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**HDT-LP200B  
PORTABLE LEEB HARDNESS TESTER  
OPERATING INSTRUCTION**



## 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/mm<sup>2</sup>
- ◆ 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 $\mu$ 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

Probe D/DC HLD: 170-960						
MATERIALS	H R C	H R B	H B	H V	H S	$\sigma_b(N/mm^2)$
STEEL/CAST STEEL	20.0-67.9	59.6-99.5	80-647	80-940	32.5-99.5	255-1710
ALLOY TOOL STEEL	20.5-67.1			80-898		1170-2639
ST.STEEL	19.6-62.4	46.5-109	85-655	85-802		740-1725
GREY CAST IRON	21-59	24-100	93-334	90-698		
NODULAR CAST IRON	21-60	24-100	131-387	96-724		
CAST ALUMINUM		24-85	20-159	22-193		
BRASS		13.5-95.3	40-173			
BRONZE		14-100	60-290			
COPPER		14-100	45-315			
FORGING STEEL			142-651			
PROBE DL DL: 560-950						
MATERIALS	H R C	H R B	H B	H V	H S	$\sigma_b(N/mm^2)$
STEEL/CAST STEEL	20.6-68.2		81-646	80-950	30.6-96.8	
ALLOY TOOL STEEL	20.5-67.1			80-898		
PROBE D+15 LD+15:300-900						
STEEL/CAST STEEL	19.3-67.9		80-638	80-937	33.3-99.3	
ALLOY TOOL STEEL	19.8-68.2			80-935		
PROBE G LG: 300-750						
STEEL/CAST STEEL			90-646			
GREY CAST IRON			92-326			
NODULAR CAST IRON			127-364			
PROBE C LC:350-950						
STEEL/CAST STEEL	20.0-70		80-683	80-996	31.9-102.3	
CW.STEEL	20.7-68.2			100-941		

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.

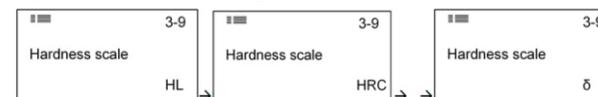
After setting the current probe, press "enter", exit and return to the measurement state, or continue to press "menu" to enter the next menu option.

**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 ... M10.



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

**3. Hardness Scale (Conversion)**

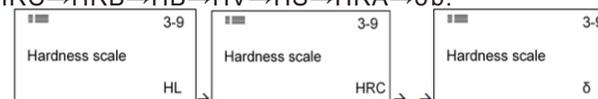
Hardness scale is based on the material selected. Not every material has same conversion. For example, for steel, it has conversions to HRC, HRB, HB, HV, HS; but for cast iron, only has conversions to HB.

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.



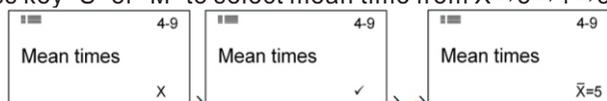
Press key **enter** to confirm the setting and enter next menu. Press and hold key **enter** to exit the menu mode and return to the measuring mode.

#### 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.

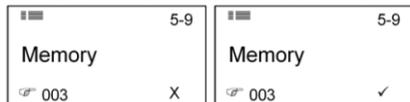
Press and hold key **enter** to exit the menu mode and return to the measuring mode.

#### 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.

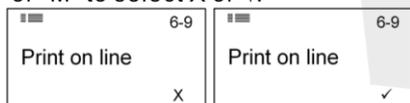
Press key **S** or **M** to select from X→√→Read→Clear.



#### 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 **enter** 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.

When PRINT ON LINE is turned on, a **P** will be displayed on the top of the LCD. After the printer is connected correctly, every measurement will be printed automatically.



Please note PRINT ON LINE function will be disabled after the tester is turned off. If you need to print, please enable it again.

#### 7. Compensation (Calibration)

##### Compensation Description

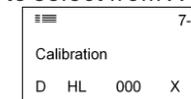
The measurement compensation is used for calibration of the instrument. After the instrument is used for some time, the ball tip on impact body may be worn out which would lead inaccuracy. In order to compensate such error, the tester is designed to be recalibrated by user.

##### 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.

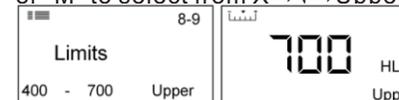
Press and hold key **enter** to exit the menu mode and return to the measuring mode.

#### 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.



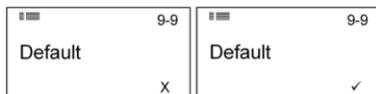
In Limit menu, press **S** or **M** to select Upper or Lower, then press **enter** to enter Adjust mode.

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:

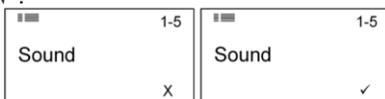
Hardness scale: HL                      Materials: M1  
 Mean time: Off                            Memory: Off  
 Print on line: Off                        Calibration: Off  
 Limits: Off                                Factory default: NO

### 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.



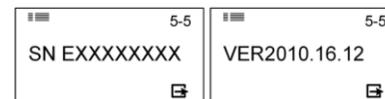
### 4.No. of test

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.



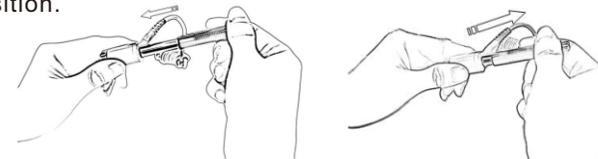
## Measuring

### 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. A slight 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

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.