



Portable Hardness Tester

Model No. PHT-1700 / 1740 / 1750



Operation Manual

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Warranty /Return Policy

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Warranty Policy:

All portable and stationary material testing instruments manufactured for/by Phase II shall be free from defects in material and workmanship for a period of 1 to 5 full years (depending upon model) from date of purchase. Parts found to be defective shall be replaced or repaired at Phase II's sole discretion. Products found by Phase II to be misused, abused or neglected are not covered under this warranty. Parts not covered by this warranty are normal wear and consumable items such as (but not limited to) impact balls, impact bodies, diamond indentors, carbide ball indentors, impact springs, cables and connectors, batteries, diamond stylus, contact probes, points and test blocks.

Consumable (wearable) items such as cables and probes have a 90 day warranty from date of purchase.

This warranty is exclusive and in lieu of all other warranties whether written, oral or implied, including any implied warranties or merchantability or fitness for a particular purpose. In no event shall Phase II be liable for any incidental, special or consequential damages of any nature.

Any attempts to "open, modify, or tamper with" this device by anyone other than Phase II will result in a voided warranty.

Return Policy:

All Phase II products must have authorization prior to return. If product is not acceptable for any reason including application issues and demonstrations, authorization for return must be obtained within 5 days of receipt of product. Unit must be in same new condition it was received. Failure to do so will result in an automatic 15% restocking fee. Returns after 30 days will not be accepted.

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1 Overview

1.1 Advantages

- Wide measuring range. Based on the principle of Leeb hardness testing theory. Capable of measuring Leeb hardness of all metallic materials.
- Large screen LCD, showing all functions and parameters. With background light.
- Seven impact devices are available for special application. Automatic identification of impact device upon plug in.
- Test at any angle, even upside down.
- Direct display of hardness scales HRB, HRC, HV, HB, HS, HL
- Large memory could store 100 groups (Relative to average times 1-32) of information including single measured value, mean value, impact direction, impact times, material and hardness scale etc.
- Battery symbol showing the capacity of the battery.
- User calibration function.
- Output via USB port. Micro printer support.
- Compact plastic case, suitable for use under poor working conditions
- Continuous working period of no less than 100 hours with two alkaline batteries (AA size) Auto power off.
- Outside dimensions: 150×74×32 mm
- Weight: 245g

1.2 Main Application & Testing Range

1.2.1 Main Application

- Die cavity of molds
- Bearings and other parts
- Failure analysis of pressure vessel, steam generator and other large equipment
- Large, hard work piece
- Testing of installed machinery and permanently assembled parts.
- Material identification based upon hardness range
- Rapid testing in large range and multi-measuring areas for large-scale work piece

1.2.2 Testing Range

Testing range refer to Table 1 and Table 2 in the Appendix.

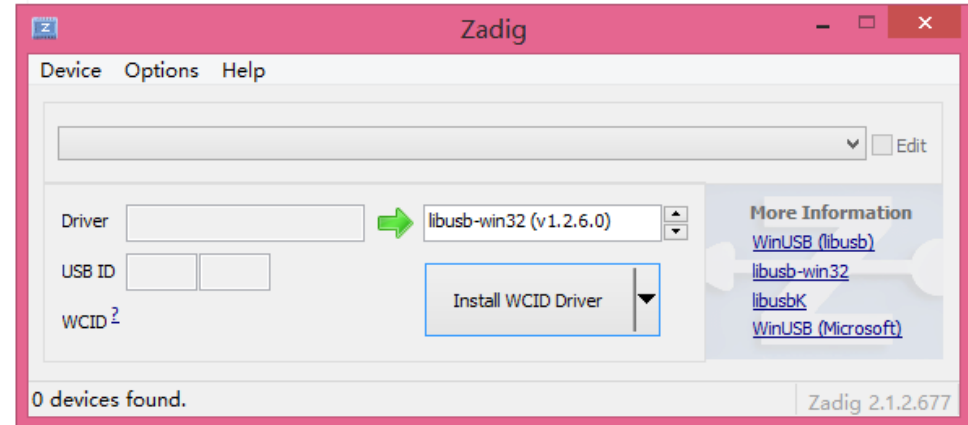
1.3 Technical Specifications

- Error and repeatability of displayed value see Table1-1 below.

Windows 8 Installation Patch:

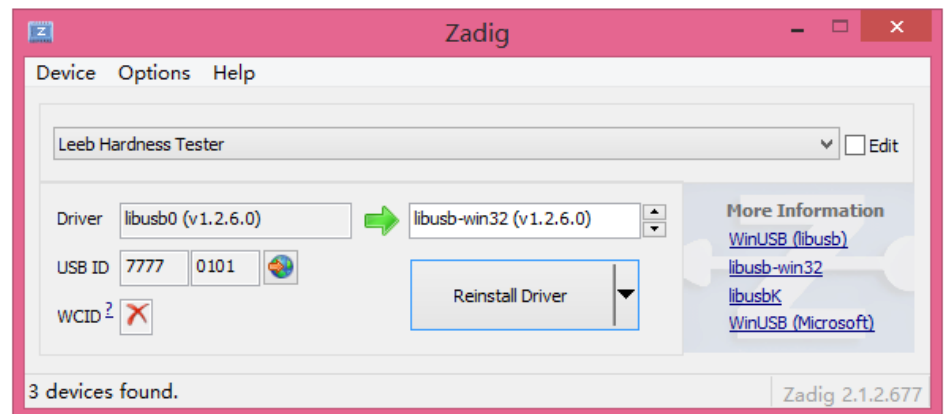
For all PHT-series portable hardness testers

- 1, Connect the tester to PC via USB cable. Power up the instrument.
- 2, Run zadig_2.1.2.exe



- 2, Activate Options/List All Devices.

Then select the "Leeb Hardness Tester" item. Select the "libusb-win32(v1.2.6.0)" option.



- 3, Press down the Install Driver/Reinstall Driver button. Wait for the driver installing process complete.

4, Now the usb driver for the Leeb Hardness Tester has been successfully installed. You can now run the datapro software to communicate with the hardness tester.

Note: Keep the instrument powered up during driver installation and connection.

Tech Support: (201) 962-8352

Data Output Software Installation:

Insert CD into drive on your computer

Window will pop up

Run AutoRun.exe

Follow prompts to load program, make sure your designation drive is set to C:

Once completed a “Datapro for Hardness icon will appear on desktop

Launch the program using the Datapro for Hardness icon on desktop shortcut

Using the USB cable provided insert round end to the hardness tester and USB side to your computer

On the software screen select “Connect”. It will ask for which COM port you are attached to. Select COM port.

Once connected you can view all saved memory files on screen.

There are also selections for “Database” and “Reports”.

Table 1-1

No.	Type of impact device	Hardness value of Leeb standard hardness block	Error of displayed value	Repeatability
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

- **Measuring range:** HLD (170~960) HLD
- **Measuring direction:** 0~360°
- **Hardness Scale :** HL(Leeb), HB(Brinell) 、 HRB(RockwellB) 、 HRC(Rockwell C), HV(Vickers)、 HS(Shore)
- **Display:** 4-Digit LCD
- **Data memory:** max. 100 groups (relative to impact times 1-32)
- **Working power:** 3V (2 AA size alkaline batteries)
- **Continuous working period:** about 100 hours (With backlight off)
- **Communication interface:** USB

1.4 Configuration

Table 1-2

	No.	Item	Quantity	Remarks
Standard Configuration	1	Main unit	1	
	2	D type impact device	1	With cable
	3	Standard test block	1	
	4	Cleaning brush (I)	1	
	5	Small support ring	1	
	6	Alkaline battery	2	AA size
	7	Manual	1	
	8	Instrument package case	1	
	9			
Optional Configuration	11	Cleaning brush (II)	1	For use with G type impact device
	12	Other type of impact devices and support rings		Refer to Table 3 and Table 4 in the appendix.
	14	Communication cable	1	
	16	Print cable	1	

1.5 Working Conditions

Working temperature: 0°C ~ +40°C;

Storage temperature: -30°C ~ +60°C

Relative humidity: ≤90%;

The surrounding environment should be void any vibration, strong magnetic field, viscous fluids, corrosive medium and heavy dust.

Optional 12pc Support Ring Set Part No. PHT1500-300



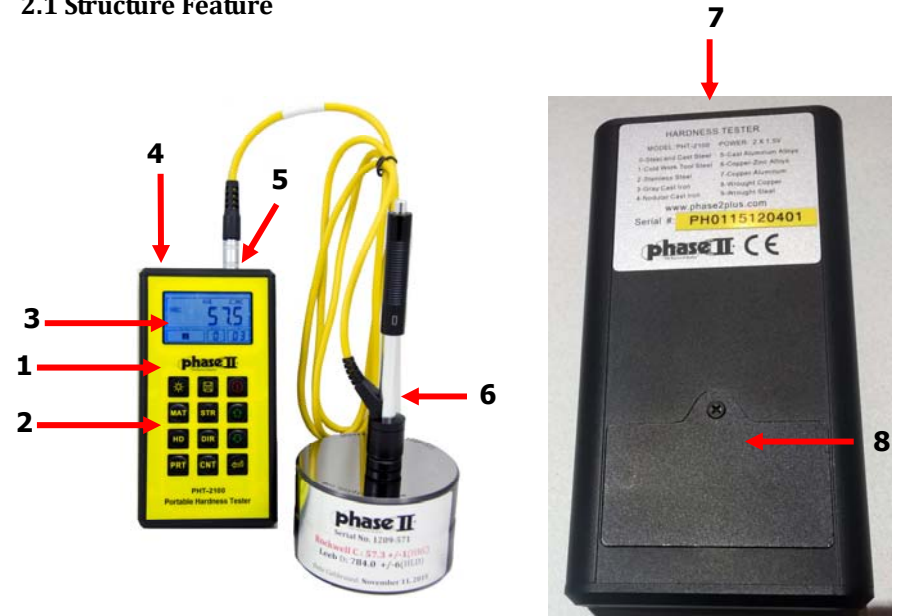
For use on convex and concave parts

Table 3

Type of impact device	DC(D)/DL	D+15	C	G	E	
Impacting energy	11mj	11mj	2.7mj	90mj	11mj	
Mass of impact body	5.5g/7.2g	7.8g	3.0g	20.0g	5.5g	
Test tip hardness:	1600HV	1600HV	1600HV	1600HV	5000HV	
Dia. Test tip:	3mm	3mm	3mm	5mm	3mm	
Material of test tip:	Tungsten carbide	Tungsten carbide	Tungsten carbide	Tungsten carbide	synthetic diamond	
Impact device diameter:	20mm	20mm	20mm	30mm	20mm	
Impact device length:	86(147)/	162mm	141mm	254mm	155mm	
Impact device weight:	75mm 50g	80g	75g	250g	80g	
Max. hardness of sample	940HV	940HV	1000HV	650HB	1200HV	
Mean roughness value of sample surface Ra:	1.6µm	1.6µm	0.4µm	6.3µm	1.6µm	
Min. weight of sample:	>5kg	>5kg	>1.5kg	>15kg	>5kg	
Measure directly	2~5kg	2~5kg	0.5~1.5kg	5~15kg	2~5kg	
Need support firmly	0.05~2kg	0.05~2kg	0.02~0.5kg	0.5~5kg	0.05~2kg	
Need coupling tightly						
Min. thickness of sample Coupling tightly	5mm	5mm	1mm	10mm	5mm	
Min. layer thickness for surface hardening	≥0.8mm	≥0.8mm	≥0.2mm	≥1.2mm	≥0.8mm	
Size of tip indentation						
Hardness 300HV	Indentation diameter Depth of indentation	0.54mm 24µm	0.54mm 24µm	0.38mm 12µm	1.03mm 53µm	0.54mm 24µm
Hardness 600HV	Indentation diameter Depth of indentation	0.54mm 17µm	0.54mm 17µm	0.32mm 8µm	0.90mm 41µm	0.54mm 17µm
Hardness 800HV	Indentation diameter Depth of indentation	0.35mm 10µm	0.35mm 10µm	0.35mm 7µm	-- --	0.35mm 10µm
Available type of impact device	DC: Test hole or hollow cylindrical ; DL:Test narrow groove or hole	D+15: Test grooves	C: Test small, light, thin parts and surface of hardened layer	G: Test large, heavy and rough surface steel	E: Test super high hardness material	

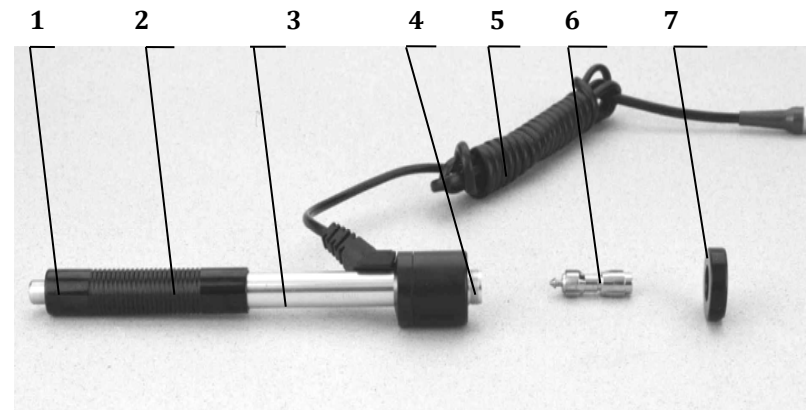
2 Structure Feature & Testing Principle

2.1 Structure Feature



- 1. Main unit 2. Keypad 3. LCD display 4. USB Port
- 5. Socket for impact device 6. Impact device 7. Materials chart 8. Battery cover

2.1.1 D Type Impact Device



- 1. Release button 2. Loading tube 3. Guide tube 4. Coil unit
- 5. Connection cable 6. Impact body 7. Support ring

2.1.2 Different Types of Impact Device



2.2 Main Screen

Below is the main display screen:

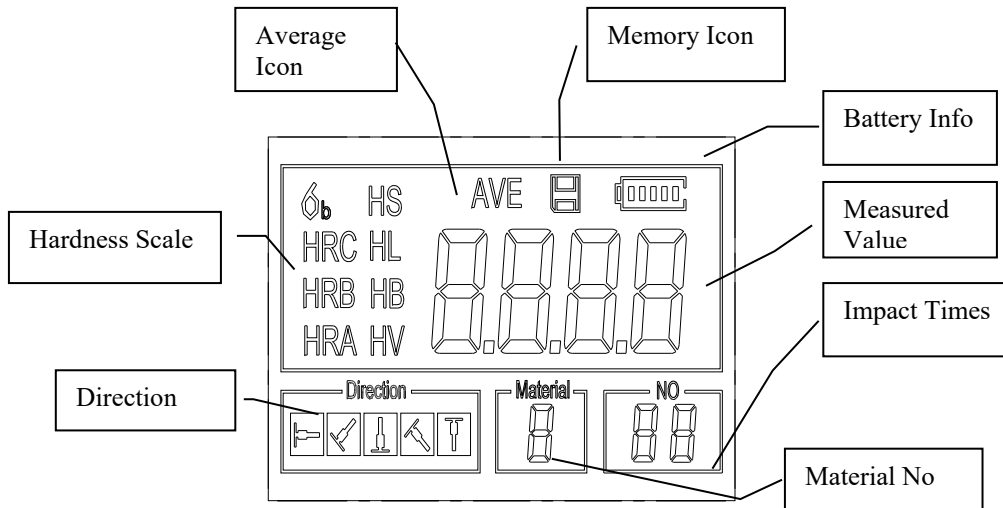


Table 2: Leeb to Tensile Strength Conversion Chart
This is an Approximation only!

No.	Material	HLD	Strength σ_b (MPa)
1	Mild steel	350~522	374~780
2	High-Carbon steel	500~710	737~1670
3	Cr steel	500~730	707~1829
4	Cr-V steel	500~750	704~1980
5	Cr-Ni steel	500~750	763~2007
6	Cr-Mo steel	500~738	721~1875
7	Cr-Ni-Mo steel	540~738	844~1933
8	Cr-Mn-Si steel	500~750	755~1993
9	Super strength steel	630~800	1180~2652
10	Stainless steel	500~710	703~1676

	HV						
Cast aluminum alloys	HB	19~ 164		23~ 210	32~ 168		
	HRB	23.8~ 84.6		22.7~ 85.0	23.8~ 85.5		
BRASS(copper-zinc alloys)	HB	40~ 173					
	HRB	13.5~ 95.3					
BRONZE(copper-aluminum/tin alloys)	HB	60~ 290					
Wrought copper alloys	HB	45~ 315					

Instruction of the Main Display Screen:

Material: The present presetting material.

Impact direction: The present impact direction.

Hardness scale: Hardness scale of the present measured value.

Battery information: Shows remaining battery capacity

Measured value: Display present single time measured value (without showing average icon), or display the present mean value (with average icon prompting). “-HI-” means over conversion value or measure range. “-LO-” means lower than conversion value or measure range.













Impact times: Number of tests taken















Average Icon: It will appear when showing the mean value of the measured values after reaching the preset of impact times.

Memory Icon: It appears when operating the instrument memory.

2.3 Keypad Definitions

Table 2-1

	Turn on/off backlight		Data Save or Data Delete		Turn the instrument on/off
	Material Selection		Hardness/Strength switch		Plus or Up
	Hardness Scale Selection		Impact Direction change		Minus or Down
	Print data		Impact Times set		Data logging or Enter

- Press  key to store present group of measured value into memory. This operation is only valid after obtaining your average
- Press key  and  to display single measured value.
- Press  key to switch on or off the background light of LCD.
- Press  key to set the impact direction.
- Press  key to change the impact times per group. The impact times item will flash after pressing the  key, and then the impact times value will increase or decrease when pressing the  or  key. Press  key to exit from changing the impact times process.
- Press  key to change the hardness scale.
- Press  key to change the material. Presetting hardness scale recovers to HL automatically after material presetting changed.
- Press  key to switch between hardness test and Tensile strength test. Only D and DC type of impact device has this function.
- Press  key to print out the measured values after measurement.

2.4 Leeb Hardness Testing Principle

It is defined as the quotient of an impact body's rebound velocity over its impact velocity, multiplied by 1000. Harder materials produce a higher rebound velocity than softer materials. For a specific group of material (e.g. steel, aluminum. etc.). Leeb hardness value represents a direct relationship to its hardness properties. For ordinary metal, conversion curves of hardness HL versus other standard static hardness (HB, HV, HRC, etc.) are available, enabling you to convert HL into other hardness values.

Fault Appearance	Fault Analysis	Repair method
Failure to power on	Low or dead Battery	Replace the batteries
No measured value	Impact device cable failure	Replace the cable

APPENDIX

Table 1

Material	Method	Impact device					
		D/DC	D+15	C	G	E	DL
Steel and cast steel	HRC	20~ 68.5	19.3~ 67.9	20.0~ 69.5		22.4~ 70.7	20.6~ 68.2
		HRB	38.4~ 99.6			47.7~ 99.9	
	HB		127~ 651	80~ 638	80~ 683	90~ 646	83~663
		HV	83~ 976	80~ 937	80~ 996		84~1042
	HS		32.2~ 99.5	33.3~ 99.3	31.8~ 102.1		35.8~ 102.6
Cold work 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				
Grey cast iron	HRC						
		HB	93~ 334			92~ 326	
	HV						
Nodular cast iron		HRC					
	HB		131~ 387			127~ 364	

5.11 Battery Replacement

The PHT-2100 uses standard AA batteries. After several hours of usage, the battery symbol on the screen will begin to show less dark tabs which is shown as . When the batteries are drained, the battery symbol will be shown as and will begin to flash. When this occurs, the batteries should be replaced.

Pay attention to the polarity of the batteries!

Please properly dispose of used batteries accordingly.

5.12 Connecting to a Computer

The Instrument is equipped with a USB data port. Using the supplied output cable the gauge has the ability to connect to a computer, or external storage device. Measurement data stored in the memory of the gauge can be transferred to the computer through the USB port.

5.13 Error Code Reference

Error Code	Explanation	Error Code	Explanation
E00	Replace Battery	E05	Can't print
E01	Value out of range	E06	
E02	Measurement not finished	E07	
E03	Data already saved	E08	
E04	No memory data	E09	

6 Maintenance & Servicing

6.1 Impact Device Maintenance

- After the impact device has been used for 1000--2000 times, please use the nylon brush provided to clean the guide tube and impact body. When cleaning the guide tube, unscrew the support ring first, then take out the impact body, spiral the nylon brush in counter-clockwise direction into the bottom of guide tube and repeat a few times to remove any dust or small chips inside the tube. Then install the impact body and support ring again.
- Release the impact body after use.
- **NEVER USE LUBRICANT OR CLEANERS ON IMPACT DEVICE!**

6.2 Instrument Maintenance Program

- When testing in the Rockwell C hardness scale your error amount should not exceed 2 Rockwell C points. Changing the spherical test tip or impact body should be considered.
- **Warranty will be VOID if unit has been dismantled by someone other than an authorized repair person**

6.3 Fault Analysis & Evaluation

3 Calibration

3.1 Instrument Preparation and Inspection

IMPORTANT!

Your hardness tester has already been calibrated at the factory.

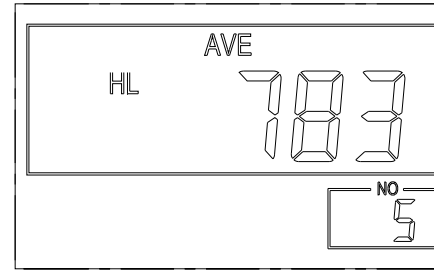
Call Tech Support for quick set up help. (201) 962-8352

Calibration of the instrument can only be performed on a calibrated LEEB test block. Rockwell, Brinell or other types of test blocks are not permitted since they don't fall within the parameters of a Leeb hardness tester. The error and repeatability of displayed value should be within +/-6HL points (D device) of the block value.

1) Power unit OFF

2) Plug in impact device

Press key, while simultaneously pressing down the key to power on the system. The calibration screen is shown as below.



Take 5 tests on your standard hardness block. The display will show the average measured value after measuring 5 times. Press key to change to its nominal value to match the value shown on your test block.

Press key to confirm the calibration. Or press the key to cancel the calibration.

Range of adjustment: ±30HL.

The measurement parameters, including the material setting, the hardness scale and the impact direction can't be changed during calibration.

Note : For Verification, Take 5 tests around the test block and get your average. This average value should be within the acceptable tolerance of the test block value. *If this value exceeds the allowable tolerance of the test block, a calibration should be performed. See above.*

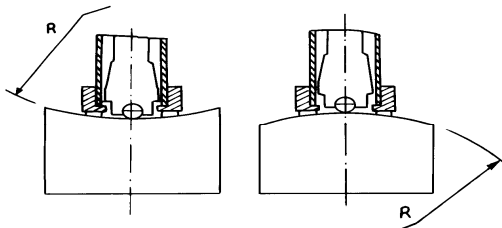
3.2 Impact Device Selection

Refer to Appendix Table 1 and Table 3 for selection of impact device.

3.3 Preparation of the Sample Surface

Preparation for sample surface should conform to the relative requirement in Appendix Table 3.

- Test surfaces should be at or close to room temperature for optimal performance
- To eliminate hardness errors resulting from the roughness of a sample's surface when using impact device D, DC or D+15, the test surface should be polished until its roughness **Ra** is no more than 2 μ m. PHASE II **SRG-2000** handheld surface roughness tester or any other suitable instrument may be used to measure the surface roughness of the sample material. The test surface should be clean and free from oil stains.
- Support of test sample. Support is not necessary for heavy samples. Lighter weight parts must be set on the flat, smooth surface of a larger mass metal object. The sample must be completely stationary and without any gaps between the two parts.
- Curved surface: The best testing surface of sample is flat. When the curvature radius R of the surface to be tested is smaller than 30mm (D, DC, D+15, C, E and DL type of impact device) and smaller than 50mm (G type of impact device), the small support ring or the shaped support rings should be chosen.
- The sample should have enough mass. Minimum thickness of sample should conform to Table 3.
- For the sample with hardened layer on surface, the depth of hardened layer should conform to Table 3.



- Coupling. Light-weight sample must be firmly coupled to a part with much larger mass. Both coupled surface must be flat and smooth. The impact direction must be vertical to the coupled surface. When the sample is a big plate, or long rod, it can be deformed and become unstable, even though its weight and thickness is within allowable ranges, and accordingly, the test value may not be accurate. So the sample should be reinforced or supported at its back.

<E04>, which means no memory data, and then return back.

- 2) Use the \uparrow key and the \downarrow key to scroll to the file that will be deleted.
- 3) Press the DEL key on the desired file. It will automatically delete the file, and display “-DEL”.
- 4) Press the CNT key, at any time, to exit the data logging function and return to measurement mode.

Note: Do not shut down the instrument while deleting data. It could lead to loss of all data if shut down while deleting.

5.7 Print Report

At the end of the inspection process, or end of the day, the user may require the readings be printed.

Before printing, please insert one connection plug of the print cable into the socket on the upper left side of the main body, and insert the other plug into the communication socket of your PC. You can print out the measurement result immediately after each testing process, by easily pressing the PRT key.

If you want to print the data stored in the instrument memory, then follow these steps:

1. Press the MEM key to activate the data logging function. The memory icon will appear.
2. Use the \uparrow key and the \downarrow key to select the desired file.
3. Press the PRT key to print the selected file. This operation will send all the data in current file to the mini printer via RS232 port and print them out.
4. Press the CNT key to exit the data logging functions and return to measurement mode.

5.8 System Reset

Press down the HD key while powering on the instrument will restore factory defaults. The only time this might possibly helpful is if one of the parameters in the gauge were somehow corrupted.

5.9 Backlight

Press key * to switch on or switch off the background light. Since the light will consume more power, turn on it only when necessary.

5.10 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 5 minutes, it will turn itself off. Before powering off, the LCD display of the instrument will continue flashing for 20 seconds. To prevent the unit from powering off you can press any button Except Power .

When the voltage of the battery gets too low, the display will show <E00>, then power off automatically.

In hardness testing, Press **[HD]** key to change the hardness scale. The supported hardness scale includes: HL, HV, HB, HRC, HS and HRB.

Note:

- ***This displays the valid hardness scale for the present selected impact device and material. It would not display the hardness scale which is not valid.***
- ***Please select material first, then select hardness scale.***
- ***Presetting hardness scale recovers to HL automatically after presetting material is changed.***

5.4 Impact Direction Setting

Press the **[DIR]** key to move to the impact direction that you will work in.

5.5 Average Times Setting

You could modify average times within the range of 1 to 32 as following:

- 1) Press **[CNT]** key in testing state. The impact times item will begin to flash;
- 2) Press **[↑]** or **[↓]** key to set the average times to the number you want.
- 3) Press **[CNT]** key finally to exit from the operation.

5.6 Data logging

At most one hundred files (F00-F99, one group as one file) can be stored inside the gauge. By simply pressing the **[LOG]** key after a new measurement finishes-the screen showing the “AVE” icon, the measured hardness/strength group values will be saved to memory. The new saved file is appended as the last file of the memory. This function provides the user with the ability to view/delete a file/group previously saved in memory.

5.6.1 Viewing stored file/Group

To view the memory data, follow the steps:

- 1) Press the **[MEM]** key to activate the data logging function. The memory icon will appear. It will display the current file name, the test parameter of the group data and the mean value of the group. If there is no data in the memory, it will display: <E04>, which means no memory data, and then return back.
- 2) Use the **[↑]** key and the **[↓]** key to select the desired file to view.
- 3) Press the **[MEM]** key to see details of that group data.
- 4) Use the **[↑]** key and the **[↓]** key to view each single measured data in that group while viewing details.
- 5) Press the **[CNT]** key to return to previous screen at any time during data logging.

5.6.2 Deleting selected file/Group

The user may require deleting a file from the instrument memory. The procedure is outlined in the following steps.

- 1) Press the **[MEM]** key to activate the data logging function. The memory icon will appear. It will display the current file name, the test parameter of the group data and the mean value of the group. If there is no data in the memory, it will display:

- AVOID any object that has a strong Magnetic Force.

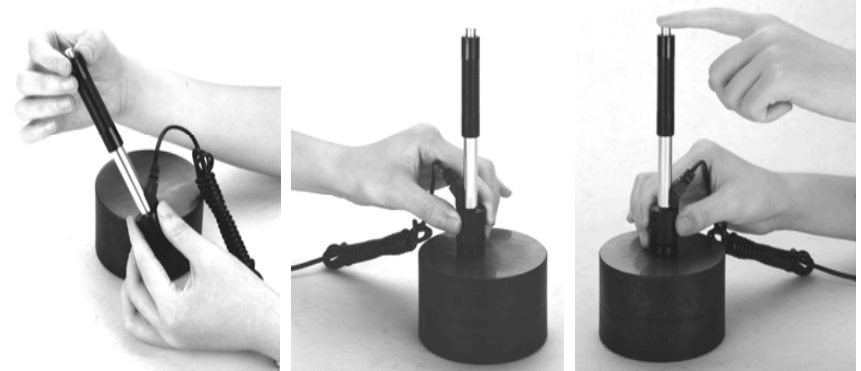
4 Testing Program

4.1 Start-Up

- Insert the plug of the impact device into the socket of impact device on the instrument.
- Press the **[ON]** key to power the unit on. The instrument is ready for testing.

4.2 Loading

Pushing the loading-tube downwards until contact is felt. Then allow it to slowly return to the starting position or using other method locking the impact body.



4.3 Placement

Press the impact device supporting ring firmly on the surface of the sample, the impact direction should be vertical to the testing surface.

4.4 Testing

- Press the release button on the upside of the impact device to test. The sample, the impact device as well as the operator are all required to be stable. The action direction should pass the axis of the impact device.
- Each measured area of the sample usually need 3 to 5 times of testing operation to obtain an average. The result data dispersion should not more than mean value $\pm 15HL$.
- The distance between any two impact points or from the center of any impact point to the edge of testing sample should conform to the regulation of Table 4-1.

Table 4-1

Type of Impact Device	Distance of center of the two indentations	Distance of center of the indentation to sample edge
	Not less than (mm)	Not less than (mm)
D、DC	3	5
DL	3	5
D+15	3	5
G	4	8
C	2	4

4.5 Read Measured Value


After each impact (test), the LCD will display the current measured value, impact times plus one and a beep will alert you if the measured value is not within the valid range. The unit will beep when reaching the preset for average impact times and immediately display the average of your tests.

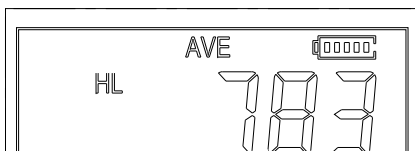
4.6 Notification


- Replacing the impact device must be done while unit is Powered off.
- You can only save data after the average has been obtained.
- Only type D and type DC of impact device have the function of tensile strength test option. You cannot change the setting to strength testing when using other types of impact device.
- Not all materials can convert to all hardness scale value. The hardness scale is reset to HL automatically after changing the material. So select material prior to changing the hardness scale.

5 Operation Detail


5.1 Power On/Off

Plug in the impact device FIRST. Press  to power on the instrument. The unit will automatically detect the type of the impact device during power up, and will display saved setting information on the screen



The instrument can be turned off by pressing the  key. The hardness tester has memory that retains all of its settings even when the power is off.

5.2 Material Setting

Press  key to change the material to the one you want to preset. Hardness scale defaults to HL automatically after material presetting changed. Please select material first, then select hardness scale.

You can select your material among the following selections: Steel and Cast Steel, Cold Work Tool Steel, Stainless Steel, Gray Cast Iron, Nodular Cast Iron, Cast Aluminum Alloys, Copper-Zinc Alloys, Copper-Aluminum Alloy and Wrought Copper. The relationship between the material number displayed on the instrument screen and the material is as follows:

Table 5-1


Material No.	Material	Material No.	Material
0	Steel and cast steel	5	Cast aluminium alloys
1	Cold work tool steel	6	Copper-Zinc alloys
2	Stainless steel	7	Copper -Aluminium alloys
3	Gray cast iron	8	Wrought copper
4	Nodular cast iron		

In strength testing, the following materials are selectable: Mild Steel, High-Carbon Steel, Cr Steel, Cr-V Steel, Cr-Ni Steel, Cr-Mo Steel, Cr-Ni-Mo Steel, Cr-Mn-Si Steel, Super Strength Steel and Stainless Steel. The relationship between the material number displayed on the instrument screen and the material is as follows:

Table 5-2

Material No	Material	Material No	Material
0	Mild steel	5	Cr-Mo steel
1	High carbon steel	6	Cr-Ni-Mo steel
2	Cr steel	7	Cr-Mn-Si steel
3	Cr-V steel	8	Super strength steel
4	Cr-Ni steel	9	Stainless steel

5.3 Hardness/Strength testing

Press  key to switch between hardness testing and strength testing (6b). **Note: Only D and DC type of impact device has the function of strength testing. So hardness testing is the only selection if the impact device is not D or DC type.**