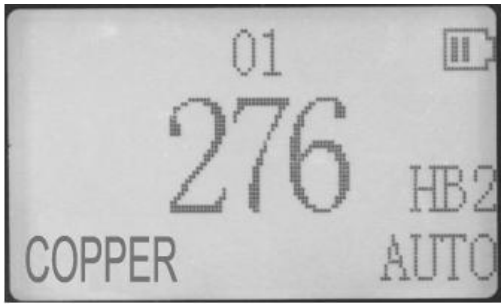
1、Instrument appearance



2、 Display

After starting up, the instrument will enter the main display interface automatically (different materials display different contents on the main interface, but the display position is the same), as shown below:

Times：01
Materials：Pure copper
Unit：HB2
Direction：AUTO



3、Button Definition

	Power		Up
M	Menu		Down

5、Technical parameters:

1、Applicable measurement range:

Materials	Hardness	Impact device	
		D	DL
Steel and cast steel	HRC	17.9～68.5	20.6～68.2
	HRB	59.6～99.6	37.0～99.9
	HRA	59.1～85.8	
	HB	127～651	81～646
	HV	83～976	80～950
	HS	32.2～99.5	30.6～96.8
Steel	HB	143～650	
CWT、ST	HRC	20.4～67.1	
	HV	80～898	
Stainless steel	HRB	46.5～101.7	
	HB	85～655	
	HV	85～802	
GC. IRON	HRC		

Grey cast iron	HB	93～334	
	HV		
NC、IRON	HRC		
	HB	131～387	
	HV		
C．ALUM	HB	19～164	
	HRB	23.8～84.6	
BRASS	HB	40～173	
	HRB	13.5～95.3	
BRONZE	HB	60～290	
COPPER	HB	45～315	

Measurement direction: support 360º(vertical down, oblique down, horizontal, oblique up, vertical up)
Detectionrange:(170-960)HLD,(17.9-69.5)HRC,(19-683)HB,(80-1042)HV,(30.6-102.6)HS, (59.1-88)HRA, (13.5-101.7)HRB
Hardness standard ：HL、HB、HRB、HRC、HRA、HV、HS
Error Value：±0.5%(HLD=800)
Indication Repeatability：0.8%(HLD=800)
Display: Industrial grade 128×64 graphic dot matrix OLED liquid crystal
Installation Szie：148mm×30mm×30mm
Power supply: rechargeable lithium battery
Continuous working time: about 20 hours
Operating conditions: operating temperature -10-50℃; Storage temperature: -30℃-60℃; Relative humidity ≤ 90%;
Applicable materials: steel and cast steel, alloy tool steel, stainless steel, gray cast iron, nodular cast iron, cast aluminum alloy, copper zinc alloy (brass), copper tin alloy (bronze), pure copper, forged steel
Main application areas: Bearings and other parts; Failure analysis of pressure vessels, steam turbine units and equipment; Heavy duty workpiece; Installed mechanical or permanently assembled parts; Workpieces with very narrow test space; Require formal original records of test results; Material differentiation of metal material warehouse; Rapid inspection of multiple measuring parts of large workpiece;Bearings and other parts; Failure analysis of pressure vessels, steam turbine units and equipment;

2、Impact Device：

Impact Device		D/DL
Impact energy Impact body weight		11mJ 5.5g/7.2g
Ball head hardness: Ball head diameter: Ball head materials:		1600HV 3mm Tungsten carbide
Impact device diameter: Impact device length: Impact device weight:		20mm 86(147)/ 75mm 50g
Maximum hardness of specimen		940HV
Average surface roughness of specimens Ra:		1.6μm
Minimum weight of specimen: Measured directly Stable support required Compact coupling is required		 >5kg 2～5kg 0.05～2kg
Minimum thickness of specimen Compact coupling is required Minimum depth of hardened layer		 5mm ≥0.8mm
Ball head indentation size		
Hardness 300 hv	Indentation diameter Indentation depth	0.54mm 24μm

Hardness 600 hv	Indentation diameter Indentation depth	0.54mm 17μm
Hardness 800 hv	Indentation diameter Indentation depth	0.35mm 10μm
Scope of application of impact device		DL models measure slender narrow grooves or holes； Type D used for routine measurements

3、Value error and repeatability

Standard hardness value	Value error	Repeatability
800HLD	±0.5%	0.8%

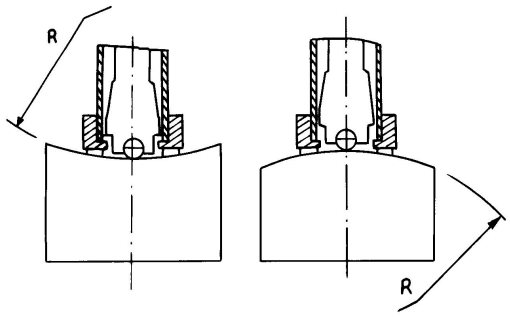
六、Use of instruments：

1、Sample preparation

In the process of preparing the specimen surface, the influence of heat and cold working on the specimen surface hardness should be avoided as far as possible.

If the measured surface is too rough, it will cause measurement error. Therefore, the tested surface of the sample must show metallic luster, and flat, smooth, no oil.

Curved surface: the test surface of the sample is preferably flat. If the curvature radius of the measured surface R is less than 30mm, a small supporting ring or a deformed supporting ring should be used in the test.



2、Specimen support

For heavy samples, no support is needed;

For medium-sized samples, must be placed on a flat, solid plane, the sample must be absolutely stable, without any shaking;

The sample shall be of sufficient thickness. The minimum thickness of the sample shall conform to Table 3.

For samples with surface hardening layer, the depth of hardening layer should conform to Table 3.

3、Coupling

For light samples, the coupling surface must be flat and smooth, the amount of coupling agent should not be too much, and the testing direction must be perpendicular to the coupling plane.

When the sample is a large area of plate, long rod, bending part, even if the weight and thickness are large, it may still cause deformation and instability of the specimen, resulting in inaccurate test value, so it should be strengthened or supported on the back of the test point.

The magnetic property of the sample itself should be less than 30 Gauss

4、Measurement

Boot

Press the "On/Off" key, then the power is switched on, and the instrument enters the measurement state after self-test.

loading

Push the loading sleeve down to lock the impact body, and the loading is complete.

The supporting ring of the impact device is pressed on the surface of the sample, and the impact direction should be perpendicular to the test surface.

measurement

Press the release button on the upper part of the impact device to test. At this time, the sample, the impact device, the operator are stable, and the direction of the force should be through the impact device axis.

Each measuring part of the sample is generally tested three times.

5、To turn it off

To turn it off

Press the [on/Off] key to shut down the instrument.

The distance between any two indentation or the distance between the center of any indentation and the edge of the sample shall conform to the following table.

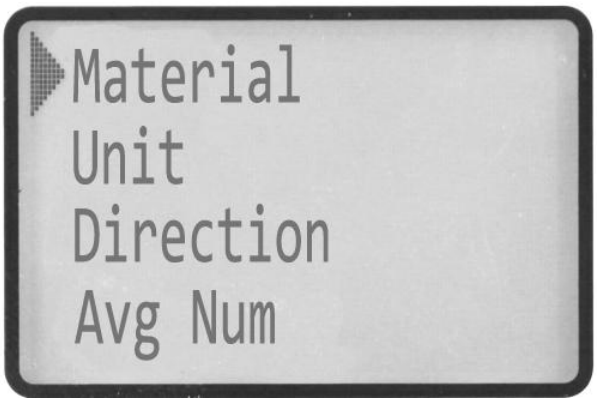
Distance between indentation centers	Distance between indentation center and specimen edge
≥3mm	≥5mm

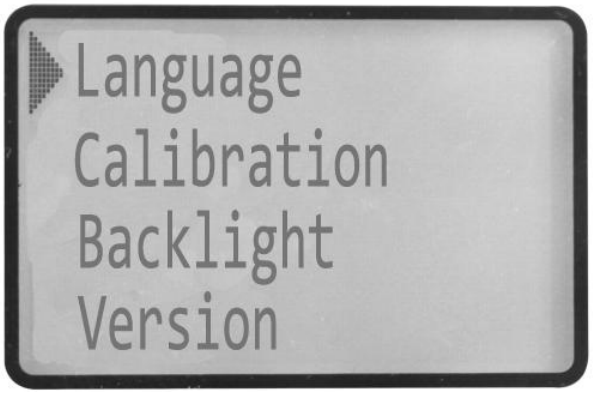
Hardness setting (with button version)

-- According to the applicable measurement range, select the hardness type and start the measurement.

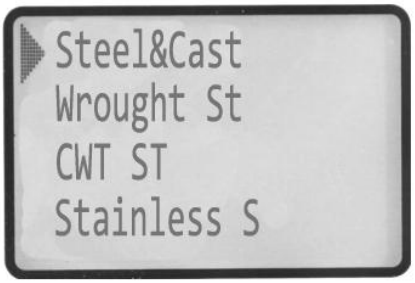
7、Menu structure diagram

The setting of instrument parameters and additional functions can be achieved through menu operation. Press the [Menu] key on the main display interface to enter the main menu, the arrow key to switch options, and the menu key to enter option Settings.

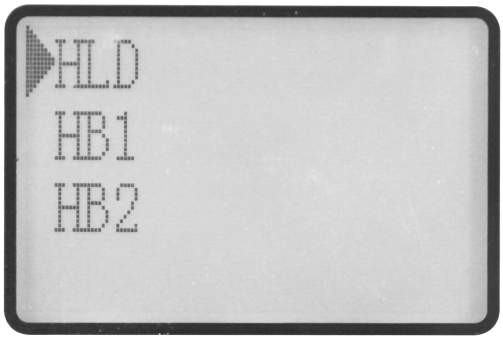




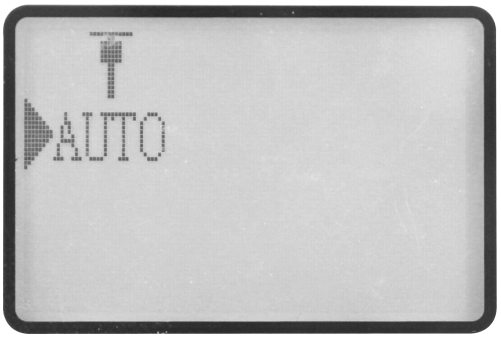
Materials： users can switch to the corresponding material options according to the different test materials; As shown in the figure below



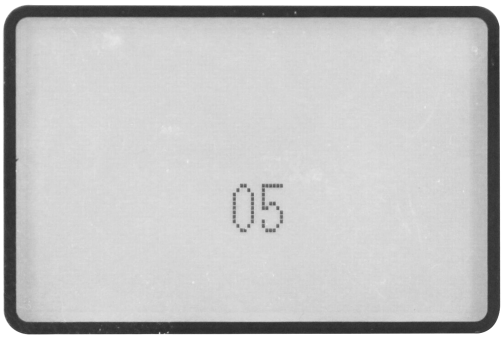
Unit：according to the actual test materials of the customer, the corresponding unit can be switched to different units (different material units display different); As shown in the figure below



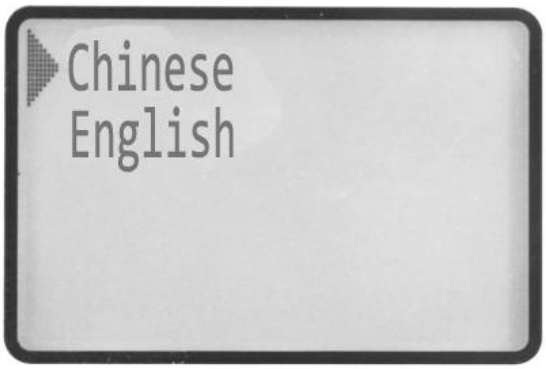
3、Direction：the direction of the instrument when the customer tests (AUTO direction is automatic adjustment); As shown in the figure below



Average number：set the number of test data needed to obtain the average value; The following figure



Language：Users can set two different languages; The following figure



Calibration:

If the error and repeatability of the measurement is too large, the instrument and the impact device can be calibrated by standard Richter hardness block (optional).

Press the [menu] key to enter the menu, press the [Up and down] key to select

Press the [menu] key to enter the menu, press the [Up and down] key to select "Calibration", press the [Menu] key to enter the calibration state.

7、The calibration measurement

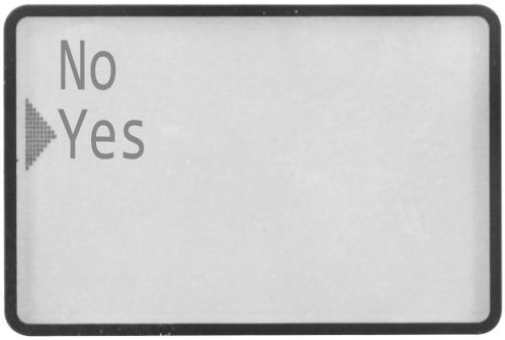
The average measurement value was obtained by randomly measuring three points vertically downwards on the Richter hardness block.

After the three points are measured, check whether they are close to the hardness value of the standard Richter hardness block. If two or three hardness values deviate greatly from the standard hardness, re-measure

Hardness value deviation is not large, press the [menu] key to complete the calibration.

The calibration range is ±15HL.

Backlight：customers can switch whether there is backlight according to the actual use; As shown in the figure below



八、Maintenance and Repair

1、Impact device

In the use of 1000-2000 times, to use the nylon brush to clean the impact device of the catheter and the impact body, cleaning the catheter will first unscrew the supporting ring, then the impact body is taken out, the nylon brush in a counterclockwise direction into the tube, after pulling out, so repeated 5 times, and then the impact body and the supporting ring on;

After use, the impact body should be released;

All kinds of lubricants are strictly prohibited in the impact device.

2、Normal maintenance procedure

When the standard Rockwell hardness block is used for verification, the error is greater than 2HRC, it may be the ball head wear failure, should be considered to replace the ball head or impact body.

In case of other abnormal phenomena, please do not disassemble or adjust any fixed assembly parts. After filling in the warranty card, submit it to the maintenance department of our company to implement the warranty regulations.

3、List of non-warranty parts

1. Shell 2. Impact body 3. Supporting ring parts 4. Key film 5. Window 6. The lithium battery

4、Storage conditions, transportation and precautions

Storage conditions, transportation and precautions

Storage should be away from vibration, strong magnetic field, corrosive media, moisture, dust, should be stored at normal temperature.

It can be carried out in the condition of third-class highway under the condition of original packing.

9、Charging

This machine uses rechargeable lithium battery, when the battery voltage is too low, please charge in time, and choose the random charging head and USB charging cable.

When the battery voltage is too low, the instrument will shut down automatically.

No matter whether it is turned on or not, it can be charged after connecting the charger, and the charging head indicator lights up.

10：List of product packaging accessories

Name	Quntity
Product	1PCS
Support ring	1PCS
Specification	1PCS
Brush	1PCS
Charging Line	1PCS