

Portable Hardness Tester

Model No. PHT-1500



Instruction Manual

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Global Connections



1 General description

1.1 Features

- LCD display with Backlight
- Converts to all common hardness scales(HV ,HB,HRC,HRB,HS).
- Easy to use push button key pad
- Max 50 groups (impact times:32-1)of data can be stored in memory.
- Test values software calibration function.
- Power comes from four(4) standard AAA batteries. Continuous working period: approx. 100 hours

1.2 Main Application and Testing Range

1.2.1 Main Application

- Assembled machinery and permanently installed parts
- Die cavity of molds
- Heavy work piece
- Failure analysis of pressure vessels, steam turbo-generator and other large equipment
- Testing of large parts that are in confined areas or on gear teeth
- Large Bearings and other large hard parts
- Material identification of the metal material warehouse

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magnetic field, corrosive medium, dampness and dust.

1.2.2 Testing Range

Testing range see table 1 and table 2.

Table 1

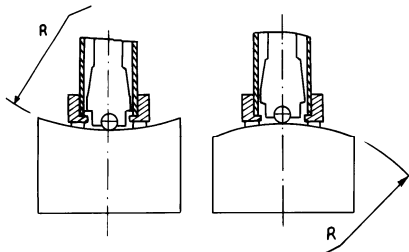
Material	Hardness method	D-Probe
	Steel and cast steel	HRC
HRB		59.6-99.6
HRA		59.1~85.8
HB		127-651
HV		83-976
HS		32.2-99.5
Hammered steel	HB	143~650
Cold work tool steel	HRC	20.4-67.1
	HV	80-898
Stainless steel	HRB	46.5-101.7
	HB	85-655
	HV	85-802
Gray cast iron	HRC	
	HB	93-334
	HV	
Nodular cast iron	HRC	
	HB	131-387
	HV	
Cast aluminum alloys	HB	19-164
	HRB	23.8-84.6
Brass(copper-zinc alloys)	HB	40-173
	HRB	13.5-95.3
Bronze (copper-aluminum/copper-tin alloys)	HB	60-290
Wrought copper alloys	HB	45-315

	No.		
Standard Kit	1	Base Instrument	1
	2	D type impact device	1
	3	Small supporting ring	1
	4	Nylon brush (A)	1
	5	High value Leeb test block	1

Preparation and Inspection prior to testing

The preparation of workpiece surface

- If the surface to be tested is too rough, a measuring error will appear. So the surface of the sample must be approx. Ra2µm smooth and the surface should be flat, and have no rust, scaling, dust oil or dirt. Clean bare metal only. Use the SRG-2000 surface roughness gauge to check surface finish prior to hardness testing.
- Curved surface: When the radius R of the curved surface to be tested is less than 30mm a small support ring or non conventional support ring should be used.



- workpiece support
 - Support is not necessary for large work piece
 - The work piece with medium weight must be placed on flat and solid surface
- Minimum thickness should not be less than 1" thick (steel)
- Part shall not be magnetic in property or erroneous readings will occur.

2.2 Testing principle

Leeb Hardness Test (definition)

An impact body with a spherical test tip made of tungsten carbide is propelled against the sample surface by a spring force and then rebounds back. At a distance of 1mm from the sample surface, the impact and rebound velocity of the impact body are measured by the following method: A permanent magnet embedded in the impact body, when passing through the coil in its coil holder, induces in the coil an electric voltage proportional to the velocities of the magnet. Leeb hardness is expressed by the following formula:

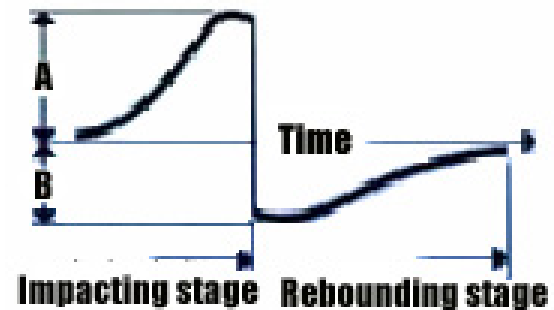
$$HL=1000 \times VB / VA$$

In which: HL——Leeb hardness value

VB——Rebounding velocity of the impact body

VA——Impacting velocity of the impact body

Output signal diagram of the impact device is as following.



Maintenance:

Impact device

- After using the impact device for 1000-2000 times, use the nylon brush provided to clean the guide tube and the impact body of the impact device. To clean the guide tube, unscrew the support ring and then take out the impact body, spiral the nylon brush in the counter-clock direction into the guide tube. When the brush reaches the bottom, draw it out. Repeat this action for 5 times and mount the impact body and the support ring.
- Remember to release the impact body after use.

● Never apply lubrication of any kind to impact device!

Standard maintenance procedures

- If the error is > 2HRC when using standard Rockwell hardness block to test, the impact body may be worn. Changing the test tip or impact body should be considered.
- For all maintenance issues, you must contact Phase II directly at (201) 962-7373

Storage:

The tester should be stored at room temperature, away from vibration, strong

Delete data in memory

In the measurement state marked by 'M' on the display, the new reading can be deleted by pressing the DEL button, and the number of stored reading is accordingly decreased by 1. To clear entire memory, just press and hold the DEL button for 3 seconds until the number of stored reading becomes 000.

Auto Power Off

The instrument features an auto power off function designed to conserve battery life. If the tool is idle (neither measuring nor any key operation) for 3 minutes, it will turn itself off.

Battery Replacement

When the battery symbol appears on the display, it is time to replace the batteries. Slide the Battery Cover away from the instrument and remove the batteries. Install batteries paying careful attention to polarity.

Calibration

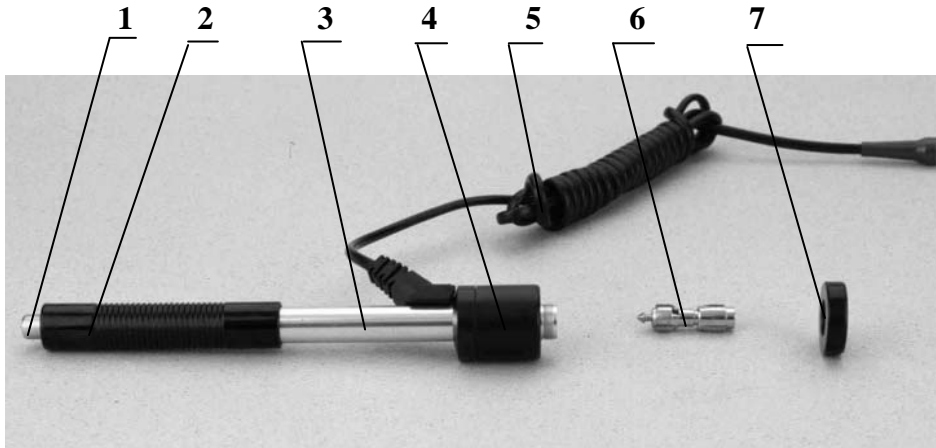
Press the POWER/MENU key for 8 seconds and CAL will be shown on the display.

Take 5 tests on your supplied leeb test block and

Press the UP or DOWN arrow button to make the value on the display match the value on your test block.

Press the POWER/MENU button to confirm the calibration and return to the main measurement mode.

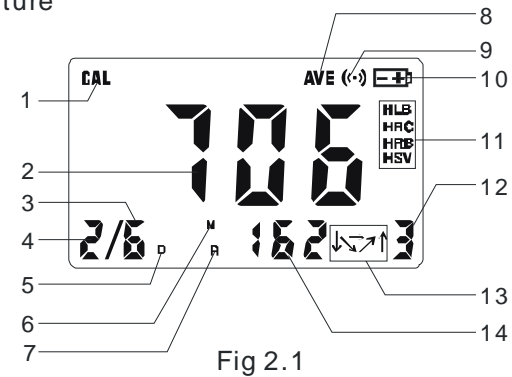
D-Type Impact device



1: Release button 2: Loading sheath 3: Guide tube 4: Coil/cover
5: Connection cable 6: Impact body 7: Support ring

2 Structure Feature & Testing Principle

2.1 Structure Feature



- | | |
|-----------------------------------|-----------------------------|
| 1 Calibration mode | 8 Average Symbol |
| 2 Measuring value | 9 Measuring symbol |
| 3 Average times set | 10 Battery indicator |
| 4 n th measuring value | 11 Hardness scale |
| 5 Impact type | 12 Material |
| 6 Measuring state | 13 Direction |
| 7 Browsing state | 14 Number of memorized data |

Testing

- A standard leeb hardness block should be used to verify the accuracy of the PHT-1500 and the reading value error and repeatability should not be more than the specification in table 5.

Note: It is recommended that you take a minimum of 5 tests and obtain your average. That value should be within the allowable tolerance for Leeb +/- 6 points. If the value exceeds this tolerance, you must perform a calibration to bring the unit back into compliance. Contact Phase II directly for this information.

Material Selection:

Press the MAT button to scroll through the available materials. Release the button once the desired metal has been chosen.

Symbol	Illustrations
1	Steel and cast steel
2	Cold work tool steel
3	Stainless steel and high temperature -resistant steel
4	Cast iron with lamellar graphite (grey cast iron GG)
5	Cast iron with spheroidal and nodular graphite (GGG)
6	Cast aluminum alloys
7	Copper - zinc alloys (brass)
8	Copper-alu /copper-tin alloys (bronze)
9	Copper

Hardness Scale Selection:

Press the SCALE button to scroll through the available hardness scales. Release the button when the desired scale has been displayed.



Symbols	Illustrations
LD	Leeb hardness value used with impact device D
HB	Brinell hardness value
HRB	Rockwell B hardness value
HRC	Rockwell C hardness value
HSD	Shore hardness value
HV	Vicker hardness value

Average Setting:

Press and hold the POWER/MENU button for 6 seconds until AV appears on the display. Release the button. press the up or down arrow buttons to choose number 2 thru 9.

Selecting "0" means the unit will not display an average.

Press POWER/MENU to return to the main screen when desired number has been chosen.

This function allows you to view the average of the amount of tests you entered.

Example: If you chose "3". The tester will show the average after 3 consecutive tests.

Impact Direction:

Use the DIR button to move the cursor until you reach the desired direction.

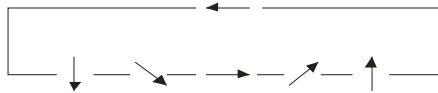


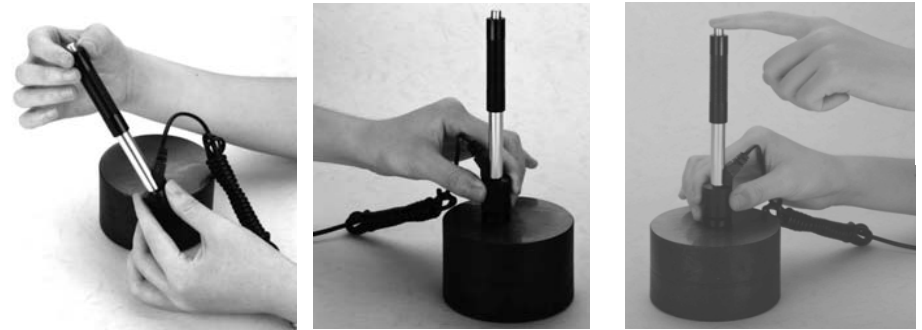
Fig 3.2

Start-up

- Insert the impact device plug into the socket of impact device located on the top of the tester.
- Press POWER/MENU button to turn on the power. The tester automatically enters into the measuring status.

Loading

- Push down the loading sheath to lock the impact body. Place the supporting ring of impact device on the surface of test sample, the direction of impact should be vertical with testing surface.



Testing

- Press down the release button on the top of the impact device to make a test. At this point, the test sample, impact device and the operator are all required to be stable; and the force direction should comply with the axis of the impact device.
- Five measurements should be carried out per measuring position of test sample. The divergence of data should be not exceed $\pm 15HL$ of mean value.

Data Memory:

When taking measurements, all values will be stored automatically in memory and the number of stored readings will increase by 1. The tester can store up to 50 groups of data. If the memory is full, the tester will automatically save the new reading and discard the oldest one. That means the tester will only hold the last 50 groups of data in memory.

Memory Recall

While in the measurement screen, press the RD button to enter into mode of viewing stored values marked by 'R'. Press the Up or down arrow buttons to scroll through the 50 stored readings. To return to the measurement state, just press the POWER/MENU key .