

UNI-T®



UT347A Leeb Hardness Tester User Manual

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PREFACE

Thank you for purchasing the new UT347A Leeb hardness tester. In order to use this product safely and correctly, please read this manual thoroughly, especially the Safety Instructions part.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

LIMITED WARRANTY AND LIABILITY

Uni-Trend guarantees that the product is free from any defect in material and workmanship within one year from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination and improper handling. The dealer shall not be entitled to give any other warranty on behalf of Uni-Trend. If you need warranty service within the warranty period, please contact your seller directly.

This warranty is the only compensation you can obtain. Uni-Trend will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by any reason or speculation. As some areas or countries do not allow limitations on implied warranties and incidental or subsequent damage, the above limitation of liability and stipulation may not apply to you.

TABLE OF CONTENTS

1. Overview	4
2. Accessories	5
3. Specifications	5
4. Product Introduction	7
5. Operating Principle	8
6. Preparation and Inspection	8
7. Quick Operation	9
8. Detailed Operation	10
9. Printer Paper Installation	20
10. Troubleshooting	21
11. Maintenance	21
12. Storage and Transport	21
Attached Table 1	22
Attached Table 2	23
Attached Table 3	24
Attached Table 4	25

1. Overview

UT347A is a tester designed to detect the metal material hardness based on the principle of the Leeb hardness test method.

Applications:

- Heavy and large workpieces;
- Bearings and other parts;
- Quality control of heat-treated parts;
- Machine guide rails and car chassis;
- Installed machinery or permanently assembled parts;
- Die cavity of molds and other workpieces with very narrow test space;
- Failure analysis of pressure vessel, steam generator and other equipment;
- Metal material identification.

Range of application:

- Refer to Attached Table 1 and Attached Table 2.

Functions:

- Test details can be recorded. The tester has the camera function and can store up to 900 records.
- The integrated thermal micro printer supports real-time printing and batch printing. The print definition is adjustable.
- The tester has a USB interface and a BLE Bluetooth module. With them, the tester can connect to computers or mobile phones and upgrade firmware;
- 2.8" TFT color screen with a resolution of 320x240;
- English/Chinese optional and easy-to-operate menu;
- Adjustable backlight brightness;
- The tester has the custom material function. Different materials have exclusive hardness conversion tables.
- The threshold alarm can be turned on/off. When it is on: higher than the upper threshold: yellow; lower than the lower threshold: red; normal: green.
- Built-in lithium battery, control circuit and USB Type-C interface for charging;
- Calibration function.

2. Accessories

Unpack the box and carefully check whether the following accessories are missing or damaged:

1. Leeb hardness tester-----	1 PCS
2. Type-D impact device-----	1 PCS
3. Standard Leeb hardness block-----	1 PCS
4. Nylon brush-----	1 PCS
5. Type-C USB cable-----	1 PCS
6. User manual-----	1 PCS
7. Download guideline-----	1 PCS
8. Printing paper-----	2 rolls

3. Specifications

● Units:
HL, HB, HRC, HRB, HV, HS

● Range:
170~960 HLD

● Indicating value error and repeatability: (see Table 1 below)

NO.	Impact device type	Hardness of standard Leeb hardness block	Indicating value error	Indicating value repeatability
1	D	790±40HLD	±6HLD	6HLD
		530±40HLD	±10HLD	10HLD
2	DC	790±40HLDC	±6HLDC	6HLDC
		530±40HLDC	±10HLDC	10HLDC
3	DL	894±40HLDL	±12HLDL	12HLDL
		736±40HLDL		
4	D+15	795±40HLD+15	±12HLD+15	12HLD+15
		544±40HLD+15		
5	G	590±40HLG	±12HLG	12HLG
		500±40HLG		
6	E	755±40HLE	±12HLE	12HLE
		508±40HLE		
7	C	851±40HLC	±12HLC	12HLC
		590±40HLC		

● Display:
2.8" TFT color screen with a resolution of 320x240

● Camera:
Effective pixel 640×480, focus free

● Flashlight:
White light, 0.5W LED

● Printing paper:
Thermal paper of 57mm width

● Data storage:
900 groups

● Alarm indicator light:
Higher than the threshold: yellow
Lower than the threshold: red
Normal: green

● Auto power off:
The meter will automatically shut down after a period of no operation. The auto power off time can be adjusted. The function can be turned off.

● Operating voltage:
Built-in lithium battery 3.7V

● Charging time:
About 2~4h

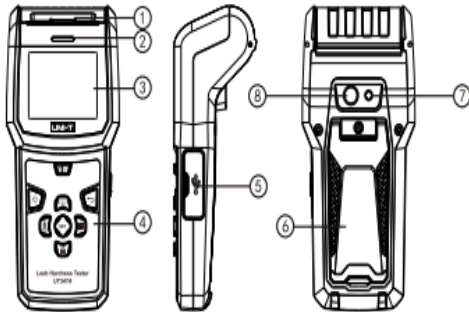
● Charging source:
DC 5V 2A

● Operating time:
About 4~8h (not print)

● Environmental requirements:
Operating: 0~40°C ≤80%RH;
Storage: 10~50°C ≤75%RH.
There is no strong vibration, strong magnetic field, corrosive medium and lots of dust in the surrounding environment.

4. Product Introduction

4.1 Structure



NO.	Description	NO.	Description
1	Printing paper export	5	USB and impact device interface
2	Indicator light	6	Bracket
3	Display	7	Flashlight
4	Buttons	8	Camera

4.2 Buttons

Operation	Short press		Long press	
	In the main interface	Menu/other setting interfaces	In the main interface	Menu/Records interface
Mode				
Power	/	/	Power on/off	Power on/off
Camera/Print	Record the current data	Take photos	/	/
Return	/	Return	Delete the current value	/
Up	Switch the probe direction	Up	Turn on/off the flashlight	Scroll up
Down	Switch the hardness unit	Left	/	Delete data
SET	Enter the menu interface	Confirm	/	Print data
Right	Switch the material	Right	/	Jump to a data
Print	Print the current data	Down	Export the printing paper	Scroll down

5. Operating Principle

Under the action of elastic force, the impact body of specified mass impacts the sample surface at a certain speed, and the hardness value is calculated by the ratio of the rebound speed and impact speed of the punch at 1mm away from the sample surface. The calculation formula is as follows:

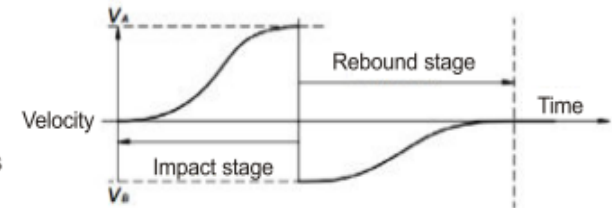
$$HL=1000 \cdot VB/VA$$

HL--Leeb hardness

VB--Rebound velocity

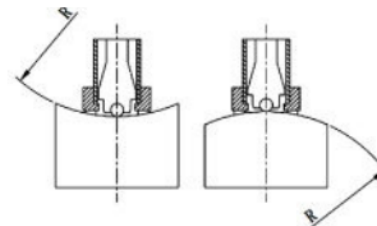
VA --Impact velocity

Output signal of impact device is shown in schematic diagram:



6. Preparation and Inspection

- The sample surface should conform to the requirements in Attached Table 3.
- The sample should not be heated or frozen; otherwise its surface hardness will be affected. Please place it at room temperature for a period of time before measuring.
- The sample surface must be smooth and glossy without oil stains.
- Heavy samples do not need to be supported. A sample with overhang, thin-wall and a weight less than 5kg should be supported by an object to avoid the sample deformation, bending and movement caused by the impact force. Medium samples must be placed on a smooth and solid surface.
- Curved sample: The optimal test surface is a plane. If a sample whose surface curvature radius R is less than 30mm (D, DC, D+15, C, E, DL type impact device) or less than 50mm (type-G impact device) is being tested, a small supporting ring or special-shaped supporting ring should be used.



- The minimum thickness of the sample should conform to the requirements in Attached Table 3.
- For samples with a surface hardening layer, the depth of the hardening layer should conform to the requirements in Attached Table 3.
- Coupling: Light samples must be closely coupled with a solid support. The coupling surfaces must be smooth. The coupling agent dosage should not be too much. The test direction must be perpendicular to the coupling plane. When the sample is a large area of plate, long rod or bending parts, it may still cause sample deformation and instability even if the sample weight and thickness is large, so it should be strengthened or supported on the back of the test point.


- The magnetism of the sample should be less than 30Gs.
- Before measurement, the tester can be inspected with the standard Leeb hardness block, and the indicating value error and repeatability should not be greater than those specified in Table 1.

Note: The standard Leeb hardness block is measured five times with a calibrated Leeb hardness tester, and the average is taken as its hardness value. If the hardness value obtained by measuring the hardness block with the Leeb hardness tester does not match this value, the tester should be calibrated first.

7. Quick Operation

Note: Turn off the tester before replacing the impact device.

7.1 Startup

- When the tester is not turned on, insert the impact device into the interface on the right side of the tester.
- Long press  to power on.

7.2 Loading

Push the loading tube down until the impact body is locked. For type-DC impact device, the loading tube can be sucked on the test surface, and the impact device is inserted into the loading tube until reaching the stop position, and then the loading is completed.

7.3 Localization

Press the support ring of the impact device firmly on the sample surface. The impact direction should be perpendicular to the test surface, as shown in the figure below.



7.4 Measurement

- Press the release button on the impact device. The sample, impact device and operator should be stable and the action direction should pass the axis of the impact device.
- Each test part of the sample usually should take 5 measurements. The data dispersion should not exceed mean value $\pm 15HL$.
The distance between any two indentations or the distance between the indentation center and the sample edge should conform to the regulations in Table 2.
- For specific materials, if the Leeb hardness values are to be accurately converted to other hardness values, comparative tests must be done to obtain the corresponding conversion relation. Use a certified Leeb hardness tester and a corresponding hardness tester to test on the same sample respectively. For each hardness value, five points of Leeb hardness should be measured uniformly around three or more hardness indentations to be converted. With the average Leeb hardness and the average corresponding hardness as comparison values respectively, make the hardness comparison curve. The comparison curve should include at least three groups of comparison data.

Type of impact device	Distance between centers of two indentations	Distance between indentation center and sample edge
	No less than (mm)	No less than (mm)
D、DC	3	5
DL	3	5
D+15	3	5
G	4	8
E	3	5
C	2	4


(Table 2)

7.5 Read Measured Values

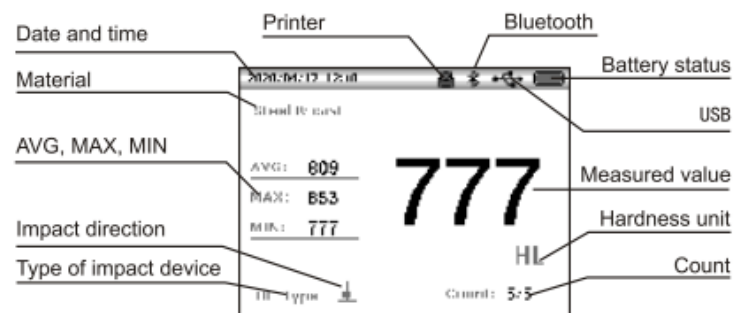
- Take the average hardness of several test points as the hardness value of the measured object.
- The measured values will show on the screen. The values measured by different types of impact devices are different, as shown in Table 1.

8. Detailed Operation

8.1 Power on/off

Long press  to power on/off. The tester will automatically shut down after a period of time without operation

8.2 Main Interface



8.3 Take Measurements

Take a measurement in the main interface, and the measured value, AVG, MAX and MIN will show on the screen. The number of impact times will increase by one, and the buzzer will sound a short beep. If the measured value is out of the range, the buzzer will sound a long beep. After reaching the set number of impact, the buzzer will sound two short beeps.

8.4 Buttons (in the main interface)

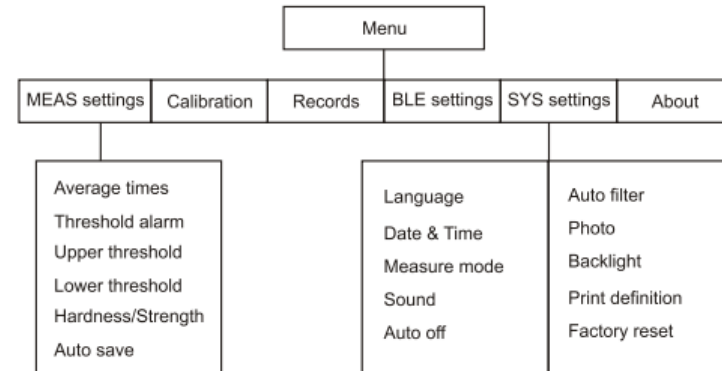
- Short press to save the current group of data, which is valid only after reaching the set impact times, and can only be saved once. After saving, press this button again to print the data or take a photo.
- In the camera interface, press to take a photo. An icon is automatically generated in the photo to indicate the current measurement average. Short press the direction (Up/Down/Left/Right) buttons to move the icon, and long press the direction buttons to quickly move it, as shown below:



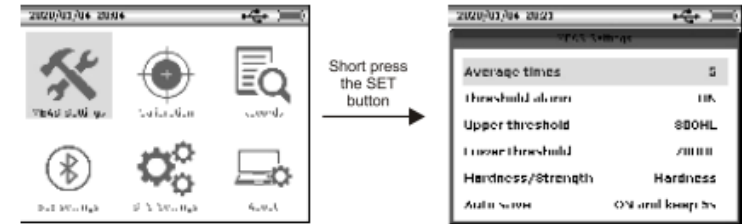
- Long press to delete the last measured value.
- Short press to change the impact direction, and long press to turn on/off the flashlight.
- Short press to step through the hardness units.

8.5 Menu

In the main interface, short press the SET button to open the menu:



8.6 MEAS Settings



- Average times



In the MEAS settings interface, press the Up/Down button to select "Average times", and then press the SET button to set the average times. Press the Right button to move the cursor to the units digit, and press the Up/Down button to add/subtract the value. Press the SET button to confirm. Press to cancel.

Note:

1. For different materials, the optional hardness units are also different.
 2. After changing the material, the hardness unit will automatically change to HL.
 3. This operation is invalid for the strength measurement.
- Short press the **SET** button to enter the menu interface.
 - Short press to select the material.
- Hardness: Steel & cast, Alloy steel, St. steel, Forged steel, Cast Al. alloy, Copper-zinc alloy, Copper-tin alloy, Grey cast iron, Nodular iron, Pure copper
 Strength: C steel, Cr steel, CrV steel, CrNi steel, CrMo steel, CrNiMo steel, CrMnSi steel, SS steel, S steel.



Press the Up/Down button to move the cursor. Press the SET button to confirm. Press to cancel.

Note: After changing the material, the current measured data will be cleared.

- Short press to print the current data, which is valid only after reaching the set impact times, and long press to control the export of printing paper.

