



Hantek



HT360 Series
Leeb Hardness Tester

User Manual
2022.12

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Hantek certifies HT360 series leeb hardness tester to meet China national industry standards, has passed the CE certification, and will further complete the certification of other national standards.

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1 Safety requirements

1.1 General security issues

Read the following safety precautions carefully to avoid injury and to prevent damage to this product or any product connected to this product. To avoid possible hazards, be sure to use this product as prescribed.

- **Only professionally authorized personnel should perform maintenance.**

- **Check all terminal ratings.**

To avoid fire or shock from excessive current, check all ratings and symbols on the product. Consult the product manual for rating details before connecting the product.

- **Do not operate with the cover open.**

Do not run the product with the outer cover or panel open.

- **Do not operate the product when you suspect it is faulty.**

If you suspect this product has been damaged, ask a qualified repairman to inspect it.

- **Maintain proper ventilation.**

- **Do not operate in a humid environment.**

- **Do not operate in a flammable or explosive environment.**

- **Please keep the product surface clean and dry.**

- **Antistatic protection.**

Static electricity may cause damage to the instrument. Test in an anti-static area as far as possible. Before connecting the cable to the instrument, the inner and outer conductors should be grounded briefly to release static electricity.

- **Use the batteries properly.**

If batteries are provided, do not expose the batteries to high temperature or fire. Keep batteries away from children. Replacing the battery incorrectly can cause an explosion (warning: lithium-ion batteries). Only use batteries specified for this product.



Warning:

Devices that meet Class A requirements may not provide adequate protection for broadcast services in the residential environment.

1.2 Safety terms and symbols

Safety terms in this manual:



Danger:

Indicate that you may cause immediate damage if you perform this operation.



Warning:

Indicate that it may not cause immediate damage to you if you perform this operation.



Note:

Indicate that you may cause damage to this product or other properties if you perform this operation.

Safety symbols on the product:



Warning

1.3 Working environment

Temperature

Operating temperature: 0 °C - 45 °C

Storage temperature: -20 °C - 60 °C

Humidity

≤+104 °F (≤+40 °C): relative humidity ≤ 90%

106 °F ~ 122 °F (+41 °C~45 °C): relative humidity ≤ 60%

The surrounding environment is free of vibration, strong magnetic field, corrosive medium and serious dust.



Warning:

To avoid the risk of short circuit or electric shock in the internal circuit, do not operate in a humid environment.

Altitude

When operating and not operating: 3000m (10000 feet).

Random vibration: 0.31 g RMS at 50Hz to 500Hz, 10 minutes per axial direction.

When not operating: 2.46g RMS from 5Hz to 500Hz, 10 minutes per axial direction.

Installation (overvoltage) category

This product is powered by a main power supply conforming to installation (overvoltage) category II.



Warning:

Ensure that no over-voltage (such as lightning) reaches the product. Otherwise, operators may be exposed to electric shock.

Definition of install (overvoltage) category

Installation (overvoltage) class I is the signal level that applies to the measuring terminal of the device connected to the source circuit, where measures have been taken to limit the instantaneous voltage to a correspondingly low level.

Installation (overvoltage) class II refers to the local distribution level, which is applicable to devices connected to the mains (AC power supply).

Degree of pollution

2 class

Definition of pollution level

- **Pollution Level 1:** No pollution, or only dry non-conductive pollution. This level of contamination has no effect. Examples: clean rooms or office with air conditioning.
- **Pollution level 2:** Generally only dry non-conductive pollution occurs. Temporary conduction due to condensation may sometimes occur. Examples: general indoor

environments.

- **Pollution level 3:** Conductive pollution occurs, or dry non-conductive pollution becomes conductive due to condensation. Examples: sheltered outdoor environment.
- **Pollution Level 4:** Permanent conductive contamination through conductive dust, rain or snow. Examples: outdoor sites.

Security level

Level 1 - Grounded product

1.4 Maintenance and cleaning

Maintenance:

Do not expose the LCD to direct sunlight for a long time when storing or placing the hardness tester.

Cleaning:

Check the instrument frequently according to the requirements of operating conditions, and clean the external surface according to the following steps:

- 1) Use a lint free rag to remove the floating dust on the outside of the hardness tester. Be careful to avoid scratching the bright filter material of the display.
- 2) Clean the hardness tester with a soft cloth soaked in water. For more thorough cleaning, use a 75% isopropyl alcohol water solvent.



Note:

To avoid damaging the surface of the instrument, do not use any corrosive reagents or chemical cleaning reagents.

Maintenance of impact device:

- 1) After using 1000-2000 times, clean the guide tube and impact body of the impact device with a nylon brush. When cleaning the guide tube, first unscrew the support ring, then remove the impact body, and screw the nylon brush counterclockwise into the tube until it reaches the end, then pull it out. Repeat this process 5 times, and then install the impact body and support ring;
- 2) After use, the impactor should be released;
- 3) It is strictly prohibited to use various lubricants inside the impact device.

**Warning:**

Before reenergizing, please make sure that the instrument is dry to avoid electrical short circuit or personal injury caused by moisture.

1.5 Environmental precautions

The following symbols indicate that this product complies with the requirements of WEEE Directive 2002/96/EC.

**Equipment recycling:**

The production of this equipment requires the extraction and use of natural resources. If the product is discarded improperly, some substances contained in the equipment may be harmful to the environment or human health. In order to avoid releasing harmful substances into the environment and reduce the use of natural resources, it is recommended to adopt appropriate methods to recycle this product to ensure that most materials can be reused correctly.

2 Product features

Product features

- HLD measurement range: (170~960) HLD
- Apply Leeb hardness measurement principle to measure various metal materials, including steel and cast steel, alloy tool steel, stainless steel, gray cast iron, ductile iron, cast aluminum alloy, copper zinc alloy, copper tin alloy, pure copper, forged steel, etc;
- Realize the mutual conversion between seven kinds of hardness scales: Leeb (HL), Brinell (HB), Rockwell B (HRB), Rockwell C (HRC), Rockwell A (HRA), Vickers (HV) and Shore (HS);
- Support tests in 5 different directions, including vertical downward, oblique downward, horizontal, oblique upward and vertical upward;
- Equipped with D-type impact device, which supports DC, DL, D+15, G and other types of impact devices;
- Support Windows connection, equipped with USB Type-C interface, which can easily and quickly exchange data with PC;
- Adopt 2.8-inch color display which can provide informative and intuitive content;
- The instrument is powered by rechargeable lithium battery, which can work continuously for no less than 80 hours. The long-life and environmentally-friendly battery has power saving functions such as backlight time adjustment and automatic shutdown;
- Chinese and English display, which is simple and convenient;
- Large capacity memory, which can store 500 data of single measurement value of the host, including measurement value, average value, measurement date, impact direction, times, materials, hardness system and other information;
- Applicable to quality control of heat treated workpieces, rapid inspection of workpieces with small test space such as installed mechanical or permanent assembly parts and mold cavities, rapid inspection of multiple parts of large workpieces, failure analysis of pressure vessels, steam turbine generators and other equipment, the material differentiation of bearing and other parts production lines, metal material warehouses, production line of bearing and other components, material differentiation of metal material warehouse, and hardness testing of machine tool guides and automobile chassis.

HT360 series portable hardness tester adopts Leeb hardness measurement principle to detect metal hardness, which can measure various metal materials including steel and cast steel, alloy tool steel, stainless steel, gray cast iron, ductile iron, cast aluminum alloy, copper zinc alloy, copper tin alloy, pure copper, forged steel, etc; Realize the mutual conversion between seven hardness scale, including Leeb (HL), Brinell (HB), Rockwell B (HRB), Rockwell C (HRC), Rockwell A (HRA), Vickers (HV) and Shore (HS). Adopt streamlined ergonomic structure design, equip with a support, and adopt 2.8 inch high-definition display screen, which can display rich and intuitive information; Equip

with a large capacity memory, which can store up to 500 data. Support the optional Bluetooth printer, which is convenient for users to output test results; Support Windows program control connection to facilitate the storage, export and printing of computer data.

3 Document Overview

This document is used to guide users to quickly understand the front panel, side panel, user interface and basic operation methods of HT360 series Leeb hardness tester.



Tips:


The latest version of this manual can be accessed at (<http://www.hantek.com>).

Software version:

Software upgrade may change or add product features. Please follow the Hantek website for the latest version.

Document format convention:

Key

Use icons to represent the front panel buttons. For example,  represents the "Scale" button.

1 Menu

Use "menu text (bold)+color (blue)" to indicate a menu option. For example, **Measure** means clicking the "Measure" option on the current operation interface to enter function configuration menu of "Measure".

2 Operating Steps

Use the arrow ">" to indicate the next operation. For example, **Print>Connect** means click **Print** and then click **Connect**.

Document content convention:

HT360 series Leeb hardness tester includes the following models. Unless otherwise specified, this manual takes HT360C as an example to explain HT360 series and its basic operation.

Model	Bluetooth
HT360	No
HT360C	Yes

Figure 1 Model

4 Quick Start

4.1 General inspection

Check the transport package

After receiving the hardness tester, users should check the equipment according to the following steps: check whether there is any damage caused by transportation: if the packaging carton or foam plastic protective pad is seriously damaged, please keep it until the whole machine and accessories pass the electrical and mechanical tests.

Check the accessories

The details of the accessories provided are described in "[Appendix A: Accessories and Options](#)" at the end of this manual. If the accessories are found missing or damaged, please contact the dealer responsible for this business.

Check the whole machine

If the appearance of the instrument is damaged, the instrument does not work properly, or fails to pass the performance test, please contact the dealer in charge of this business.

4.2 Appearance and dimension

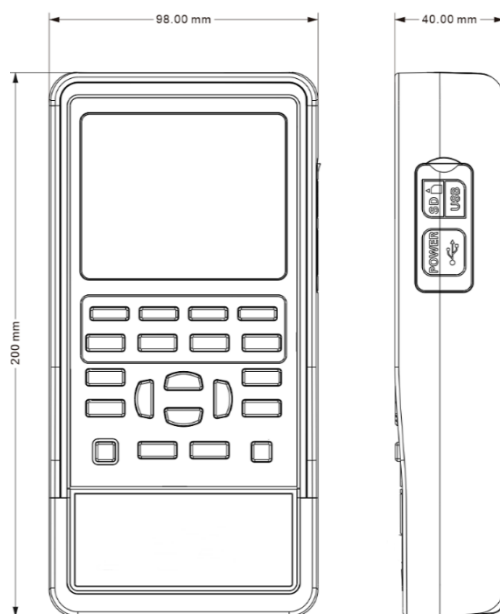


Figure 41 Front view and side view

4.3 D-type impact device

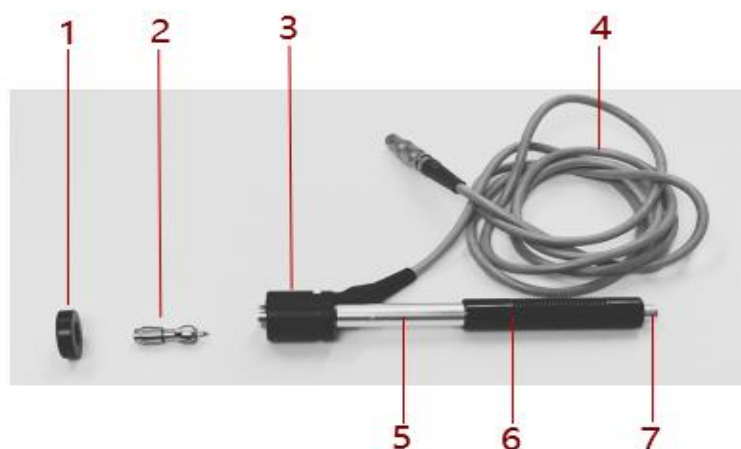


Fig. 2 D-type impact device

- | | |
|-------------------|------------------|
| 1 Supporting ring | 5 Conduit |
| 2 Impact body | 6 Loading set |
| 3 Coil | 7 Release button |
| 4 Conductor | |

4.4 Profiled impact device



Fig. 43 Profiled impact device

Working principle

Impact the sample surface with an impact body with specified mass at a certain speed

under the effect of elastic force, and calculate the hardness value with the ratio of the rebound speed and impact speed of the punch at a distance of 1mm from the sample surface. The calculation formula is as follows:

$$HL=1000 * VB/VA$$

Where: HL - Leeb hardness value

VB -- Rebound speed of impact body

VA - Impact velocity of impact body

The output signal of the impact device is shown in the following diagram:

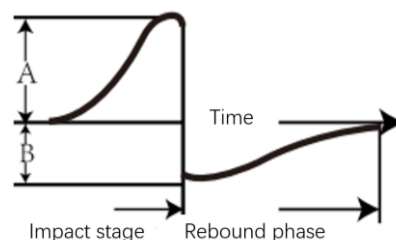


Fig. 4 Output signal of impact device

Technical characteristics

Serial No	Impact device type	Hardness value of standard Leeb hardness block	Indication error	Repeatability of indication
1	D	760±30HLD 530±40HLD	±6 HLD ±10 HLD	6 HLD 10 HLD
2	DC	760±30HLDC 530±40HLDC	±6 HLDC ±10 HLDC	6 HLD 10 HLD
3	DL	878±30HLDL 736±40HLDL	±12 HLDL	12 HLDL
4	D+15	766±30HLD+15 544±40HLD+15	±12 HLD+15	12 HLD+15
5	G	590±40HLG 500±40HLG	±12 HLG	12 HLG
6	E	725±30HLE 508±40HLE	±12 HLE	12 HLE
7	C	822±30HLC 590±40HLC	±12 HLC	12 HLC

Table 41 Display error and repeatability

This series of hardness tester meets the following standards

1. GB/T 17394. 1-2014 *Leeb Hardness Test for Metallic Materials Part 1: Test Method*
2. GB/T 17394. 2-2012 *Leeb Hardness Test for Metallic Materials Part 2: Verification and Calibration of Hardness Tester*

3. GB/T 17394.3-2012 *Leeb Hardness Test for Metallic Materials Part 4: Calibration of Standard Hardness Blocks*
4. GB/T 17394.4-2014 *Leeb Hardness Test for Metallic Materials Part 4: Standard Value Conversion Table*
5. Design basis and standard: *Technical Conditions for Leeb Hardness Tester JB/T 9378-2001*

4.5 Preparation before use

Preparation of sample surface

When preparing the sample surface, the influence of heating and cold working on the sample surface hardness shall be avoided as far as possible.

If the measured surface is too rough, measurement error will be caused. Therefore, the tested surface must show metallic luster and be flat, smooth and free of oil stain.

Curved surface: The test surface is better to be flat. When the curvature radius R of the tested surface is less than 30mm (type D, DC, D+15, C, E, DL impact devices) and less than 50mm (type G impact devices), small support rings or profiled support rings should be used for testing.

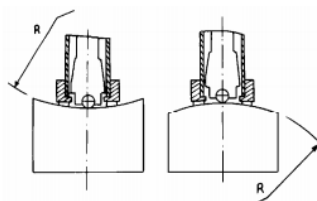


Figure 4 Curved sample face

Support of sample

1. No support is required for heavy samples;
2. For medium-sized samples, they must be placed on a flat and firm plane. The samples should be placed stably without any shaking;
3. The sample shall have sufficient thickness, and the minimum thickness of the sample shall comply with Table 3;
4. For the samples with surface hardening layer, the depth of hardening layer shall comply with Table 3.

Coupling

1. For the light sample, it must be tightly coupled with the solid support, the two coupling surfaces must be flat and smooth, the amount of coupling agent must not be too much, and the test direction must be perpendicular to the coupling plane;
2. When the sample is a large area plate, long rod or bending piece, if the weight and thickness are too large, it may cause distortion and instability of the sample, leading to

inaccurate test values, so it should be reinforced or supported at the back of the test point;


3. The magnetism of the sample should be less than 30 Gauss.

4.5.1 Measurement

Before measurement, random hardness block can be used to inspect the instrument, and its display error and repeatability shall not be greater than those specified in Table 4.1.

Note: The value of the random hardness block is measured vertically and downwards 5 times using a calibrated Leeb hardness tester, and the arithmetic mean is taken as the hardness value of the random hardness block. If the value exceeds the standard, the calibration function can be used for calibration.

1. Booting

- a. Insert the impact device plug into the impact device socket on the upper side of the instrument;
- b. Press the  key. When the power is on, the instrument enters the measurement state.

2. Loading

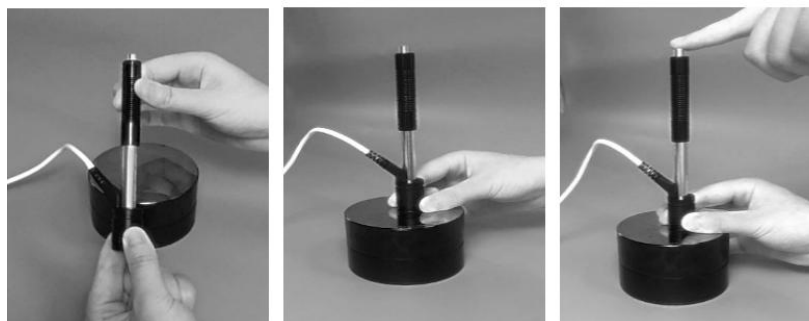


Figure 4 Loading

Push the loading sleeve downward to lock the impact body; For DC-type impact device, place the loading bar on the test surface, insert the DC-type impact device into the loading bar until its stop position, and then the loading is completed.

Press the support ring of the impact device tightly on the surface of the sample, and the impact direction should be perpendicular to the test surface.

3. Measuring

- Press the release button on the upper part of the impact device to measure. At this time, the sample, impact device and operator shall be stable, and the force direction shall pass through the axis of the impact device;
- Each measuring part of the sample is generally tested for five times. The data

dispersion shall not exceed $\pm 15HL$ of the average value;

- The distance between any two indentations or the distance from the center of any indentation to the edge of the sample shall comply with Table 4.2
- For a specific material, in order to convert the Leeb hardness value to other hardness values more accurately, a comparison test must be conducted to obtain the corresponding conversion relationship. The method is: use qualified Leeb hardness tester and corresponding hardness tester to test on the same sample respectively. For each hardness value, measure five Leeb hardness values evenly around more than three hardness indentations that need to be converted. Use the average Leeb hardness value and the average corresponding hardness value as the corresponding values, and make a hardness comparison curve. The comparison curve shall include at least three groups of corresponding data.

Impact device type	The distance between two indentation centers is not less than (mm)	The distance between the indentation center and the sample edge is not less than (mm)
D、DC	3	5
DL	3	5
D+15	3	5
G	4	8
E	3	5
C	2	4

Table 4 Measurement

4. Read the measured value

- Take average value of several valid test points as one Leeb hardness test data.
- Display the hardness value in front of the Leeb hardness symbol HL. The HL values measured by different types of impact devices are different.


4.5.2 Adjusting the support

When using the instrument, the user can open the standing foot as a support to tilt the instrument upward for easy operation and observation. When the instrument is not in use, the user can close the support to facilitate placing or moving.



Figure 45 Adjusting the support

4.5.3 Charge

If the power key  is pressed but the instrument does not respond, the battery may be depleted.

You can charge the instrument as follows:

Method 1: Charge the instrument through the power adapter

Connect the instrument to the power socket through the standard power adapter (5V/2A) and Type-C data cable for charging.

Method 2: Charge the instrument through Type-C interface

Connect the instrument to the computer or other equipment (5V/500mA) through Type-C data cable for charging.


Charging state description:

When the battery is installed during charging, the indicator light of the power key is red, and the battery box at the upper right corner of the instrument screen displays the change of power. If the battery is not installed, the power key indicator will flash red, and the battery box on the instrument screen will flash.

When the battery is fully charged, the instrument will automatically stop charging and the power key indicator will be turned off.

When the battery box at the upper right corner of the screen is displayed as a red box, it indicates that the battery is about to run out.

4.5.4 Set System Language

This product supports multiple languages. You can click [System>Language](#)  to

set the system language.

4.6 Product introduction

This chapter describes the front and rear panels and user interface of the instrument.

4.6.1 Front panel



Figure 4 Front Panel

1 Display screen

2.8 inch TFT LCD.

2 Menu keys

It corresponds to the four menus displayed below the LCD screen.

3 Material type key

Switch the measured material types, including steel and cast steel, alloy tool steel, stainless steel, gray cast iron, ductile iron, cast aluminum alloy, copper zinc alloy, copper tin alloy, pure copper and forged steel.

4 Main interface key

Press this key to return to the main interface.

5 Hardness scale key

Switch the hardness system, including Leeb (HL), Brinell (HB), Rockwell B (HRB), Rockwell C (HRC), Rockwell A (HRA), Vickers (HV) and Shore (HS).

6 Impact direction key

Switch the direction of impact.

7 Power key

Press the key when the machine is turned off, and the instrument will be turned on; Press the key when the machine is turned on, and the instrument will be turned off.

8 Printing shortcut key

Quickly print the current measurement.

9 Direction key

Used to move cursor position and change settings.

10 Esc

When printing multiple groups of data, printing can be stopped before completed.

11 Measurement times key

Change the number of measurements from 1 to 32.

12 Delete key

During the measurement, press this key
to delete the current measurement value.

13 Confirm key

14 Next Page

In the main interface, press this key to turn to the next page.

15 Save key

When automatic storage is closed, after measuring a group of data, press this button to save the current measured value. If the current data has not been measured, it cannot be saved.

4.6.2 Side panel



Figure 4 Side Panel

Type-C interface

Connect Type-C cable for charging and computer upgrading.

4.6.3 Top panel



Figure 46 Top panel

Impact device socket

Connect the impact device.

4.6.4 User interface

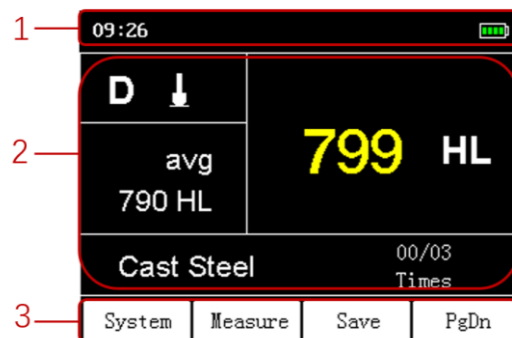


Figure 4 User Interface

1 Status display


Status display	Sign	Description
Time	Instrument time	Press the System>User button to enter the user system and change the time. When the battery is removed, the time and date will return to their original values.
	Electricity surplus	Prompt the remaining power. When the battery icon is red, it indicates that the battery is low. Please charge the instrument in time. Charging power supply: 5V/2A; The charging time is about 6 hours; The continuous working time shall not be less than 80 hours (25 °C without Bluetooth);

Table 2 User Interface

2 Functional area

The function area is displayed when the machine is turned on.

3 Menu area

Press     to select the corresponding menu.

4.7 Battery

4.7.1 Battery storage

Lithium ion batteries can be stored in clean, dry and ventilated rooms. Avoid contact with corrosive substances and keep away from fire and heat sources.

If the instrument is not used for a long time (more than 6 months), the battery should be taken out of the instrument and stored in a dry and cool environment with 50% ~70% of the power.

If the lithium battery is damaged, rusted, leaking, swollen, etc., it shall be taken out immediately and scrapped.

4.7.2 Battery replacement

The battery can be recharged repeatedly, but it is a consumable. If the standby time is greatly reduced, the battery needs to be replaced. The battery specification is 18650 lithium battery, 3.7V, 2600mAh.

Please refer to the following steps for replacement:

1 Open the support and you can see two screws. Remove the screws and remove the battery cover to see the battery.

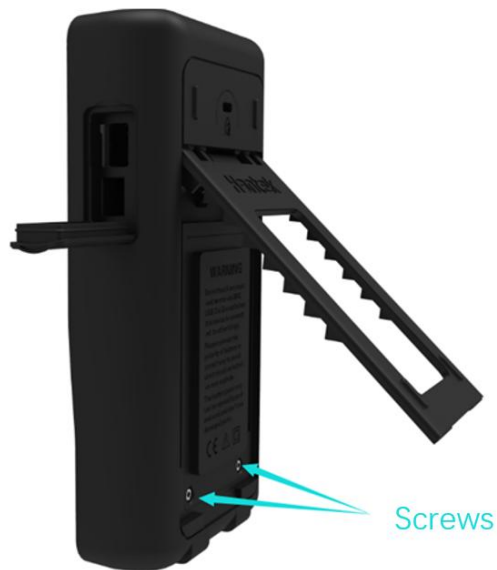


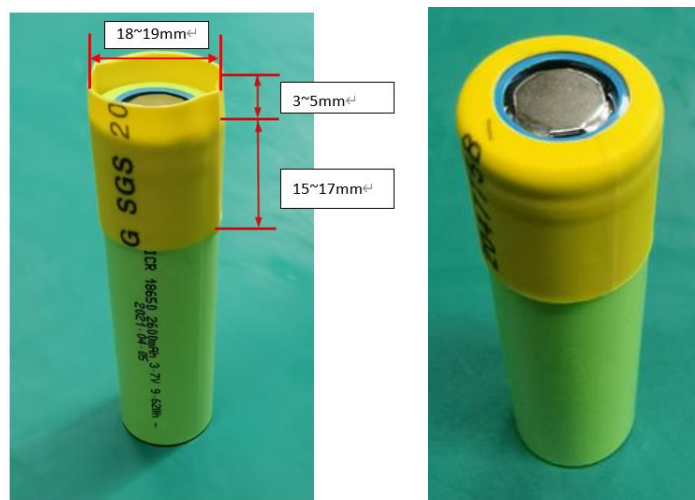
Figure 47 Opening the support

2 Please take out the battery from the negative pole, and take out the whole battery after the negative pole leaves.



3 When installing the battery, make sure that the positive pole of the battery has an insulating tube, otherwise, please refer to the following steps to install the insulating heat shrink tube.

- 1) Prepare insulating heat shrink tube of the following sizes.
Size: thickness 0.2~0.3mm, inner diameter 18~19mm, length 21mm.
- 2) Put it on the positive pole of the battery.
- 3) Use a hot air gun with the temperature of 270 ° to blow the tube for 5 seconds to make the heat shrink tube stick to the battery.



4 Install the battery.



Figure 48 Installing the Battery



Note:

Pay attention to the positive and negative pole of the battery when replacing the battery.

4.8 Safety lockhole

A safety lockhole is reserved on the back shell of the instrument, and users need to purchase a safety lock by themselves. Wrap one end of the safety lock around an object that is difficult to move, insert the other end into the safety lock hole, turn the key


clockwise to lock the instrument, and then pull out the key. In this way, the most basic anti-theft requirements can be met.



Figure 49 Safety Lockhole

5 Function introduction

5.1 Measuring interface

After the instrument is started, it will enter the measurement interface. If it is in any other interface, just press  to enter the measurement interface;

Each time the material is switched, the hardness scale is changed to Leeb, so the material should be set first and then the hardness scale;

Under normal conditions, the current measured value cannot be stored when the set number of impacts is not reached;

The measurement interface mainly displays the measuring impact device, measuring material, current measured value, measuring times and average value. When the measurement times reach the set number, the average value changes from white to green. The display page is as follows:

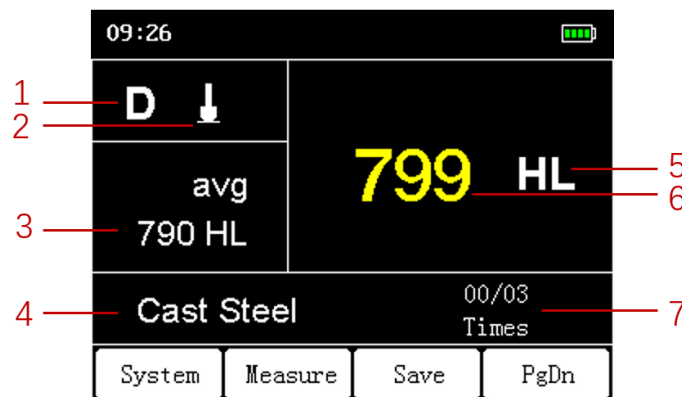


Figure 5 Measurement Interface

1 Impact device

The instrument supports 5 types of impact devices, namely D, DC, DL, D+15 and G, which are automatically identified during replacement, and no calibration is required.

2 Measuring direction

It supports vertical downward, oblique downward, horizontal, oblique upward and vertical upward.

3 Measuring average

4 Measuring materials

The measured materials include steel and cast steel, alloy tool steel, stainless steel, gray cast iron, ductile iron, cast aluminum alloy, copper zinc alloy (brass), copper tin alloy (bronze), pure copper and forged steel.

5 Hardness scale

Switch the hardness scale, including Leeb (HL), Brinell (HB), Rockwell B (HRB), Rockwell C (HRC), Rockwell A (HRA), Vickers (HV) and Shore (HS).

6 Current measured value

7 Times of measurement/total times of measurement

When the number of measurements reaches the set number, the average value changes from white to green.

5.2 System settings

After the instrument is started and enter the<Main Interface>, press **the System** button to enter the<System>.

On the System page, language, sound, backlight brightness, backlight time, automatic shutdown, date and time can be set.

Function	Settings	Description
Language	Chinese English	Set the menu language.
Backlight	1-10	Set the screen backlight brightness.
BL time	30s 60s 90s 120s OFF	Set the backlight time of the screen. The screen backlight will be dimmed within a specified time if no key is operated.
APO Time	5min 10min 30min OFF	Set the automatic shutdown time. The instrument will automatically shut down within the specified time if no key is not operated.
Beeper	ON OFF	Turn key sound on or off.
Date Time	- -	When the battery is removed, the time and date will return to their original values.

Table 5 System menu functions

5.3 Measurement

Select **Measure** in the main interface to enter the<Measure>interface.

Function	Settings	Description
Direction	Downward Inclined down Horizontal CLB climb Upward	Select the direction of impact.
Times	1-32	Set the average number of times. When the number of measurements reaches the


Function	Settings	Description
		average number, the average value is displayed in green. Continue measuring will result in recount.
Material	(Cast) Steel CWT. steel Stainless steel Grey cast iron Ductile iron Cast aluminum alloy Copper zinc alloy Copper tin alloy Pure copper Forged steel	Switch the type of material being measured.
Scale	HL HB HRB HRC HRA HV HS	Change the hardness scale

Table 51 Measurement menu functions

5.4 Save

Select **Save** in the main interface to enter the <Save> interface.

There are 10 storage groups in total. Each storage group can store 50 data, and a total of 500 data can be stored.

Function	Settings	Description
Auto Save	ON OFF	When automatic storage is on, the measured values will be automatically stored in the selected storage group after each measurement, and each storage group can store 50 data. When the current storage group is full, the instrument will remind you to switch to the next storage group. When the automatic storage is off, after a measurement is completed, press  to save the measured value, otherwise the measured value will not be saved.
Store Set	1-10	After each measurement, the data is stored in this storage group.
Browse Set	1-10	Select a group to browse data.
Delete Set	1-10	Select a group to delete data.

Function	Settings	Description
Delete All	--	Delete all data in ten groups.

Table 52 Storage menu functions


5.5 Information

In the main interface, **Pgdn** > **Info** to enter the<Information>interface.

Display the instrument model, serial number, hardware version, software version and whether Bluetooth printing is supported.

5.6 Calibration

In the main interface, **Pgdn** > **Cal** to enter the<Calibrate>interface.

If the instrument is used for the first time or not used for a long time, the instrument and impact device must be calibrated with a random Leeb hardness block. The number of measurements is 5, and the displayed value is the average value. Press  to adjust.

Press the **Save** key to complete the calibration, and press the **Back** key to cancel the calibration. The calibration range is $\pm 15HL$.

Attention: Calibration must use Leeb hardness blocks.

5.7 Printing

Only HT360C supports printing.





Figure 5 Printer

Hantek hardness tester	
Storage No. :	No.01
Record No. :	No.02
Date :	2022/06/06
Tester :	D
Direction :	Downward
Times :	04
Material :	(Cast) Steel
Average Value :	792HL

792 786 798 791	

Figure5 Printing Paper

- 1 Printer: Press the power on key , and the indicator will flash blue.
- 2 Hardness tester: Main interface > **Print** > **Connect**, the instrument displays "Connecting the printer...". At this time, the instrument cannot be operated. After about one minute, when the printer successfully connects to the device, the printer blue light is off, printing can be performed.
During printing of multiple measured values, press  to stop the current printing.




Function	Description
Link State	Displays the connection status between the instrument and the printer.
Curr Value	Print the current measured value. If the current measurement is not completed, prompt "Measurement is not completed" and no printing will be performed.
Group Set	Press   to select one of the 10 groups.
Value Set	Select some values to print in some print groups.
Print All	Print all the values in all print groups selected

Table 5 Print menu functions

5.8 Firmware upgrade

1. Download and install the burning tool "DfuSe Demo v3.0.5". Download the upgrade package (*.*.dfu).
2. In the shutdown state, insert the USB cable into the Type C port of the instrument, and the instrument is connected to the computer. Keep holding down the  key, gently press the power key and release it. At this time, the indicator light in the lower right corner starts flashing red and green, indicating that the instrument has entered the Dfu mode. Release F1 key.

6 Windows software

6.1 Software download and installation

Users can download the application software of the instrument on the official website of Hantek:

<http://hantek.com/products/detail/18195>

You can also scan the [QR code](#) on the back of the instrument for downloading.

Open the "HT360" application and use it directly without installing it.

Press the power key to turn on the instrument.

Connect the instrument to a Windows computer using a USB cable to communicate via USB.

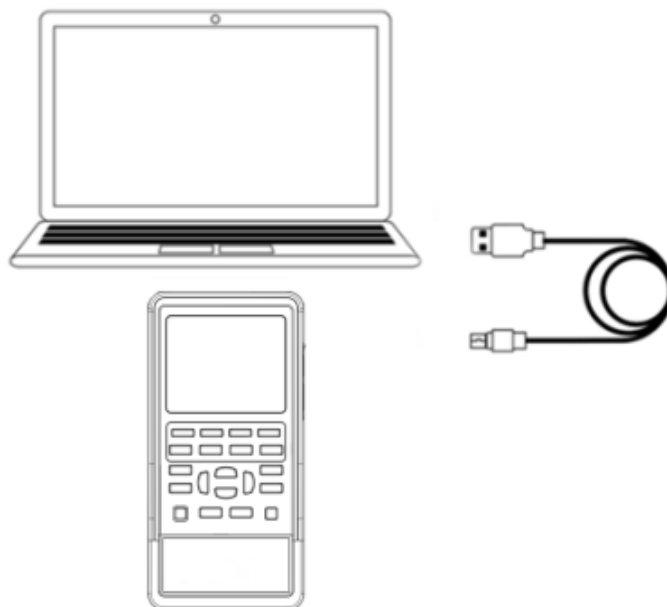


Figure. 6 Connection diagram

6.1.1 Software function

User interface

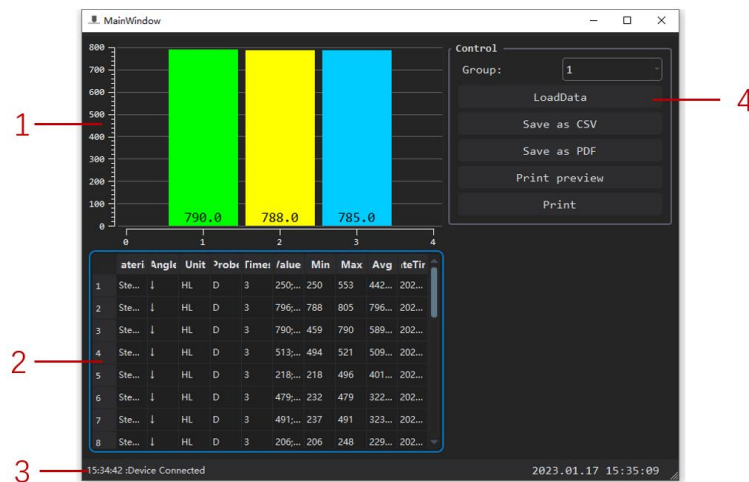


Figure. 6 Upper computer user interface

1. Hardness value histogram

After selecting a group of measured values to load, the specific value of a measured number is represented by a histogram.

2. Loading details

The measured data, including material, impact angle, hardness scale, impact device, impact times, specific value, maximum value, minimum value, average value and test date, shall be displayed as a whole.

3. Connection status

When the device connection is successful, "Device connected" is displayed. The previous time is the time when the device was connected. When the device is disconnected, "Device disconnected" is displayed. The previous time is the time when the device was disconnected.

4. Control area

- Load: load the data of the above selected group.
- Save as CSV: Export the load group data, including material, impact angle, hardness scale, impact device, impact number, specific value, maximum value, minimum value, average value and test date, as a CSV file.
- Save as PDF: Export the histogram to a PDF file.
- Print Preview
- Print: Print the currently loaded group data.









5. Current date

7 Troubleshooting

1. If the power key is pressed, the screen is still black without any display.

- 1) Plug in the charger. If the instrument is on, the battery is dead or damaged. Charge or replace the battery.
- 2) After the above check, restart the instrument.
- 3) If you still cannot use this product normally, please contact Hantek.

2. The screen display is too dark to see clearly

- 1) Check whether the brightness value of the LCD screen is too small. Press the **System** > **Backlight**, press the direction keys   to select the **backlight**, and press   to change the brightness of the LCD screen to an appropriate state.
- 2) Check the backlight time setting. Press **System** > **Backlight**, press the direction keys   to select the **backlight time**, and press   to change the screen backlight time.

3. The instrument does not display the measured value

The sensor cable is faulty. Replace the sensor cable.

8 Attached table

8.1 Attached table 1

Material	Hardness system	Impact device					
		D/DC	D+15	C	G	E	DL
Steel and cast steel	HRC	17.9~68.5	19.3~67.9	20.0~69.5		22.4~70.7	20.6~68.2
	HRB	59.6~99.6			47.7~99.9		37.0~99.9
	HRA	59.1~85.8				61.7~88.0	
	HB	127~651	80~638	80~683	90~646	83~663	81~646
	HV	83~976	80~937	80~996		84~1042	80~950
	HS	32.2~99.5	33.3~99.3	31.8~102.1		35.8~102.6	30.6~96.8
Steel	HB	143~650					
CWT、ST alloy tool steel	HRC	20.4~67.1	19.8~68.2	20.7~68.2		22.6~70.2	
	HV	80~898	80~935	100~941		82~1009	
Stainless steel	HRB	46.5~101.7					
	HB	85~655					
	HV	85~802					
GC. IRON	HRC						
	HB	93~334			92~326		
	HV						
NC、IRON	HRC						
	HB	131~387			127~364		
	HV						
C.ALUM	HB	19~164		23~210	32~168		
	HRB	23.8~84.6		22.7~85.0	23.8~85.5		
BRASS	HB	40~173					
	HRB	13.5~95.3					
BRONZE	HB	60~290					
Copper	HB	45~315					

8.2 Attached table 2

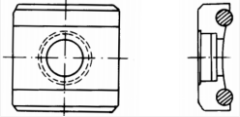
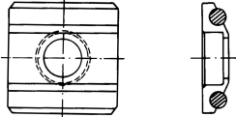


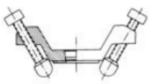
Serial No	Material	Leeb hardness HLD	Strength σ_b (MPa)
1	C mild steel	350~522	374~ 780
2	C high carbon steel	500~710	737~ 1670
3	Cr	500~730	707~ 1829
4	CrV	500~750	704~ 1980
5	CrNi	500~750	763~ 2007
6	CrMo	500~738	721~ 1875
7	CrNiMo	540~738	844~ 1933
8	CrMnSi	500~750	755~ 1993
9	SSST	630~800	1180~ 2652
10	SST	500~710	703~ 1676

8.3 Attached table 3

Profiled impact device		DC (D) /DL	D+15	C	G	E (Import needed)
Impact energy		11mJ	11mJ	2.7mJ	90mJ	11mJ
Mass of impact body		5.5g/7.2g	7.8g	3.0g	20.0g	5.5g
Ball joint hardness:		1600HV	1600HV	1600HV	1600HV	5000HV
Ball joint diameter:		3mm	3mm	3mm	5mm	3mm
Ball joint material:		Tungsten carbide	Tungsten carbide	Tungsten carbide	Tungsten carbide	Diamond
Diameter of impact device:		20mm	20mm	20mm	30mm	20mm
Length of impact device:		86(147)/75mm	162mm	141mm	254mm	155mm
Weight of impact device:		50g	80g	75g	250g	80g
Maximum hardness of test surface		940HV	940HV	1000HV	650HB	1200HV
Average surface roughness of test surface Ra:		1.6μm	1.6μm	0.4μm	6.3μm	1.6μm
Minimum weight of test piece:				>1.5kg		
Can be directly measured		>5kg	>5kg	0.5~1.5kg	> 15kg	>5kg
Stable support required		2~5kg	2~ 5kg	kg	5~ 15kg	2~5kg
Dense coupling required		0.05~2kg	0.05~2kg	0.02~0.5kg	0.5~5kg	0.05~2kg
Minimum thickness of test piece		5mm	5mm	1mm	10mm	5mm
Dense coupling		≥	≥0.8mm	≥	≥1.2mm	≥0.8mm
Minimum depth of hardened case		0.8mm		0.2mm		
Ball joint indentation size						
When the hardness is 300HV	Indentation diameter	0.54mm	0.54mm	0.38mm	1.03mm	0.54mm
	Indentation depth	24 μm	24 μm	12 μm	53μm	24μm
Hardness	Indentation	0.54mm	0.54mm	0.32mm	0.90mm	0.54mm

600HV Hour	diameter Indentation depth	17 μm	17 μm	8 μm	41 μm	17 μm
When the hardness is 800HV	Indentation diameter Indentation depth	0.35mm 10μm	0.35mm 10μm	0.35mm 7 μm	-- --	0.35mm 10 μm
Applicable Scope of impact device		Type DC type for hole or cylinder; Type DL for slot or hole	Type D+15 for groove or concave surface	Type C for light and thin parts and hardene d surface.	Type G for heavy and rough castings and forgings	Type E for material with extremely high hardness

8.4 Attached table 4

Serial No	Code	model	Diagram of special-shaped support ring	remarks
1	03-03.7	Z10-15		Measure the external cylindrical surface R10~R15
2	03-03.8	Z14.5-30		Measure the external cylindrical surface R14.5~R30
3	03-03.9	Z25-50		Measure the external cylindrical surface R25~R50
4	03-03.10	HZ11-13		Measure the internal cylindrical surface R11~R13
5	03-03.11	HZ12.5-17		Measure the internal cylindrical surface R12.5~R17
6	03-03.12	HZ16.5-30		Measure the internal cylindrical surface R16.5~R30
7	03-03.13	K10-15		Measure the external spherical surface SR10~SR15
8	03-03.14	K14.5-30		Measure the external spherical surface SR14.5~SR30
9	03-03.15	HK11-13		Measure the internal spherical surface SR11~SR13
10	03-03.16	HK12.5-17		Measure the internal spherical surface SR12.5~SR17
11	03-03.17	HK16.5-30		Measure the internal spherical surface SR16.5~SR30
12	03-03.18	UN		Measure the external cylindrical surface, the radius is adjustable R10~∞

9 Appendix

9.1 Appendix A: Accessories and Options

Order information	Order number
Host model	
Leeb hardness tester	HT360
Leeb hardness tester Bluetooth version (+Bluetooth printer)	HT360C
Standard accessories	
Power adapter	— —
USB cable	— —
D-type impact device	— —
Nylon brush A	
Small support ring	— —
Product certificate	— —
Instrument Kit	— —
Matching	
Standard Leeb hardness block	— —
Toolbox	— —

9.2 **Appendix B: Warranty Summary**

Qingdao Hantek Electronics Co., Ltd. (hereinafter referred to as Hantek) promises that the mainframe and accessories of its production instruments will be free from any material and process defects within the product warranty period.

During the warranty period, if the product is proved to be defective, Hantek will repair or replace it for free. For detailed warranty regulations, please refer to Hantek's official website or product warranty card. For the full text of the repair service or warranty instructions, please contact the Hantek repair center or local offices.

Except for the warranty provided in this summary or other applicable warranty cards, Hantek does not provide any other express or implied warranty, including but not limited to any implied warranty on the product's tradability and applicability for special purposes. In no event shall Hantek be liable for indirect, special or consequential losses.



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