

1. Forewords

1.1. History

Метод измерения Леббс был впервые использован в тес/м0/огу в 1978 году. Он определяется как отношение скорости отскока тела к скорости его удара, умноженное на 1000. Более твердые материалы дают более высокую скорость отскока, чем более мягкие материалы. Для определенной группы материалов (например, сталь, алюминий и т. д.) значение твердости по Леббу представляет собой прямую зависимость от его свойств твердости. Для обычного металла доступны кривые перевода твердости HL в другие стандартные значения статической твердости (HB, H, HRC и т. д.), позволяющие переводить HL в другие значения твердости.

1.2. Leeb Hardness Test (definition)

Ударник со сферическим испытательным наконечником, изготовленным из корбида вольфрама, под действием силы тяжести отталкивается от поверхности образца, а затем отскокивает назад. На расстоянии 1 мм от поверхности образца измеряют скорость удара и отскока ударника по следующей методике: Постоянный магнит, встроенный в ударник, проходя через катушку в его держателе, индуцирует в обмотку электрическое напряжение, пропорциональное скорости магнита. Твердость по Либу выражается следующей формулой:

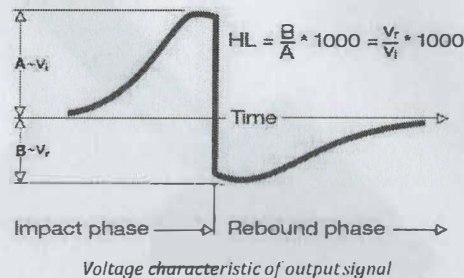
$$HL = \frac{V_r}{V_i} * 1000$$

Where: HL is Leeb Hardness

V_r is the rebound velocity of the impact body

V_i is the impact velocity of the impact body

The voltage characteristic of output signal, when the impact body passes through the induction coil is illustrated in the following figure:



A Leeb's Hardness Tester measures the hardness of sample material in terms of Hardness Leeb (HL), which can be converted into other Hardness units (Rockwell B and C, Vicker, Brinell and Shore D).

1.3. Notation of Leeb's Hardness

When measuring the hardness of a sample material using the traditional static hardness testing method, a change of applied pressure will result in a change in the hardness reading. This will also happen during a Leeb's Hardness test when one changes the impact device. In hardness measurement of the same test sample with different impact devices, the Leeb's hardness values obtained will vary.

For example: 720HLD≠720HLC

Because different converting curves are obtained from different impact devices, when

converting hardness HL into another hardness values, the notation for the converted hardness values should include the impact device used.

For example:

Hardness HRC converted from hardness L using impact device D should be written as 35, 9 HRCLD.

Where: 35=Hardness value HL

9=Hardness value HRC

L=Leeb's Method

D=Impact device

2. Features and Applications

2.1. Introduction

This instrument is an advanced state-of-the-art palm sized metal hardness tester with many new features which are light weight, easy operation, integrated design, high contrast display, low operating temperature, auto compensating for impact direction and etc. It can be widely used for measuring hardness of almost all ferrous and non-ferrous metal materials for scale of Leeb hardness, Rockwell C, B & A, Brinell, Vickers, Shore and Strength.

It has a memory which can be downloaded to computer via USB port or wirelessly. The measuring value can be printed out from tester to micro-printer or from PC. All stored data can be recalled and read on the tester easily.

It also has a very unique feature, which impact device can convert between D and DL simply by changing impact body. This two-in-one probe is equivalent to two individual probes. With this optional accessory, you can take measurement at very narrow surface such as slot bottom, gear tooth that probe D cannot match.

The 3.7V Li-ion rechargeable battery inside the tester can be charged via USB from PC or via individual USB charger from mains wall power. With data software for PC, customers can download measuring values from the tester to PC and make process such as save, delete, create testing report and export them to Excel.

2.2. Specifications

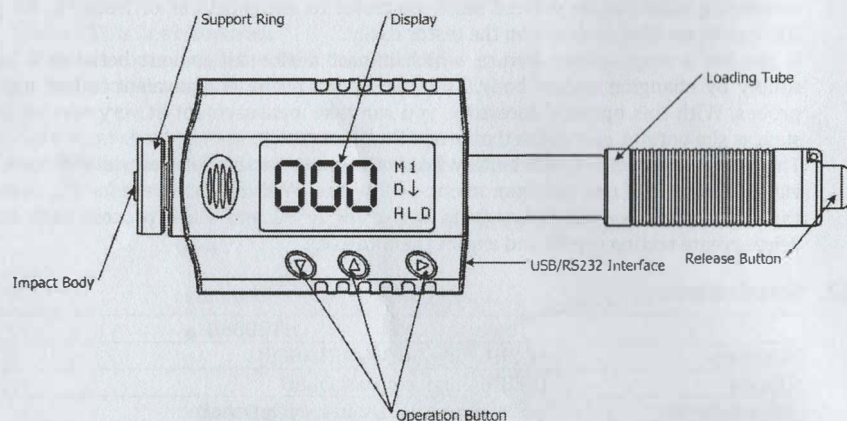
HT2008B	
Accuracy	+/-2HL (or +/-0.3%@HL=800)
Display	1228*64 high contrast OLED
Impact device	D (Default) / D-DL 2 in 1 (Optional)
Impact direction	Universal angle, no need to setup impact direction
Display mode	Normal/flip or upward/downward
Hardness scale	HL / HRC / HRB / HB / HV / HS / HRA / σ _b
Conversion table	85 29
Measuring range	HL170-960 / HRC1-74 / HRB1.2-140 / HB18-1027 / HV42-1220 / HS3.9-112 / HRA7-88.5 / σ _b (rm)89-3300N/mm ²
Materials	10 common metal materials
Memory	26 files, 100 data for each file
Statistics	Average/Max/Min/S. value
Interface	USB to PC for transferring data, USB for charging
Recalibration	allowed by user
Alarm	Up or down limit

Indicator	Low battery
Power supply	3.7V Li-ion rechargeable battery
Power on/off	Auto or manually
Operating environment	-20°C ~+45°C
Dimension (LxWxD)	148mm×44mm×22mm
Net weight	110g
Standards	Conforming to ASTM A956, DIN 50156, GB/T 17394-1998

2.3. 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, turbogenerator.

3. Layout of instrument



4. Symbols and Illustrations

4.1. Symbols and Illustrations

Symbols	Illustrations
HLD	Leeb hardness value used with impact device D
LDL	Leeb hardness value used with impact device DL
HB	Brinell hardness value
HRB	Rockwell B hardness value
HRC	Rockwell C hardness value
HS	Shore hardness value
HV	Vickers hardness value
HRA	Rockwell A hardness value
σ_b (N/mm ²)	Strength value

4.2. Measurement and Conversion Table

Range for measurement and conversion:

IMPACT DEVICE D	HL: 170-960						
MATERIALS	HRC	HRB	HB	HV	HS	HRA	σ_b (N/mm ²)
STEEL/CAST STEEL	0.1-74.7	1.2-140	28-1027	45-1230	4.0-112	7-88.5	118-3315
ALLOY TOOL STEEL	0.9-78.7			32-1698			79-6599
STAINLESS STEEL	3.7-62.4	8.3-101.7	85-655	36-802			108-1725
LAMELLAR IRON			35-570				
NODULAR IRON			62-857				
CAST ALUMINUM		24-85	19-445				
BRASS		1.5-99.6	32-477				
BRONZE			15-505				
WROUGHT COPPER			35-569				
FORGING STEEL			50-1060				
MILL ROLLER							
CHINESE STEEL	20-67.9	59.6-99.5	80-647	80-940	32.5-99.5	30-88	375-1710

5. Preparation before Measuring

5.1. Requirements for the sample

5.1.1. The surface temperature of sample should be less than 120°C.

5.1.2. 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 2 μ m.

5.2. 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.

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

For coupling purposes,

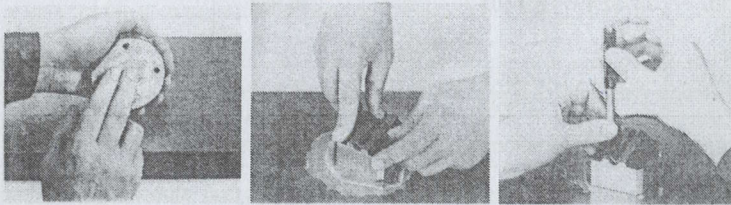
- ◇ The coupling surface between the sample and base plate should be flat, plane parallel and ground.
- ◇ A thin proper layer of coupling paste is to be applied to the contact surface of the sample.
- ◇ The sample should be firmly pressed against the surface of the base plate by moving it with a circular motion.
- ◇ The direction of impact should be perpendicular to the coupling surface.
- ◇ For the coupling operation, the following prerequisites must be fulfilled:
- ◇ The contact surface of the sample and the surface of the base plate must be flat, plane parallel and ground.

- ◇ The direction of the test impact must be perpendicular to the coupled surface.
- ◇ Minimum thickness of the sample for coupling (5mm).

Proper Coupling:

Proper coupling requires a little experience. Insufficiently coupled samples produce large variations of individual measurements, L-values which are too low and the operation is characterized by a rattling noise upon impact of the test tip.

Example for coupling a test piece with a base plate:



Application of the coupling paste (As thin as possible).

Mutual rubbing of both parts while firmly press the sample against the base plate.

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.

5.3. Requirement for the surface hardened layer of the sample

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/DL the depth of the hardened layer should be no less than 0.8 mm.

5.4. Surface of the test sample should not be magnetic.

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

5.6. Supporting the Samples during Testing

Type of impact device	Classification of samples		
	heavy	medium-weight	light-weight
D/DL	more than 5 kg	2 - 5 kg	0.05 - 2 kg

When measuring hardness with this tester, the following has to be noticed: Despite the low mass of the impact body and low impact energy, a relatively large impact force of short duration is generated when the impact body hits the measuring surface. The max. impact force of impact device D/DL is 900N.

For heavy samples of compact shape, no particular precautions are necessary.

Smaller and lighter samples or work pieces yield or flex under this force, producing L-values which are too small and of excessively large variation. Even with big or heavy work pieces it is possible for thin-wall regions or thinner protruding parts to yield upon impact. Depending on the frequency of the resilient yielding action, the measured L-value may be too small or too large. In many situations, potential problems can be checked in the following manner:

- Medium-weight samples and also heavier samples with protruding parts or thin walls should be placed on a solid support in such a manner that they do not move or flex during the test impact.
- Light-weight samples should be rigidly "coupled" with a non-yielding support such as a

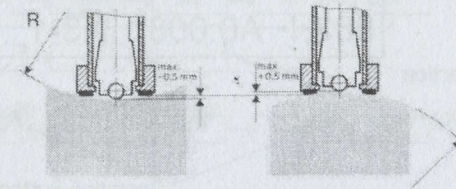
heavy base plate. Clamping in a vice is of no value, since the samples become exposed to stress and because complete rigidity is never attained. As a rule, the measured L-values would be too small and show excessive variations.

5.7. Samples with Curved Surfaces

Impact testers only work properly, if the impact body has a certain position in the guide tube at the moment of impacting the test surface. In the normal position, automatically present when testing flat and convex-cylindrical samples (such as round samples), the spherical test tip is located exactly at the end of the guide tube.

However, when testing spherically or cylindrically shaped concave surfaces, the impact body remains further within the guide tube or protrudes further therefore. Thus, with such types of curved surfaces, it is to be observed that radii of curvature do not drop below the values indicated in the following Fig.

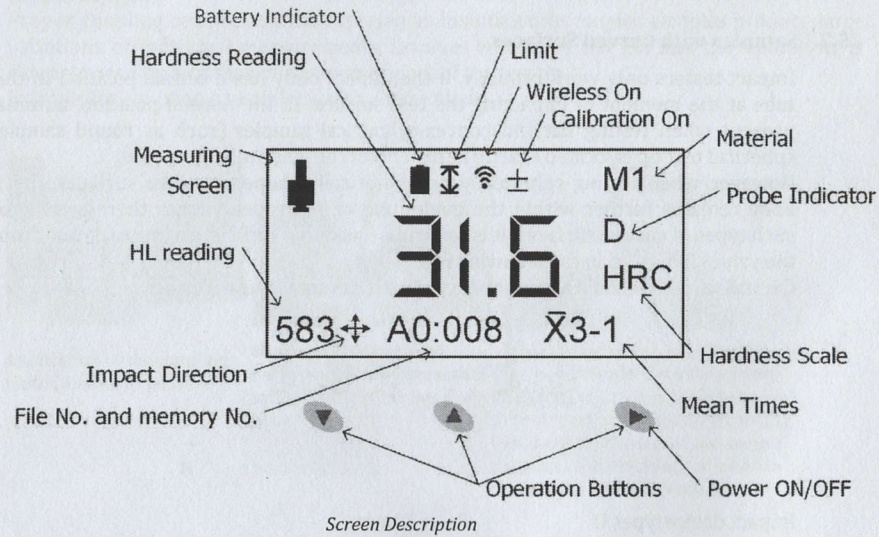
Curved surfaces should always be tested with the small support ring.



Impact device types D $R_{min}=30mm$

For impact devices D, special support rings are available to accommodate smaller radii on convex or concave surface.

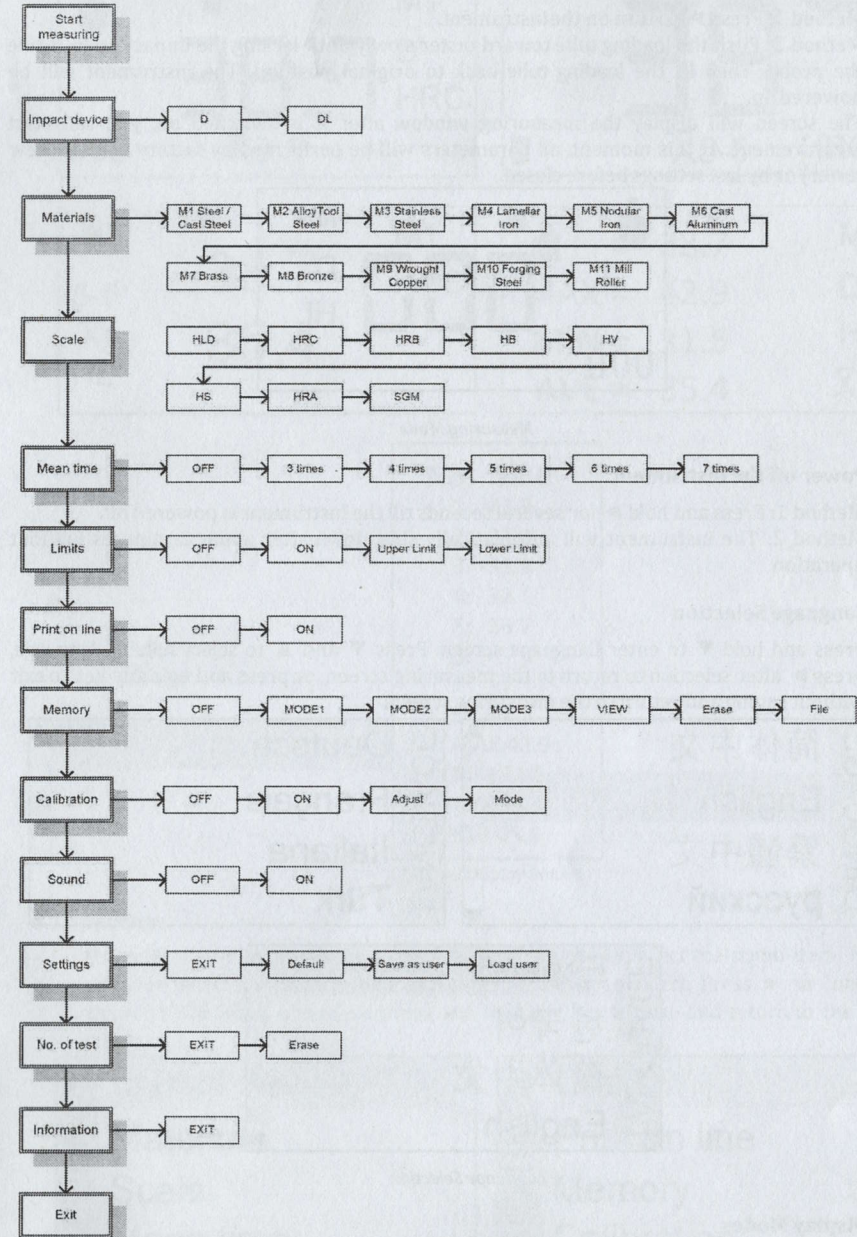
6. Operation



6.1. Button description

▼ (Menu key)	▲	► (Power On/Off)
<ul style="list-style-type: none"> • Menu key, press it to enter main menu • Downward key, press it to move cursor downward • Press and hold the key to save the settings and exit • Press and hold ▼ and ▲ simultaneously in the measuring screen to display the measuring direction • Press ▼ and ▲ simultaneously in the measuring screen to display wireless indicator (1800 only) 	<ul style="list-style-type: none"> • Upward key, press it to move cursor upward • Press and hold it to save the settings and exit • Press it in measuring screen to switch in different display modes • Press and hold it to delete measurement • Press and hold ▲ and ▼ simultaneously in the measuring screen to display the measuring direction • Press ▲ and ▼ simultaneously in the measuring screen to display wireless indicator (1800 only) 	<ul style="list-style-type: none"> • Press it to switch on the tester • Press and hold it to switch off the tester • Confirm the selection • Press and hold the key to save the settings and exit

6.2. Diagram of Operation



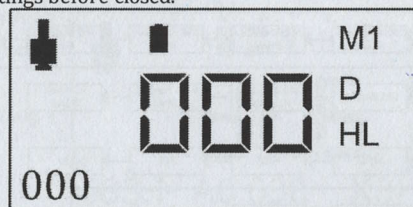
Operation Flowchart

6.3. Power on the instrument

Method 1: Press ► to turn on the instrument.

Method 2: Push the loading tube toward tester slowly until locking the impact body inside the probe. Then let the loading tube back to original position. The instrument will be powered on.

The screen will display the measuring window after it is switched on, you can start measurement. At this moment, all parameters will be performed by factory default (new tester) or by last settings before closed.



Measuring Mode

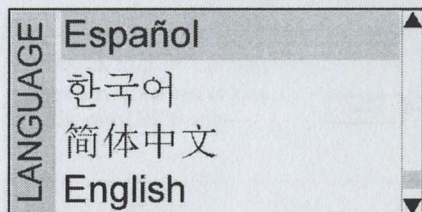
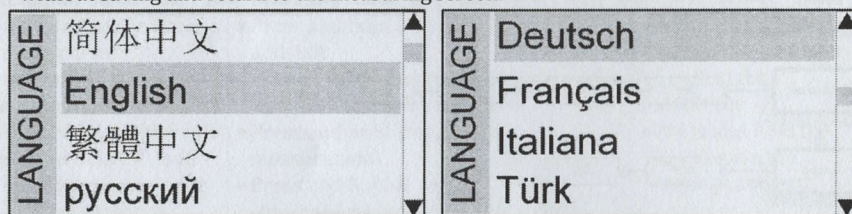
6.4. Power off the instrument

Method 1: Press and hold ► for several seconds till the instrument is powered off.

Method 2: The instrument will automatically shut down after about 2 minutes without operation.

6.5. Language Selection

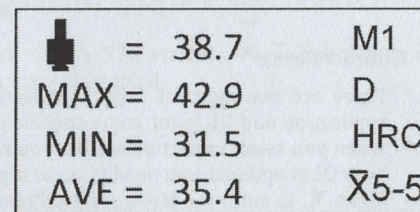
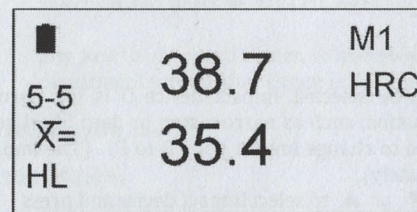
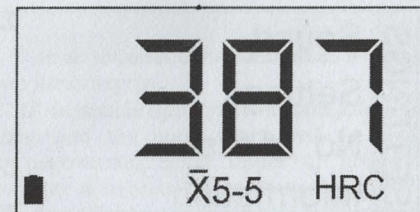
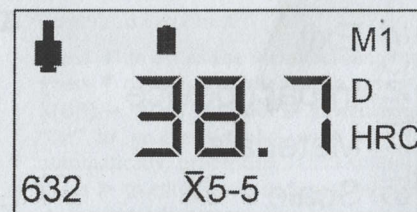
Press and hold ▼ to enter Language screen. Press ▼ and ▲ to select suitable language, press ► after selection to return to the measuring screen, or press and hold any key to exit without saving and return to the measuring screen.



Language Selection

6.6. Display Modes

In measuring mode, press ▲ in turn to switch between different display modes.

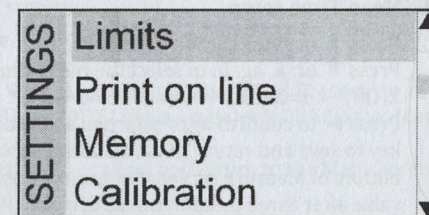
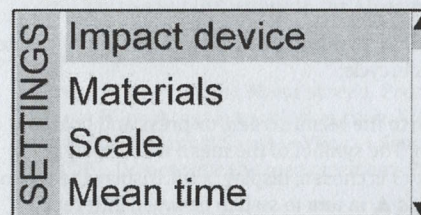


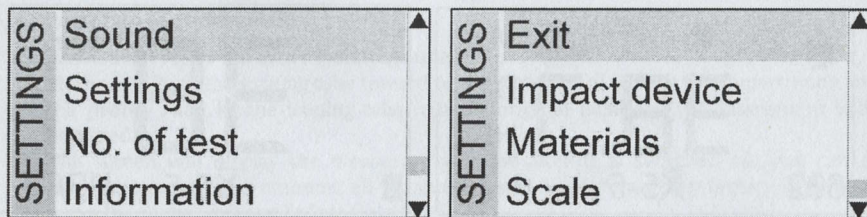
No.	HRC
1:	42.9
2:	31.5
3:	31.9
4:	32.1
5:	38.7
6:	-.-
7:	-.-
8:	-.-
MAX 42.9	
MIN 31.5	
AVE 35.4	
STD 05.1	

Different Display Modes

6.7. Settings

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select the menu item. Press ► again to enter the chosen item and press ▼ or ▲ to select. Press ► to confirm and return to the Menu screen, or press and hold any key to save and return to the Measure screen.





Menu

6.7.1. Impact Device

There are two kinds of impact device can be selected. Impact device D is for normal application and DL is for some specific situation, such as narrow step or deep blind hole. When you select impact device DL, you need to change impact body D to DL. (The impact body DL is optional, you need to order separately).

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Impact device and press ► to enter. Press ▼ or ▲ again to select D or DL in cycle. Press ► to confirm and return to the settings menu, press and hold any key to save and exit to the measure screen.

6.7.2. Materials selection

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Material and press ► to enter. Press ▼ or ▲ again to select the material in cycle. Press ► to confirm after selection and return to the Menu screen, or press and hold any key to save and return to the Measure screen. The symbol of the chosen material will display at right upper of Measure screen.

M1	STEEL/CAST STEEL	M7	BRASS
M2	ALLOY TOOL STEEL	M8	BRONZE
M3	STAINLESS STEEL	M9	WROUGHT COPPER
M4	LAMELLAR IRON	M10	FORGING STEEL
M5	NODULAR IRON	M11	MILL ROLLER (only for HARTIP1800)
M6	CAST ALUMINUM		

6.7.3. Hardness scale conversion

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Scale and press ► to enter.

Press ▼ or ▲ again to select the hardness scale in cycle:

HL→HRC→HRB→HB→HV→HS→HRA→SGM

Press ► to confirm after selection and return to the Menu screen, or press and hold any key to save and return to the Measure screen. The symbol of the chosen unit will display at right of Measure screen.

6.8. Mean Time setup

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Mean time and press ► to enter.

Press ▼ or ▲ again to select the mean times in cycle:

X(Off) → x=3 → x=4 → x=5 → x=6 → x=7.


Press ► to confirm after selection and return to the Menu screen, or press and hold any key to save and return to the Measure screen. The symbol of the mean will display at bottom of Measure screen. For example, as x=3 is chosen, display x3-0. Display the mean value after three measurements are got. (Press ▲ in turn to switch between different display modes to view mean values, please refer to 6.6 Display Modes)

6.9. Upper/Lower Limit

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Limits and press ► to enter.

Press ▼ or ▲ again to select the upper/lower limit in cycle:

X(Off) → √(On) → Upper → Lower. Select "Off" to disable Upper/Lower limit alarm. Select "On" to enable Upper/Lower limit setting, and the audio alarm will be enabled automatically, prompting alarm sound after overrunning. Select "Upper" or "Lower" and press ► to enter limits setting screen. Press ▼ or ▲ to adjust value. Press and hold ▼ or ▲ for fast adjustment. Press ► to confirm after adjustments and return to Limits menu, select On and press ► save changes and return to the upper-level menu, or press and hold

any key to save and return to the Measure screen. The symbol  will display on the instrument screen after Upper/Lower limit alarm is enabled.


6.10. Print On line

6.10.1. Wireless

There are two kinds of wireless module for HARTIP1800 – 2.4G wireless and Bluetooth. You can choose one when ordering the hardness tester. For HARTIP1800, 2.4G wireless module is standard and Bluetooth is optional. Accordingly we have two kinds of micro-printer which work with 2.4G wireless or Bluetooth. When you order micro-printer, please specify which module you want.

6.10.2. Connect the printer

Turn on the printer. Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Print on line option and press ► to enter. Press ▼ or ▲ to select X(Off) → √(On) in turn. To enable on line printing, please select ON. Press ► to confirm after selection and return to the Menu screen, or press and hold any key to save and return to the Measure screen. After turning on, it will be connected with the printer automatically and wireless for printing of

real time data or stored data. After print on line is enabled, the symbol  will display on the screen.

Activating wireless with long time will consume more battery power so the tester is designed to switch off wireless function automatically when the tester turns off. You need to switch if on manually if you need to use it.

6.10.3. Print stored data

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Memory and press ► to enter. Press ▼ or ▲ again to select "View" then press ► to review stored data. Press ▼ and ▲ at the same time in "View" screen, Press ► to confirm printing. Press ▼ or ▲ to cancel. After printing, press ► to confirm and return to the upper-level menu, or press and hold any key to save and return to the Measure screen.

6.11. Memory

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Memory and press ► to enter.

Press ▼ or ▲ again to select in cycle: X(Off) → MODE1(Save single) → MODE2(Save Mean)

→ MODE3(Manual Save) → View → Erase → File.

X(Off): Do not save the measurement. Press ► to confirm and return to the Menu screen.

6.11.1. MODE1 (Save single)

Save each measurement. Press ► to confirm and return to the Menu screen.

6.11.2. MODE2 (Save Mean)

Only save the mean value. Press ► to confirm and return to the Menu screen.

6.11.3. MODE3 (Manual Save)

Save the data by pressing ► after measuring. Press ► to confirm and return to the Menu screen.

6.11.4. View

To view the stored data. Press ▼ or ▲ for Page/Up/Down. Press ▼ and ▲ at the same time to print the data. Press ► to return to the upper-level menu.

6.11.5. Erase

Clear all data of current file. For example, as file A0 is displayed, all data of file A0 will be deleted. Press ► to display "Erase All". Press ► to confirm and delete the data. Press ▼ or ▲ to cancel.

6.11.6. File

Press ► to enter the File menu. Press ▼ or ▲ to select the file. Press ► to confirm and return to the upper-level menu.

After setting, press ► to confirm and return to the upper-level menu, or press and hold any key to save and return to the Measure screen.

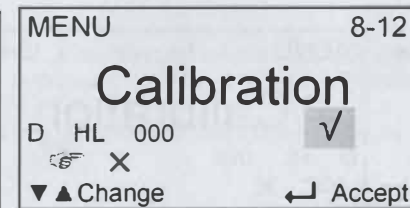
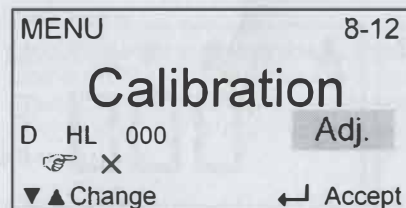
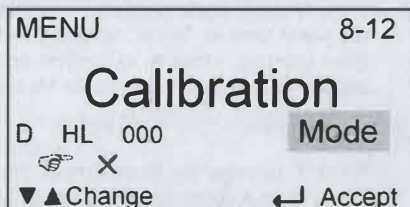
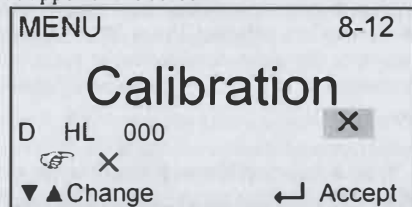
6.12. Калибровка

После длительного использования шаровой наконечник на ударном корпусе может быть изношен, что приведет к неточности. Чтобы компенсировать такую ошибку, тестер предназначен для повторной калибровки пользователем.

Нажмите ▼ для входа в экран меню. Нажмите ▼ или ▲ чтобы выбрать Калибровка, и нажмите ►, чтобы войти. Нажимайте ▲ для циклического выбора: X(Выкл.) --> Режим--> Adj.(Настройка) --> √(On).

Калибровка будет работать только при включении калибровки в меню. Вы можете в любой момент включить/выключить функцию калибровки. Перед активацией функции калибровки необходимо выбрать режим калибровки - Единый (MODE-U) или Индивидуальный (MODE-1). При выборе РЕЖИМ-U можно регулировать только значение HL, а при выборе РЕЖИМ-1 можно регулировать каждое значение шкалы. Конечно, как только вы отключите функцию калибровки, все показания вернуться к исходным, даже если вы внесли изменения в настройки калибровки. Затем отрегулируйте значение в соответствии с точностью,

finally press ► to accept changes. . After Calibration is done, the symbol \pm will display at upper of the screen.



6.12.1. Режим калибровки

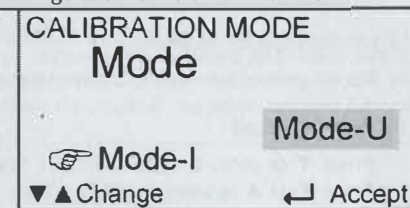
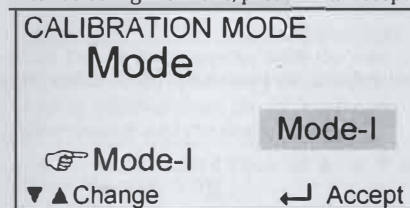
Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Calibration and press ► to enter. Press ▲ to move to "Mode" item then press ► to enter modesselection. Press ▼ or ▲ again to select different modes.

There are two modes of calibration: Individual Calibration (MODE-1) and Unified Calibration (MODE-U).

Select Unified Calibration, only calibrate the HL value and all other scales will be calibrated accordingly.

Select Individual Calibration, each scale can be calibrated individually. For example, you can calibrate HRC value by increasing or decreasing a few HRC values while other scales will not change.

After selecting the mode, press ► to accept it and go back to the calibration menu.



6.12.2. Adjust

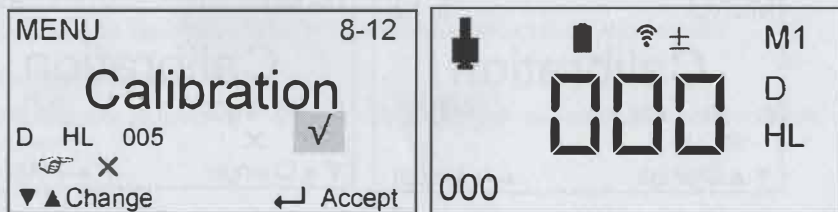
In calibration menu, press ▲ to move to "Adj." item then press ► to enter Adjust screen. Press ▼ or ▲ to adjust the value. If the hardness reading is 5 HL lower than the standard value, please press ▲ to increase 005 to calibrate it. If the hardness reading is 5 HL higher than the standard value, please press ▼ to decrease 005 to calibrate it. . Press and hold ▲ or ▼ for fast adjustment.

Then press ► to accept the adjustments and return to the calibration menu.



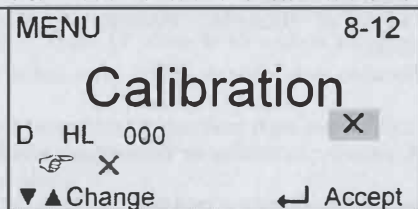
6.12.3. Calibration On

In calibration menu, the current item is "√"(Calibration On), press ► to switch on the Calibration and return to the Menu screen. After Calibration is done, the symbol \pm will display at upper of the measuring screen.



6.12.4. Calibration Off

If you want to switch off the calibration, in calibration menu, press ▲ to move to "X", then press ► to switch off the Calibration function and return to the Menu screen.



6.12.5. Calibration for DL probe

For DL probe, you need to make calibration individually by same procedure like D probe.

6.13. Prompt Sound

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Sound and press ► to enter. Press ▼ or ▲ to select X(Off) → √(On). Press ► to confirm after selection and return to the Menu screen, or press and hold any key to save and return to the Measure screen.

6.14. Settings

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Settings and press ► to enter. Press ▼ or ▲ again to select in cycle: Exit → Default → Save as user → Load user. Exit: Return to the Measure screen without modification. Press ► to return to the Menu screen, or press and hold any key to save and return to the Measure screen. Default: Restore factory settings. Save as user settings: User can save the set parameters, such as the impact device, materials, mean times, Upper/Lower Limit etc. Load Settings: Load the saved user settings. Press ► to return to the Menu screen, or press and hold any key to save and return to the Measure screen.

6.15. No. of Test

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select No. of Test option and press ► to enter, then you can view the current measurement counts for convenient maintenance of the instrument. Press ▼ or ▲ to select Exit or Erase. Press ► to confirm. Select Erase to clear the measurement counts.

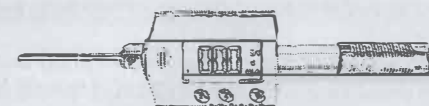
6.16. Information

Press ▼ to enter the Menu screen. Press ▼ or ▲ to select Information and press ► to enter. Press ▼ or ▲ to view the data in cycle: Instrument Serial No. → Website → Standards → Patent No. → Manufacture Date → Version. Press ► after view to return to the Menu screen, or press and hold any key return to the Measure screen.

7. Changing impact body

This tester has a very unique feature, which impact device can convert between D and DL simply by changing impact body. This two-in-one probe is equivalent to two individual probes. With this optional accessory, you can take measurement at very narrow surface such as slot bottom, gear tooth that probe D cannot match. Please refer to the following steps to change impact body. Unscrew the support ring from the tester and let the impact body D out.

Insert the impact body DL into probe and screw the guidetube onto the probe.



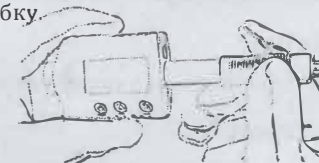
Hardness tester with DL probe

Note: The block D supplied with the new tester indicates the standard HLD value instead of LDL value, when measuring on standard block D with DL probe, the reading is LDL value, which is different from the HLD value marked on the block. If you need standard LDL value, please contact with the manufacturer.

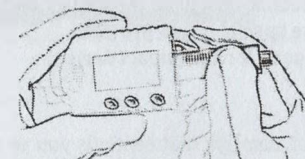
8. Take Measuring

8.1. Загрузка пружины

8.1.1. Держите основной корпус (тестер) левой рукой, пока правая рука держит загрузочную трубку.



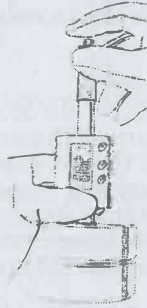
8.1.2. С небольшим усилием протолкните загрузочную трубку против силы пружины в направлении тестера до блокировки ударного элемента.



8.1.3. Дслабьте усилие и дайте загрузочной трубке вернуться в исходное положение.

8.2. Take measurement

Поместите тестер на поверхность измеряемого объекта с помощью опорного кольца.



Пожалуйста, обратите внимание: правильный способ удержания важен для получения лучших показаний.

Внимание: тестер должен быть плотно и перпендикулярно расположен к поверхности объекта. Небольшой зазор между опорным кольцом тестера и поверхностью объекта приведет к неточным показаниям.

8.3. Release the testing force

Плотно поместив тестер на поверхность объекта левой рукой, возьмитесь за загрузочную трубку большим и средним пальцами правой руки и нажмите на спусковую кнопку указательным пальцем.

Ударное тело внутри зонда будет воздействовать на поверхность объекта с силой пружины. Затем на экране отобразится значение жесткости.

Внимание: при нажатии спусковой кнопки следите за тем, чтобы не нажимать спусковую кнопку только одним указательным пальцем, что может повлиять на точность тестирования.

9. Maintenance and Repair

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

9.1. 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.

Cleanguide tube with the special brush provided.








Do not apply oil to any parts for the impact device.

9.2. Charging Battery

When a low battery indicator displays that reminds you to charge the battery. However it is still possible to measure for some time. Please make sure to obtain additional or replacing battery from the manufacturer. Otherwise it may cause the instrument to get un-accuracy value. Please connect the instrument with USB charger or PC to charge the

battery.

Support Rings and impact body

Support Rings for Impact Device D			
Part designation and dimensions:			Suitable for the following surfaces
 D6	Φ 19.5×5.5mm	R≥60mm	plane cylindrical hollow-cylindrical spherical hollow-spherical
 D6a	Φ 13.5×5.5mm	R≥30mm	plane cylindrical hollow-cylindrical spherical hollow-spherical
Special Support Rings			
			Cylindrical
Z 10-15	20×20×7.5mm	R 10mm-15mm	R<10mm not possible
Z 14.5-30	20×20×6.5mm	R 14.5mm-30mm	R≥30mm D6/D6a
Z 25-50	20×20×6.5mm	R 25mm-50mm	
			hollow-cylindrical
HZ 11-13	20×18×5mm	R 11mm-13mm	R<11mm not possible
HZ 12.5-17	20×20×5mm	R 12.5mm-17mm	R≥30mm D6a
HZ 16.5-30	20×20×5mm	R 16.5mm-30mm	
			spherical
K 10-15	Φ 20×7.7mm	R 10mm-13mm	R<10mm not possible
K 14.5-30	Φ 20×6.7mm	R 14.5mm-30mm	R≥30mm D6/D6a
			hollow-spherical
HK 11-13	Φ 17×5mm	R 11mm-13mm	R<11mm not possible
HK 12.5-17	Φ 18×5mm	R 12.5mm-17mm	R≥30mm D6a
HK 16.5-30	Φ 20×5mm	R 16.5mm-30mm	
UN	Φ 52×20×16mm		
			
Impact Body			
Impact body DL	