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**HDT-LP200
PORTABLE LEEB HARDNESS TESTER
OPERATION MANUAL**

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WATCH THE OPERATION
VIDEO OF PRODUCTS.



VIDEO



Specifications

- ◆ Accuracy: $\pm 0.3\%$ (or HL = 800),
- ◆ Resolution: 1HLD, 1HV, 1HB, 0.1HRC, 0.1HRB, 0.1HRA, 0.1HS, 1SGM
- ◆ Display: Backlit LCD display
- ◆ Impact direction: full Angle measurement
- ◆ Hardness scale: HL/HRC/HRB/HB/HV/HS/SGM
- ◆ Measuring range: HL170-960, HRC17-70, HRB13-109, HB20-655, HV80-940, HS32-99.5, SGM (rm) 225-2639N/mm²
- ◆ Memory: 300 data can be saved and re-readable
- ◆ Working conditions:
 - Minimum weight: 5kg(direct measurement)
 - 2kg(fixed to the weight)
 - 0.05kg(coupled to the weight)
 - Minimum thickness: 5mm
 - Minimum radius: 30mm
 - Minimum roughness(Ra): 2 μ m
- ◆ Statistics: Average/Max/Min value can be calculated automatically
- ◆ Power supply: 1.5V AAA battery *1, With power display
- ◆ Interface: RS232 interface is used to connect computer
- ◆ Operating environment: -10~+45°C
- ◆ Dimension (L x W x D): 124 x 67 x 30 mm
- ◆ Weight: 240 g
- ◆ Standard: ASTM A956, DIN 50156, GB/T 17394-1998

Applications

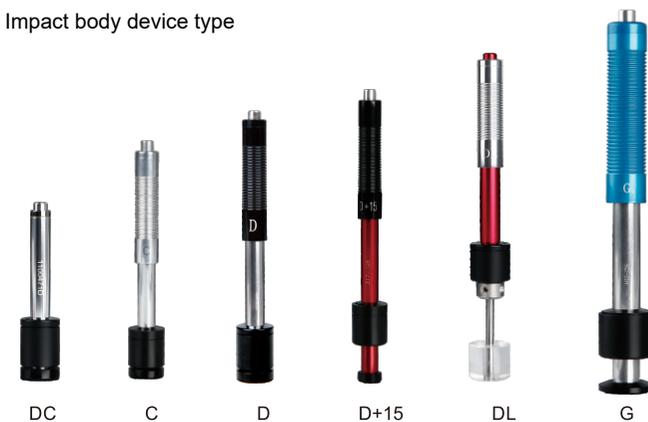
- ◆ Hardness tests on installed machines or steel structures: e.g. on heavy and large work-piece or on permanently installed system parts.
- ◆ Rapid testing of multiple measuring areas for examination of hardness variations over larger regions.
- ◆ Measuring hardness for produced parts at production line.
- ◆ Identifying metallic material stored in a warehouse.
- ◆ Ineffectiveness analysis of permanent parts, pressure -vessel, turbo generator.

Instrument outline and description

1 Instrument graphic



2 Impact body device type



3 Characteristics of various impact devices

Type	Brief description
D	Universal standard unit for majority of hardness testing assignments.
DC	Extremely short impact device, other specs identical with type D.
	highly confined spaces, holes and cylinders, internal measurements on assembled machines
DL	Extremely slim front section
	extremely confined spaces, base of grooves
D+15	Slim front section
	grooves and recessed surfaces
G	Increased impact energy (approx. 9 times that of type D)
	Brinell hardness range only, heavy cast and forged parts with lower demands on surface finish
C	Reduced impact energy (compared with type D).
	surface hardened components, coatings, minimum layer thickness: 0.2mm. thin walled or impact sensitive components

4 key description



:Read the memory



:Power On
Power Off



:Menu
Increase the value



:Change parameter
Decrease the value



:Delete the current reading
Delete the stored values



:Confirm the setup
View the statistics values

Symbol description

1 Description of hardness scale symbols

Symbol	Meaning	Symbol	Meaning
HL	Leeb hardness value	HS	Shore hardness value
HB	Brinell hardness value	HV	Vicker hardness value
HRB	Rockwell B hardness value	SGM	Intensity of tension
HRC	Rockwell C hardness value		

2 Description of detailed hardness scale symbols

Test materials	Hardness unit	HRC	HRB	HB	HV	HS	HRA	ob(N/mm ²)
Probe type:HL D								
steel/cast steel		20.0-67.9	59.6-99.5	80-647	80-940	32.5-99.5	30-88	375-1710
alloy steel		0.9-78.7		15-1878	32-1698	5.5-128		79-6599
stainless steel		3.7-62.4	8.3-101.7	85-655	36-802			108-1725
grey castiron		21-59	24-100	35-570	90-698			
nodular castiron		21-60	24-100	62-857	96-724			
cast aluminum			24-85	19-445	22-193			
brass			1.5-99.6	32-477				
bronze			14-100	15-505				
copper			14-100	39-569				
forging steel				50-1060				
rolling steel	1-72					14-117.8		
Probe type:HL DL								
steel/cast steel	1-73	1.5-109.5	1-1026	1-1167	0.5-100			
alloy steel	2.4-72.9			2.0-1556				
nodular castiron	13-78.4	38-110	50-1271	5-1160				
cast aluminum		1.6-120	3-736	12-645				
Probe type:E								
steel/cast steel	6.3-78.5		24-1144	24-1369	3.6-121			
alloy steel	10.5-83.2		24-1659					
Probe type:G								
steel/cast steel		1-133	10-946					
alloy steel			19-804					
stainless steel			10-844					
grey castiron			5-804					
nodular castiron			5-998					
cast aluminum		1-120	8-635					
Probe type:D15								
steel/cast steel	1-69.8		12-999	12-1221	2-112			
alloy steel	1.3-78			2-1485				
Probe type:C								
steel/cast steel	5-72.5		23-953	23-1125	5-111			
alloy steel	4-77.2			43-1566				

Note: Data for non-Leeb hardness units are obtained by converting Leeb hardness measurements. This product ensures the accuracy of these converted values within the standard range. Although the device may display some converted data outside the standard scope, such data is for reference only and cannot guarantee complete accuracy or practical significance.

Preparation before Measuring

1 Requirements for the sample

1. The surface temperature of sample should be less than 120°C
2. The samples must feature a metallic smooth, ground surface, in order to eliminate erroneous measurements brought about by coarse grinding or lathe scoring. The roughness of the finished surface should not exceed 2µm.
3. Requirements for the weight of the sample.
For samples weighing over 5 kg and of compact shape, no support is needed. Samples weighing between 2-5 kg, and also for heavier samples with protruding parts or thin walls, should be placed on a solid support in such a manner that they do not bend or move by the impact force.

4. Samples weighing less than 2 kg should be firmly coupled with a stable support weighing over 5 Kg.

For coupling purposes,

- (1) Application of the coupling paste (As thin as possible)
- (2) Mutual rubbing of both parts while firmly press the sample against the base plate.
- (3) A particular advanced of coupling is the possibility of obtaining a very uniform, rigid connection between the sample and the support, totally eliminating stresses at the sample surface. The resulting variation in measured values is very low.

The quality requirements of different types of impact devices on the specimens are shown in the table below.

Impact device type weight (Kg)	DU,DC,D+15	G	C	Specimen treatment method
Heavy specimens	> 5	> 15	>1.5	Direct test
Medium-sized specimen	2~5	5~15	0.5~1.5	be placed firmly
Light specimen	0.05~2	0.5~5	0.02~0.5	be coupled

5. Surface -hardened steels and especially case-hardened steels produce L-values which are too low when case-hardening depth is small because of their soft core. When measuring with impact device D the depth of the hardened layer should be no less than 0.8 mm.

6. The specimen should not be magnetic.

2 Surface test piece requirements
For test sample of curving surface with radius of curvature R less than 30mm, a small support ring should be used.

3 Large area event specimen
When the specimen is a large area of plate, long bar and bending part, even if the quality and thickness meet the requirements, it may still cause deformation and instability of the specimen, resulting in inaccurate test values.

4 Properties of the sample
The requirements of d-type impact device on specimen quality and roughness are as follows:
light-weight: 0.05- 2Kg medium: 2. 5Kg heavy: 5Kg
Minimum surface roughness ISO N7/Ra 2µm/Rz 10µm

Operation

1 Parameter Settings

1. Probe selection

Long press "M" to enter the menu probe to select options.

Press the "set" key to switch the probe between D, DL, D+15, G and C.

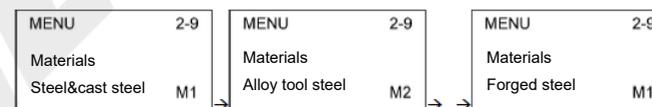
After setting the current probe, press "enter", exit and return to the measurement state, or continue to press "menu" to enter the next menu option.

2. Materials Selection

The material selected is prior to the conversion from HL value to other scales.

Press and hold key "M" to enter the MENU mode, then press "enter" to enter the next menu - MATERIALS.

Press key "S" or "M" to change material from M1M2M3 ... M11.



Press key "M" to confirm the setting and enter next menu. Press and hold key (M) to exit the menu mode and return to the measuring mode.

3. Hardness Scale (Conversion)

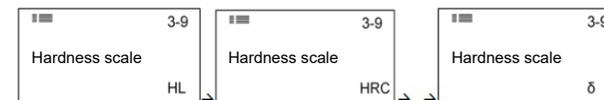
Hardness scale is based on the material selected. Not every material has same conversion. For example, for steel, it has conversions to HRC, HRB, HB, HV, HS; but for cast iron, only has conversions to HB.

The material selected is prior to the conversion from HL value to other scales.

Press and hold key "M" to enter the MENU mode, then press "enter" consecutively to enter the menu - HARDNESS SCALE.

Press key "S" or "M" to change hardness scale from

HL→HRC→HRB→HB→HV→HS→HRA→σb.



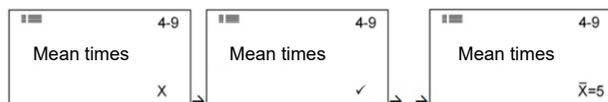
Press key to confirm the setting and enter next menu. Press and hold key “enter” to exit the menu mode and return to the measuring mode.

4. Mean Time

With LP200, the statistics values can be calculated automatically after setup mean time.

Press and hold key “M” to enter the MENU mode, then press “enter” consecutively to enter the menu – MEAN TIME.

Press key “S” or “M” to select mean time from X→3→4→5.



Press key “enter” to confirm the setting and enter next menu. Press and hold key “enter” to exit the menu mode and return to the measuring mode.

5. Memory

The LP200 has a memory capacity of 300 data. The stored values can be re-readable on LCD.

Press and hold key “M” to enter the MENU mode, then press “enter” consecutively to enter the menu – MEMORY.

Press key “S” or “M” to select from X→√→Read→Clear.



6. print on line

Press and hold key “M” to enter the MENU mode, then press “enter” consecutively to enter the menu – PRINT ON LINE.

Press key “S” or “M” to select X or √.



Press key “M” to confirm the setting and go to next item of menu. Press and hold key “enter” to exit the menu mode and return to the measuring mode.

7. Compensation (Calibration)

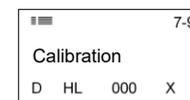
Compensation Description

The measurement compensation is used for calibration of the instrument. After the instrument is used for some time, the ball tip on impact body may be worn out which would lead inaccuracy. In order to compensate such error, the tester is designed to be recalibrated by user.

Calibration

Set hardness scale to be calibrated. Press and hold key “M” to enter the MENU mode, then press “enter” consecutively to enter the menu – CALIBRATION.

Press key “S” or “M” to select from X →√→Adjust.



Press key “enter” to confirm the setting and enter next menu. Press and hold key “enter” to exit the menu mode and return to the measuring mode.

8. Limits

The upper and lower limits can be set by user.

Press and hold key “M” to enter the MENU mode, then press “enter” consecutively to enter the menu – LIMITS.

Press key “S” or “M” to select from X→√→Upper→Lower.



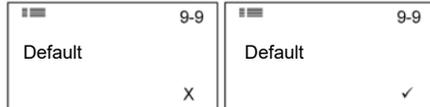
In Limit menu, press “S” or “M” to select Upper or Lower, then press “enter” to enter Adjust mode.

Press “M” or “S” to adjust Upper or Lower value till it meets your actual requirements. After finishing adjustment, press “enter” to confirm modifying and press “enter” again to go to next menu.

9.Factory default

Press and hold key "M" to enter the MENU mode, then press "enter" consecutively to enter the menu – DEFAULT.

Press key "S" or "M" to select "X" or "✓". Press "enter" to confirm and press "enter" again to exit the menu mode and return to the measuring mode.



Default settings:

Hardness scale: HL

Mean time: Off

Print on line: Off

Limits: Off

Materials: M1

Memory: Off

Calibration: Off

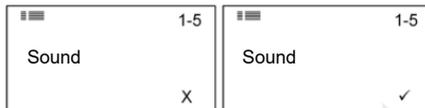
Factory default: NO

2 Configuration Menu

In the measuring mode, press and hold key "S" to enter the Configuration mode.

1.Sound

In the measuring mode, press and hold key "S" to enter the Configuration mode, first item is SOUND. Press key "S" or "M" to select "X" or "✓".



2.Battery type

In the measuring mode, press and hold key "S" to enter the Configuration mode, then press "enter" consecutively to enter the menu – BATTERY TYPE. Press key "S" or "M" to select 1.5V or 1.2V. Press "enter" to enter next menu.



3.Viewing style

In the measuring mode, press and hold key "S" to enter the Configuration mode, then press "enter" consecutively to enter the menu – VIEWING STYLE. Press key "S" or "M" to select 1 or 2.

Press "enter" to enter next menu.



4.No. of test

In the measuring mode, press and hold key "S" to enter the Configuration mode, then press "enter" consecutively to enter the menu – NO. OF TEST. Press key "S" or "M" to view number or clear the number. Press "enter" to enter next menu.



5.System information

In the measuring mode, press and hold key "S" to enter the Configuration mode, then press "enter" consecutively to enter the menu – 5-5. Press key "S" or "M" to view serial number, firmware or other system information. Press "enter" to exit configuration menu.



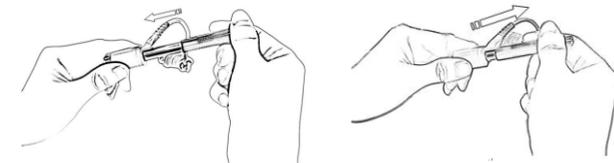
Measuring

1 Measuring

Load spring force

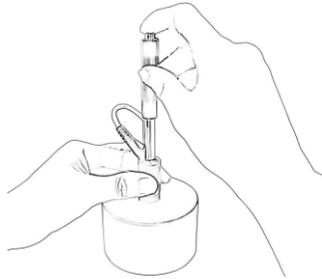
Hold the main body (the tester) with left hand while right hand is holding loading tube, then push the loading tube with a little force against spring force toward tester until to lock the impact body.

Loose the force and let the loading tube returns to the original position.



Take measurement

Place the tester against onto the surface of object to be measured by the support ring.



Place the impact device against the object to be measured.
Then press the release button on top of the impact device with finger of right hand.
The measuring value will be displayed on LCD.

Please note: the proper way of holding is important for obtaining better readings.

Attention: the tester must be placed against object surface firmly and perpendicularly. As light gap between support ring of tester and surface of object will lead inaccurate reading.

Release the testing force

After firmly placing the tester onto the surface of object with left hand, hold the loading tube with thumb and middle finger of right hand and press the release button with forefinger.

The impact body inside probe will impact the surface of object with spring force.
Then the hardness reading will be displayed on the screen.

2 Replacing Battery

This tester has a memory capacity of 300 data. The stored values can be re-readable on LCD.

Switch on the memory function from the menu, please refer to Memory, then all measured data will be stored automatically. In measuring mode, press “R” to enter data review mode, in this mode, you can review stored data, press “S” or “M” to turn the page forth or back. Press “enter” to exit “Read data” mode and go back to the measuring mode. For more detailed information, please refer to Memory.

3 Print-out (Optional)

If the tester is integrated with a wireless module, it can be equipped with a wireless printer to print the measurement in real time. Switch on the print function from the menu, please refer to Print on line.

The measuring data will be printed automatically; if the mean time is set, when measuring times reach setting times, the average value, max. value and min. value will also be printed automatically. To cancel printing, return to the menu to disable print on line.



Maintenance and Repair

Do your best to avoid shock, heavy dust, damp, strong magnetic field, and oil stain.

1 Maintenance of the Impact Device

The devices do not require any particular care other than periodic cleaning of the impact body and the guide tube after performing approximately 1000-2000 tests. During cleaning, the following procedures need to be observed:

- Unscrew support ring and remove impact body from guide tube.
- Clean off any dirt and metallic dust from the impact body and the spherical test tip.
- Clean guide tube with the special brush provided.
- Do not apply oil to any parts for the impact device.

2 Replacing Battery

When a battery indicator displays that reminds you to replace the battery. However it is still possible to measure for some time. Please make sure to obtain suitable batteries.