

Portable Hardness Tester

Model No. PHT-1700 / 1740



Instruction Manual

21 Industrial Avenue
Upper Saddle River NJ 07458
(201) 962-7373
www.phase2plus.com

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1 General description

1.1 Features

- LCD display of 128×64 matrix with Backlight
- Converts to all common hardness scales(HV ,HB,HRC,HRB,HS).
- Easy to use Menu driven system
- With RS232 interface, multiple communication modes are adopted to meet customized requirements of various users.
- Automatic detection of optional impact devices
- Max 600 groups (impact times:32-1)of data can be stored in memory.
- Upper and lower limit of hardness can be preset; with alarm
- Test values software calibration function.
- Power comes from two standard AA batteries. Continuous working period: approx. 100 h (no back light on).

1.2 Main Application and Testing Range

1.2.1 Main Application

- The assembled machinery and permanently installed parts
- Die cavity of molds
- Heavy work piece
- Failure analysis of pressure vessel, steam turbo-generator set and other large equipment
- Testing of parts in confined areas or on gear teeth
- Bearings and other parts
- Material identification of the metal material warehouse

1.2.2 Testing Range

Testing range see table 1 and table 2.

Table 1

| Material | Hardness method | Impact device | | | | | |
|--|-----------------|---------------|-----------|------------|-----------|------------|-----------|
| | | D/DC | D+15 | C | G | E | DL |
| Steel and cast steel | HRC | 17.9-68.5 | 19.3-67.9 | 20.0-69.5 | | 22.4-70.7 | 20.6-68.2 |
| | HRB | 59.6-99.6 | | | 47.7-99.9 | | 37.0-99.9 |
| | HRA | 59.1~85.8 | | | | 61.7-88.0 | |
| | HB | 127-651 | 80-638 | 80-683 | 90-646 | 83-663 | 81-646 |
| | HV | 83-976 | 80-937 | 80-996 | | 84-1042 | 80-950 |
| | HS | 32.2-99.5 | 33.3-99.3 | 31.8-102.1 | | 35.8-102.6 | 30.6-96.8 |
| Hammered steel | HB | 143~650 | | | | | |
| 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 | | | | | |
| Gray cast iron | HRC | | | | | | |
| | HB | 93-334 | | | 92-326 | | |
| | HV | | | | | | |
| Nodular cast iron | HRC | | | | | | |
| | HB | 131-387 | | | 127-364 | | |
| | 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/copper-tin alloys) | HB | 60-290 | | | | | |
| Wrought copper alloys | HB | 45-315 | | | | | |

Table 2

| 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 |

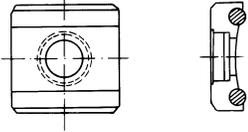
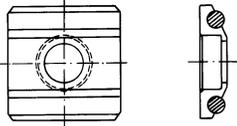
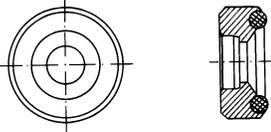
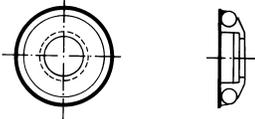
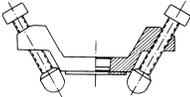
1.3 Types and specification

| | No. | | Remarks |
|-----------------------------|-----|---|--------------------------|
| Standard Delivery | 1 | Main unit | 1 |
| | 2 | D type impact device | 1 |
| | 3 | Small supporting ring | 1 |
| | 4 | Nylon brush (A) | 1 |
| | 5 | High value Leeb test block | 1 |
| | 6 | Communication cable | 1 |
| Optional Accessories | 7 | Nylon brush(A) | For G type impact device |
| | 8 | Various non-conventional type of impact devices | See table 3 |
| | 9 | Various non-conventional type of impact supporting ring | See table 4 |

Table 3

| Non conventional impact devices | | 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 |
| Diameter of 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)/ 75mm | 162mm | 141mm | 254mm | 155mm |
| Impact device Weight | | 50g | 80g | 75g | 250g | 80g |
| Max. hardness of workpiece | | 940HV | 940HV | 1000HV | 650HB | 1200HV |
| Mean roughness of workpiece surface of the Ra | | 1.6µm | 1.6µm | 0.4µm | 6.3µm | 1.6µm |
| Min. weight of sample | | | | | | |
| Measure directly | | >5kg | >5kg | >1.5kg | >15kg | >5kg |
| Need support firmly | | 2-5kg | 2-5kg | 0.5-1.5kg | 5-15kg | 2-5kg |
| Need coupling tightly | | 0.05-2kg | 0.05-2kg | 0.02-0.5kg | 0.5-5kg | 0.05-2kg |
| Min. thickness of sample coupling tightly | | 5mm | 5mm | 1mm | 10mm | 5mm |
| Min. layer thickness for surface harden | | ≥0.8mm | ≥0.8mm | ≥0.2mm | ≥1.2mm | ≥0.8mm |
| Size of tip indentation | | | | | | |
| Hardness 300HV | Indentation diameter | 0.54mm | 0.54mm | 0.38mm | 1.03mm | 0.54mm |
| | Indentation depth | 24µm | 24µm | 12µm | 53µm | 24µm |
| Hardness 600HV | Indentation diameter | 0.54mm | 0.54mm | 0.32mm | 0.90mm | 0.54mm |
| | Indentation depth | 17µm | 17µm | 8µm | 41µm | 17µm |
| Hardness 800HV | Indentation diameter | 0.35mm | 0.35mm | 0.35mm | -- | 0.35mm |
| | Indentation depth | 10µm | 10µm | 7µm | -- | 10µm |
| Available type of impact device | | <p>D: General test</p> <p>DC: Hole or hollow-cylindrical test</p> <p>DL: Slender narrow groove or hole test</p> | <p>D+15: groove or reentrant surface</p> | <p>C: small, light, thin parts or surface of hardend layer</p> | <p>G: large, thick, heavy or rough surface steel</p> | |

Table 4

| No. | Code | Type | Sketch of non conventional supporting ring | Remarks |
|-----|----------|-----------|---|--|
| 1 | 03-03.7 | Z10-15 | | For testing cylindrical outside surface R10-R15 |
| 2 | 03-03.8 | Z14.5-30 |  | For testing cylindrical outside surface R14.5-R30 |
| 3 | 03-03.9 | Z25-50 | | For testing cylindrical outside surface R25-R50 |
| 4 | 03-03.10 | HZ11-13 | | For testing cylindrical inside surface R11-R13 |
| 5 | 03-03.11 | HZ12.5-17 |  | For testing cylindrical inside surface R12.5-R17 |
| 6 | 03-03.12 | HZ16.5-30 | | For testing cylindrical inside surface R16.5-R30 |
| 7 | 03-03.13 | K10-15 |  | For testing spherical outside surface SR10-SR15 |
| 8 | 03-03.14 | K14.5-30 | | For testing spherical outside surface SR14.5-SR30 |
| 9 | 03-03.15 | HK11-13 | | For testing spherical inside surface SR11-SR13 |
| 10 | 03-03.16 | HK12.5-17 |  | For testing spherical inside surface SR12.5-SR17 |
| 11 | 03-03.17 | HK16.5-30 | | For testing spherical inside surface SR16.5-SR30 |
| 12 | 03-03.18 | UN |  | For testing cylindrical outside surface, radius adjustable R10-∞ |

1.4 Operating conditions:

Ambient temperature: -10°C-40°C

Relative humidity: ≤90%

No vibration, no strong magnetic field and no corrosive medium and heavy dust in ambient environment.

2 Structure features and Testing principle

2.1 Structure features

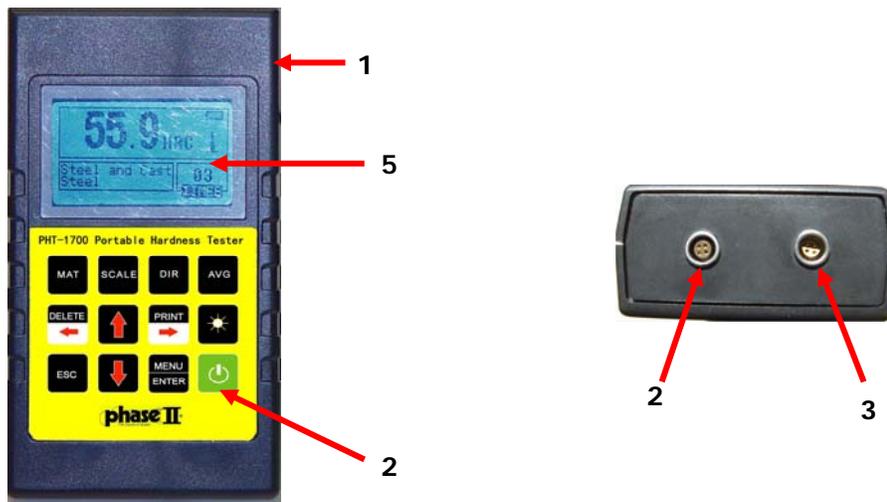
2.1.1 Hardness Tester

1: Main unit

2: Impact device



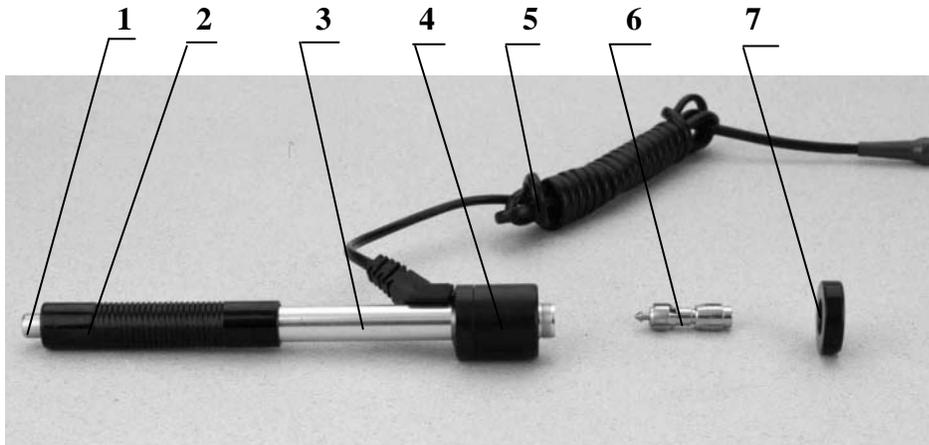
2.1.2 Main unit



1: Shell 2: Communication socket 3: Impact device socket

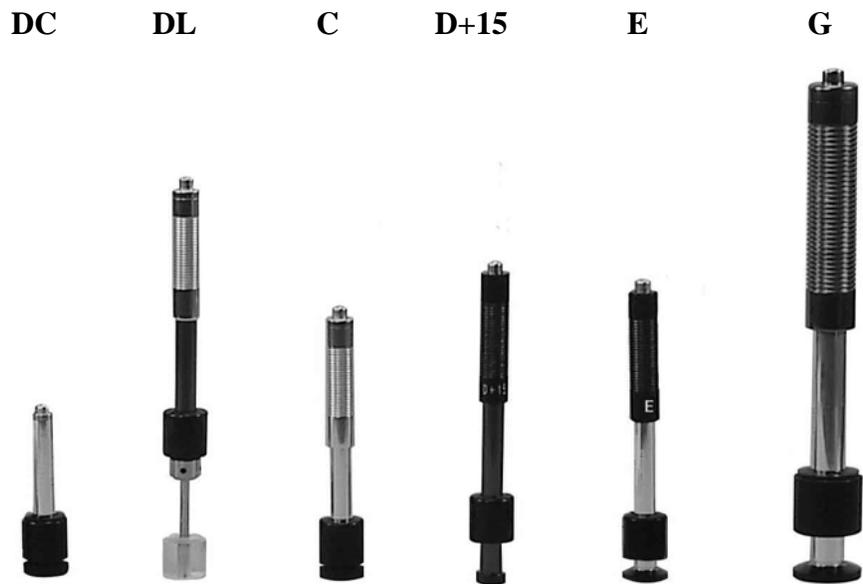
4: Keypad 5: LCD screen

2.1.3 D type impact device



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

2.1.4 Non conventional types of impact devices



2.2 Testing principle

Leeb Hardness Test (definition)

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

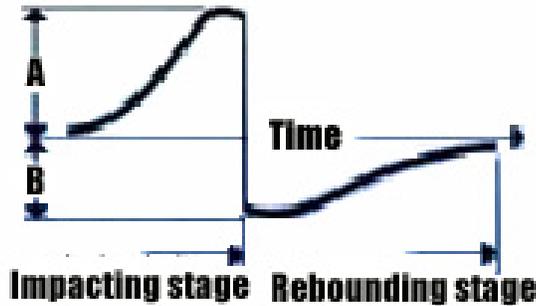
$$HL=1000 \times VB / VA$$

In which: HL——Leeb hardness value

VB——Rebounding velocity of the impact body

VA——Impacting velocity of the impact body

Output signal diagram of the impact device is as following.



3 Technical capabilities

3.1 Specifications

- Measuring range: HLD(170-960)HLD
- Measuring direction: 360°
- Hardness scale: HL, HB, HRB, HRC, HRA, HV, HS
- Display: LCD, 128×64 matrix LCD
- Data memory: up to 600 groups (impact times: 32-1)
- Range of upper and lower limit: the same as measuring range
- Working voltage: 2*1.5V
- Continuous working period: approx. 100 h (no back light on)
- Communication interface: RS232
- Accuracy and repeatability of displayed value, see table 5.

3.2 Dimension size and weight

3.2.1 Dimension 142×80×39mm (main unit)

3.2.2 Weight approx. 0.6kg (main unit);

Table 5

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

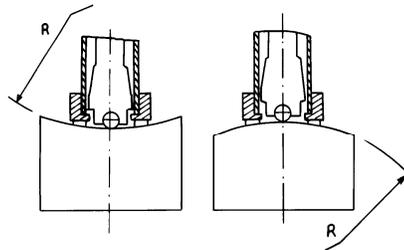
4 Testing

4.1 Preparation and Inspection prior to testing

4.1.1 The preparation of workpiece surface

The preparation for workpiece surface should comply with the relevant requirements specified in table 3

- If the surface to be tested is too rough, measuring error will appear. So the surface of the sample must be smooth and the surface should be flat, and have no oil or dirt.
- Curved surface: it is better that the testing surface of workpiece is plane. When the curvature radius R of the curved surface to be tested is less than 30mm (for D, DC, D + 15, C, E and DL type impact device) and less than 50mm (for G type impact device), a small support ring or non conventional support ring should be used.



- workpiece support
 - Support is not necessary for large work piece
 - The work piece with medium weight must be placed on flat and solid surface
- Minimum thickness should not be less than 1" thick (steel)
- As for test piece with hardened surface layer, the depth of hardened layer should comply with table 3.
- Part shall not be magnetic in property or erroneous readings will occur.

4.1.2 System setting of tester

Specific procedures for setting, refers to 6.9.

4.1.3 Measuring condition setting of tester

Specific procedures for setting, refers to 6.5.

4.2 Testing

- A standard leeb hardness block should be used to verify the accuracy of the PHT-1700 and the reading value error and repeatability should not be more than the specification in table 5.

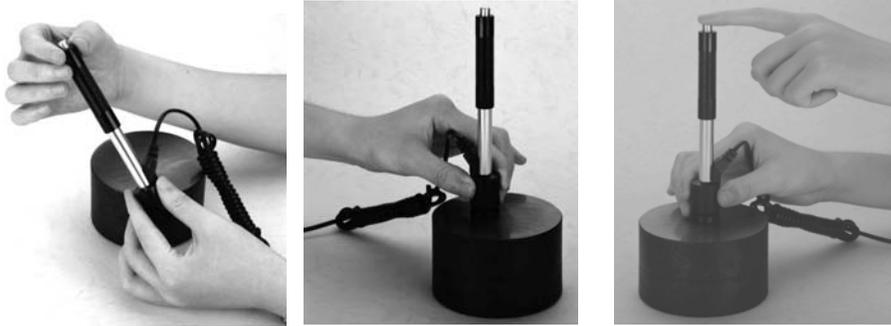
Note: It is recommended that you take a minimum of 5 tests and obtain your average. That value should be within the allowable tolerance for Leeb +/- 6 points. If the value exceeds this tolerance, you must perform a calibration to bring the unit back into compliance. Contact Phase II directly for this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

4.2.1 Start-up

- Insert the impact device plug into the socket of impact device located on the right of the tester.
- Press (⏻) key to turn on the power, then the tester enters into the measuring status.

4.2.2 Loading

- Push down the loading sheath to lock the impact body. For DC impact device, the loading bar must be used.
- Place the support ring of impact device on the surface of test sample, the direction of impact should be vertical with testing surface.



4.2.3 Testing

- Press down the release button on the top of the impact device to make a test. At this point, the test sample, impact device and the operator are all required to be stable; and the force direction should comply with the axis of the impact device.
- Five measurements should be carried out per measuring position of test sample. The divergence of data should be not exceed $\pm 15HL$ of mean value.
- Distance between any two indentations, or the distance between any indentation center and the edge of test sample should be in accordance with the specification of table 6.

Table 6

| Type of impact device | The distance of two indentations center | The distance between indentation center and edge of test piece |
|-----------------------|---|--|
| | No less than | No less than |
| D/DC | 3 | 5 |
| DL | 3 | 5 |
| D+15 | 3 | 5 |
| G | 4 | 8 |
| E | 3 | 5 |
| C | 2 | 4 |

4.2.4 Read measured value

4.2.5 Print out result

For specific setting method, see 6.3.3 and 6.6.

4.2.6 Press () key to turn off

4.2.7 The processing of testing results

The average of 5 tests can be stored in memory for future output.

4.2.8 The displayed results

- Hardness value will be displayed ahead of HL (the symbol of Leeb Hardness), and type of impact device will be displayed back of HL. For example, 700HLD expresses that the Leeb hardness is 700 by means of the measurement made by D type impact device.
- For other type hardness which changed from Leeb Hardness value, corresponding hardness symbol should be added ahead of Leeb hardness symbol. For example, 400HVHLD expresses that the Vickers hardness value is 400, which changed from Leeb hardness value measured by D type impact device.

**Note: HL values which measured by various impact devices are various. For example:
700HLD≠700HLC.**

5 Special prompts

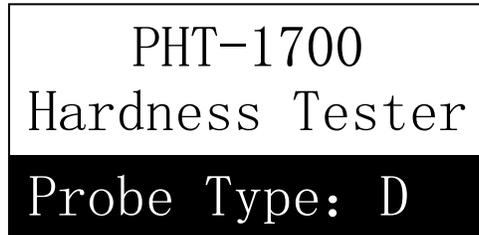
- Replacement of impact device must be performed while the power is OFF! Otherwise the impact device type can't be identified automatically, and it is possible to cause the damage to circuit board of the tester.
- In normal condition, the current measured value can be printed or stored if the (Impact times) value which had been set is not satisfy. If the printing and storing are required at this point, (Average) key can be pressed to finish measurement, then printing can be carried out.
- The functions of (Auto Save), (Auto Print), and (Auto Trans.) will be inactive when pressing down (Average) key to finish measurement in advance.
- Only D and DC type impact device have tensile strength measuring function so that (Hard/ σ_b) setting can't be changed if other type impact devices are used; if the setting has been changed into (σ_b) via D/DC type impact device, the (Hard/ σ_b) setting will be changed into (Hard) when other impact devices had been installed instead of D/DC type impact device.
- When (σ_b) has been set, hardness scale will not been set (cursor will skip off (Hardness Scale)).
- Not all materials can be changed into every hardness scale, hardness scale will return to Leeb hardness (HL) automatically after material has been changed. So (Material) must be set first when setting measurement parameters, and (Hardness Scale) should be set next.

6 Detail Testing procedures

6.1 Start-up

PLUG IMPACT DEVICE IN FIRST!

Press () key to turn on the equipment, following interface will be displayed.



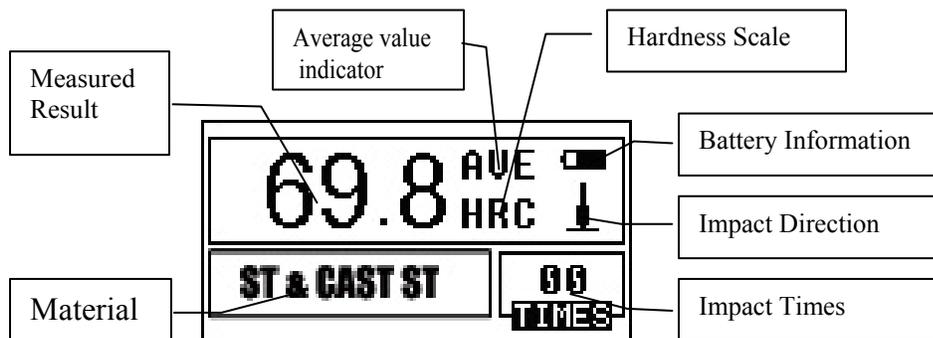
Tester will check and automatically recognize and display the type of impact device. At this point carefully observe whether the impact device type is correct and then enter your main measuring parameters..

6.2 Turn On or turn off

Tester can be turned on or off by pressing () key in any display status.

6.3 Testing

The tester will enter the main display interface as shown below.



The measured values are displayed in this interface, and multiple shortcut key operation functions can be chosen at this time.

6.3.1 Explanation of the main display interface

Battery information: Battery capacity will be shown as battery symbol on display

Impact direction: current impact direction.

Average value indicator: average value will be displayed when impact times setting has been entered.

Hardness scale: the hardness scale of current measuring value. (HRC, HB, etc)

Measured value: current single measured value (without average value indicator), current average value (with average value indicator). It expresses the value is more than conversion or measuring range when ↑ is displayed; and it expresses the value is lower than conversion or measuring range when ↓ is displayed.

Material: material that has been set.(Steel, cast steel, etc)

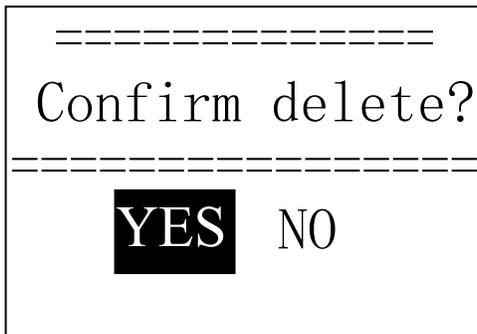
Impact times: impact times that have been completed will be shown on the display. Impact times that has been set will be displayed when impact times has been set by shortcut key, and the times which corresponding to single measured value will be displayed when viewing single measured value.

6.3.2 Testing procedures

Testing can be carried out under this interface status, and the current measured value will be displayed whenever one measurement is finished. The counting of impact times will add 1 per measurement as performed. The PHT-1700 will send out a long beep if that the value exceeds tolerance limit; and the unit will send out two short beeps when the impact times which has been set is achieved. After 2 seconds, the average value will be displayed with a short beep.

6.3.3 Key operation

- Press (SAVE) key to save current group data. The key can only be active after average value has been displayed; furthermore the save can be done only once.
- Press (DELETE) key , the latest single measured value can be deleted, but the deletion should be confirmed in the following interface.



Press (◀ - ▶) key to move cursor to(YES); then press (ENTER) key to confirm the deletion of latest single measuring value.

Press (◀ - ▶) key to move cursor to(NO); then press (ENTER) key to cancel the deletion. Deletion can be canceled by press (ESC) key at any time.

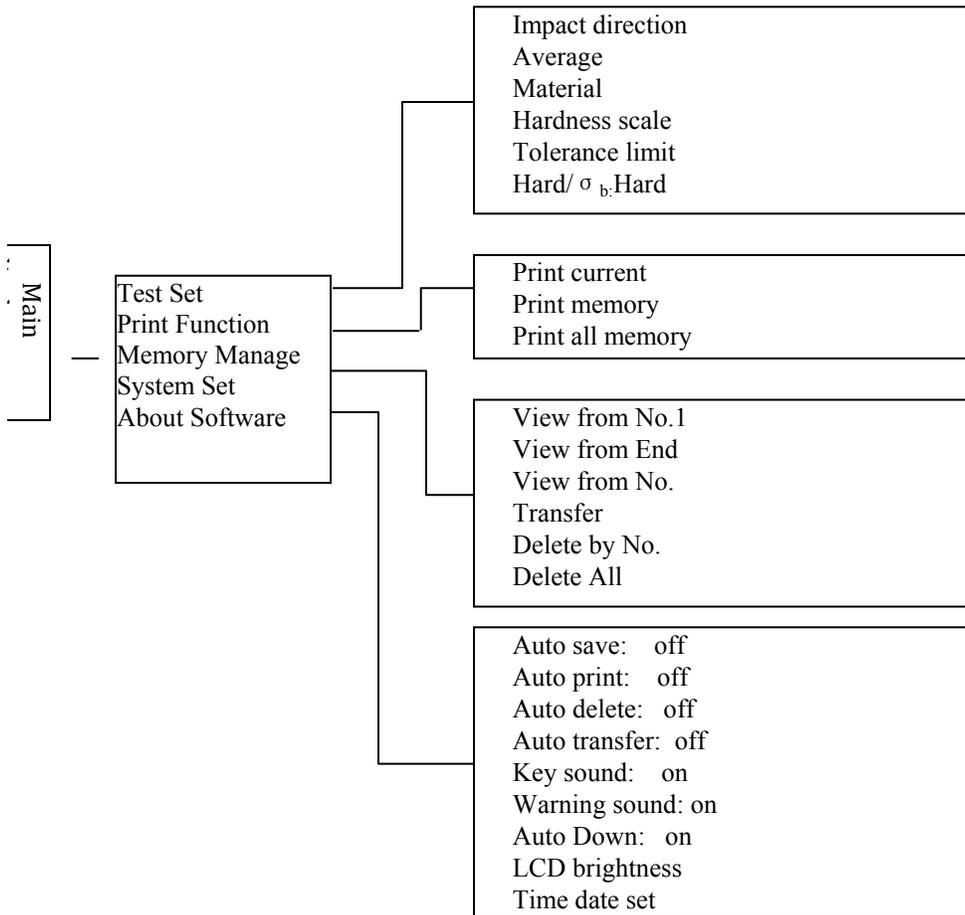
- Single measured value can be viewed by press (▲) or (▼) key, and the average value or latest measured value can be showed again by press 【ESC】 key. The viewing sequence is different by press(▲) or (▼) key.
- Measurement can be finished by press (Average) key in case the impact times setting has not been achieved, and the average value will be displayed.
- LCD back light can be turn on or off by press (☼) key.
- Press (MENU) or (ENTER) key to return to main interface.
- Press (MENU) key to enter main menu interface.

Shortcut key setting:

- Impact direction setting can be changed by press (DIREC.) key.
- Impact times setting can be changed by press (TIMES) key, the current impact times can be showed by press (TIMES) at the first time; the counting will add 1 when press (TIMES) once, and it will return to 1 if times of 32 is achieved.
- Hardness scale setting can be changed by press (HARD) key. Press this key to scroll through all hardness scales that are available to current material and impact device that you have set. The hardness scale will be changed into Leeb hardness if the current setting is strength measurement.
- Material setting can be changed by press (MAT'L) key. Press this key to scroll through all materials that are available. The hardness scale will be changed into Leeb hardness, therefore, material should be set first, then hardness scale should be set.

6.4 Menu structure diagram

The parameter settings of the PHT-1700 can be achieved by pressing the(MENU) key to enter the main menu. Use arrow keys to scroll through parameters.

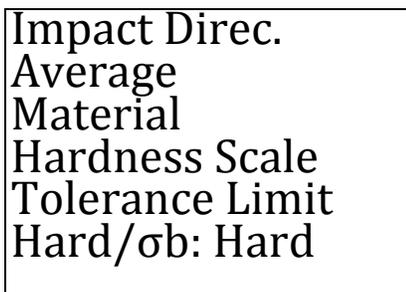
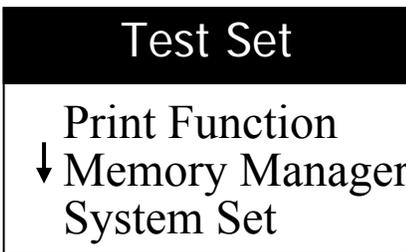


6.5 Measuring condition setting

When in main display interface, pressing (MENU) key to enter the main menu.

Press (ENTER) key to enter (TEST Set)menu.

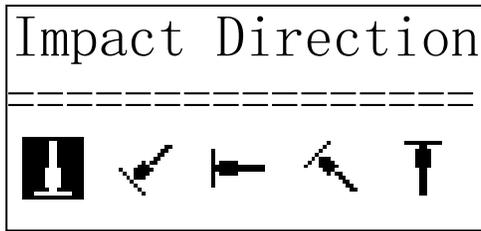
Press (▲) (▼) key to move cursor to the item which will be set, then press (ENTER) key.



Note: 1. If the (Hard/σ_b) is set to (Hard), hardness scale could not be selected obviously. Therefore, the cursor will skip over the item (Hardness) while moving.
2. Only D/DC type impact device is provided with the function of strength measuring, therefore, cursor can't be moved to item(Hard/σ_b) when other type of impact device is used.

3. The symbol ↓ on the left bottom of menu shows the menu is not end, which can be paged down by pressing (▼) key; The symbol ↑ on the top of menu shows the menu is not end, which can be paged up by pressing (▲).

6.5.1 Impact direction setting

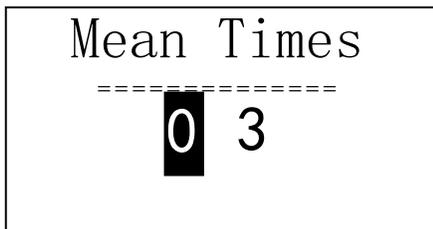


Press ( : ) key to move cursor to the direction which will be set.

Press (ENTER) key to finish the change.

Press (ESC) key to cancel the change.

6.5.2 Mean times setting



The mean times can be modified in the range of 1-32.

Press number key to input the value, and the cursor will scroll through the values.

Press (ENTER)key to finish the change. Press (ESC) key to cancel the change.

6.5.3 Material setting

6.5.3.1 Following available materials will be displayed in case of (Hard/ σ_b) is set to(Hard):



Press () or () key to move cursor to the material which will be set.

Press (ENTER) key to finish the change.

Press (ESC) key to cancel the change.

Note: 1. After the material setting had been changed, hardness scale setting will return to HL automatically.

2. Material should be chosen prior to the hardness scale.

3. The symbol ↓ on the left bottom of menu shows the menu is not end, which can be paged down by pressing the () key; The symbol ↑ on the top of menu shows the menu is not end, which can be paged up by pressing ().

6.5.3.2 Following available materials will be displayed in case of (Hard/ σ_b) is set to(σ_b):

- Cr Steel
- Cr- V Steel
- Cr- Ni Steel
- Cr- Mo Steel
- Cr- Ni- Mo Steel
- Cr- Mn- Si Steel
- Super ST. Steel
- STAIN. Steel

Press (▲) or (▼) key to move cursor to the material which will be set.
 Press (ENTER) key to finish the change.
 Press (ESC) key to cancel the change.

Note 1: The symbol ↓ on the left bottom of menu shows the menu is not end, which can be paged down by pressing (▼) key; The symbol ↑ on the top of menu shows the menu is

not end, which can be paged up by pressing

Hard of Material

HV HB HRC HL

HS HRB HRA

Press () () or (▲) (▼) key to move cursor to the hardness scale which will be set.
 Press (ENTER) key to finish the change.
 Press (ESC) key to cancel the change.

Note:

1. For the current selected impact device and material, only the hardness scale which can be converted will be displayed; hardness scales that cant be converted will not be displayed.
2. Material should be chosen prior to the hardness scale.
3. After the material setting had been changed, hardness scale setting will return to HL.

6.5.5 Tolerance limit setting

Tolerance limit

| | |
|-------|------|
| Min | Max |
| 0 170 | 0960 |

↑ Material

Hardness Scale

Tolerance limit

Hard/ σ_b : Hard

Press number key to input the value, and the cursor can move in circles to right automatically.
 Press (ENTER) key to finish the change.
 Press (ESC) key to cancel the change.

Note: 1. If the setting exceeds the measuring range, the tester ask operator to reset.
 2. Exchanging will be done automatically if the Min. tolerance limit is more than Max. tolerance limit.

Press (ENTER) key to perform the selection between (Hard/ σ_b), and the cursor will exchange between hardness and strength.

Note: Only D/DC type impact device is provided with the function of strength measuring. Therefore, the item can only be set to (Hard) if the impact device is either D or DC.

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6.6 Print function

If it is in main display interface, press 【MENU】 key to enter main menu.

```
Test Set
Print Function
Memory Manager
System Set
```

Press (▲) (▼) key to move cursor to(Print Function).
Press (ENTER) key to enter (Print Function) menu.

6.6.1 Printing current value

```
Print Current
Print Memory
Print All Mem
```

Press (▲) (▼) key to move the cursor to the print function required, then press (ENTER) to print.

```
PHT-1700
Hardness Tester
-----
No.:
Operator:
Time:13:40:46
Date:08/05/2011
-----
Probe Type: D
Impact direc.:+90 Deg
Mean Times:05
Material:Matl of
Roller
-----
51.4 50.9 51.5 51.6
51.7
Average= 51.4HSD
-----
```

6.6.2 Print Memory value

```

Select Group
(001 to 010)
=====
From 001 to 001
  
```

As for (Print Memory), this parameter should be selected first. The group range which is saved in memory will be displayed at the same time. Press number key to input the value, and the cursor will scroll through values.

Press (ENTER) key to confirm print.
Press (ESC) key to cancel print.

```

          PHT-1700
          Hardness Tester
-----
No. :
Operator:
*****
Date:01/01/2007
Probe Type:  D
Impact direc.:+90 Deg
Average:03
Material:
Steel and Cast Steel
-----
No.:0002 550 549 548
Average= 549HL
No.:0003 529 527 533
Average= 530HL
*****
  
```

Information to be printed includes: tester name, date, type of impact device, impact direction, average times, material, group No., single measured value and average value.

If the information in the group is as the same as that in the previous group, such as date, type of impact device, impact direction, average times, material and hardness scale, only group No., single measured value and average value can be printed, otherwise date and measuring conditions can also be printed out.

Note: 1. Actual number of groups will be printed in case of the number which had been set exceeds the actual range.

2. No difference for the sequence to print the starting and ending group, that is to say if 1~5 groups will be printed, the sequence can be set from 1 to 5 or from 5 to 1.

6.6.3 Print all memory

Press (Print All Mem) key to print the values of all groups in the memory in the same format.

6.7 Memory manager

```

Test Set
Print Function
Memory Manager
↓ System Set

```

When in the main display interface, press (MENU) key to enter the main menu.

Press (▲) (▼) key to move the cursor to [Memory Manager] .
Press (ENTER) key to enter menu (Memory Manager).

If no data in the memory, "No Memory!" will be shown, and return subsequently.

```

View from No.1

```

```

View from End

```

```

View form No.

```

```

Transfer

```

```

Delete by No.

```

```

Delete All

```

Press (▲) (▼) key to move the cursor to the function required, then press (ENTER) key.

6.7.1 Viewing from the No.1 group/ Viewing from the end group

Press (View from No.1) key to display data in memory from the No.1 group.

Press (View from End) key to display data in memory from the end group.

6.7.2 Viewing from selected group

```

Select Group
From 001 to
  0 010
=====

```

Press (View from No.) key, selecting interface will be displayed

Press number key to input the value.

Press (ENTER) key to display data in memory from the starting group selected.

Press (ESC) key to cancel operation.

6.7.3 Transferring data

Press (Transfer) key to output the data in memory via RS232 interface in text format.

6.7.4 Deleting selected group

Press (Delete by No.) key, a interface including group range to be deleted will be showed.

Press number key to input digital value.

Press (Enter) key to cancel selected group.

Press (Esc) key to cancel the operation.

```

Select Group
(001 to 010)
=====
From 0 01 to 001

```

Note: 1. If the input group number exceeds the actual range, then deletes the actual group among them.

2. No difference for the sequence to the starting and ending group, that is to say if 1~5 groups will be deleted, the sequence can be set from 1 to 5 or from 5 to 1.

3. Data group No. saved in memory will be reset after deletion.

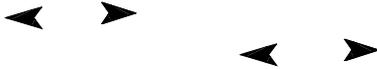
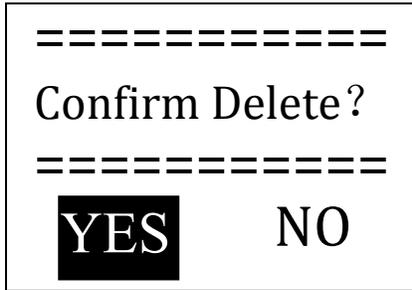
4. When deleting data, especially small group data, because the following data needs to be moved, max 30 seconds(approx.) may be required. Never to turn off power at this time, as loss of data can

occur.

6.7.5 Delete all

Press (Delete All) to cancel all data in memory.

6.7.6 Confirm deletion



Confirming interface will be displayed when deleting data in memory.

Press () () key to move cursor to (YES), then press (ENTER) key to

delete the data. Press () () key to move cursor to (NO), then press (ENTER) key to cancel the operation.

6.8 Viewing interface

The No., dates and average values of 8 groups data can be displayed at most in the same interface.

| | | |
|---------|-------|-------|
| No. 001 | 02/07 | |
| 62.4 | HSD | |
| No. 002 | 03/07 | |
| 77.6 | HSD | |
| No. 003 | 03/07 | 546HL |
| No. 004 | 03/07 | 483HL |
| No. 005 | 04/07 | 666HL |
| No. 006 | 06/07 | 787HL |
| No. 007 | 06/07 | 690HL |
| No. 008 | 08/07 | 820HL |

Press (▲) (▼) key to turn over pages.

Press (ESC) key to exit view.

By pressing (ENTER) key, cursor will be showed and more details can be viewed.

Press (▲) (▼) key to select the group in this interface.

| | | |
|--------------|----------|---|
| No.007 | 06/07/07 | |
| Average = | 690HL | ↓ |
| D | 05 Times | |
| (Cast) Steel | | |

Press (ESC) key to return to the previous viewing interface.

Press (ENTER) key to view detail information in this group.

| | | | |
|-----|-----|-----|---|
| 569 | 568 | 562 | ↑ |
| 564 | 565 | | |

Pr

ess (▲)

(▼) key to turn over pages to view

average value, measuring condition or single measured value.

| |
|----------------|
| System Set |
| Test Set |
| Print Function |
| Memory Manager |

Press (ESC) key to return to the previous viewing interface.

ay interface, press (ESC) key to enter the main menu.

Press (▲) (▼) key to move cursor to (System Set).

Press (ENTER) key to enter (System Set) menu.

Press (▲) (▼) key to move cursor to the item to be set.
Press (ENTER) key to directly change, or enter corresponding changing interface. Press (ESC) key to return. **Pg21**

Auto Save: Off
Auto Print: Off
Auto Delete: Off
Auto Trans.: Off
Key Sound: On
Warn. Sound: On
Auto Down: On
LCD Brightness
Time Date Set

For items of (Auto Save), (Auto Print), (Auto Delete), (Auto Trans.), (Key Sound) and (Warn. Sound), (ENTER) key can be pressed to selected (On) or (Off).
If (Auto Save) is set to (On), the current group data can be saved automatically after measuring finished and

average value displayed.

If (Auto Print) is set to (On), the current data can be printed out after measuring finished and average value displayed.

If (Auto Delete) is set to (On), gross error can be deleted automatically when average times had been achieved or measurement had been finished in

advance by pressing (AVE.) key according to 3σ rule. If some data had been cancelled, additional measurement should be carried out to satisfy the times set.

If (Auto Trans.) is set to (On), the current group data can be output in text format via RS232 after measuring finished and average value displayed.

If (Key Sound) is set to (On), buzzer will send out a short sound with each press of the button.

If (Warn. So ▼ d) is set to (On), buzzer will send out a long sound when the measured value exceeds the tolerance limit, data deletion or other cases.

If (Auto Down) is set to (On), Power will turn off if neither measurement nor any key operation is performed within 5 minutes.

LCD Brightness

=====

Bright: Press [▲]

Dark: Press [▼]

6.9.1 LCD brightness Set

Press (▲) key to increase brightness.

Press (▼) key to reduce brightness.

Press (ENTER) key to finish change.

Press (ESC) key to cancel change.

Time Date Set

— 6.9.2 Time and Date Set —

8/18/2009 14:32

When in this interface, current time and date will be displayed on the screen, the format is “mm/dd/yy”.

Press (▲) (▼) key to input the value, and the cursor can move in circles to right automatically.

Press (ENTER) key to finish the change, which current time and date will be replaced by time and date set.
Press (ESC) to cancel this change.

↑Print Function
Memory Manager
System Set
About Software

PHT-1700
Version:2.1A
Code:R0050121A
SN:R00507080028

Calibration

Average=550
Nominal= **550**

6.10 About software

When in the main display interface, press (MENU) key to enter the main menu.

Press (▲) (▼) key to move cursor to (About Software).
Press (ENTER) key to enter (About Software).

Information about the tester and embedded software will be displayed on this interface.

The software version and embedded software identification are subjected to change due to the upgrading of software without notifying in advance.

6.11 Software calibration

The tester and impact device must be verified with a standard Leeb hardness test block prior to the daily use.

POWER OFF unit. Press (ENTER) key as well as (⏻) key at the same time to enter software calibration .

Impact direction should be set to (↓).
Five tests should be performed on the Leeb hardness test block.

Average value of the 5 tests will be shown on the display.

Press (▲) (▼) key to input nominal value.

Press (ENTER) Key to finish calibration.
Press (ESC) key to cancel calibration.
Calibration range is ±15HL.

6.12 Back light

The LCD display is equipped with an Led Back Light, which supplied for easily use in dark light condition. The Back Light can be turn on or off by pressing (☼) at any time when the tester is in operation.

6.13 Turn off the power automatically

- Auto turn off function is designed to save the battery.
- If the PHT-1700 is idle for 5 minutes, the tester will turn off automatically. The display will flash for 20 seconds prior to switch off. At this time, any key except (Ⓚ) can be pressed to stop the flash of LCD screen, and cancel auto- off operation.
- Unit will turn off when batteries have been drained and the display will show "Battery Empty!" and turn off automatically.

6.14 Battery replacement

Battery symbol will flash  if battery capacity runs out. At this point, User can replace the damaged battery according to the following procedures.

- Turn off the Power of main unit.
- Remove battery cover on bottom back side of main unit. Remove old batteries and discard according to local and federal guidelines.
- Install the new AA batteries in their place paying close attention to polarity
- Put the battery cover back in place, then turn on the power to check if the tester is functioning properly

6.15 The connection of data communication cable

The small 4-pin plug which located on the end of communication cable should be inserted in the RS232 socket on the left side of main unit, and D type 9-pin RS232 port 9-pin port should be inserted in PC communication or the serial port printer case.

7 Trouble shooting

| Failure | Cause | Solution |
|----------------------------|-----------------------|---------------------|
| No power to display | Battery empty | Replace battery |
| No measuring value | Probe cable | Replace Probe cable |
| Value is inaccurate | Calibration data loss | Repeat Calibration |

8 Maintenance

8.1 Impact device

- After using the impact device for 1000-2000 times, use the nylon brush provided to clean the guide tube and the impact body of the impact device. To clean the guide tube, unscrew the support ring and then take out the impact body, spiral the nylon brush in the counter-clock direction into the guide tube. When the brush reaches the bottom, draw it out. Repeat this action for 5 times and mount the impact body and the support ring.
- Remember to release the impact body after use.
- **Never apply lubrication of any kind to impact device!**

8.2 Standard maintenance procedures

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

9. Notice of Transportation and Storage.

The tester should be stored at room temperature, away from vibration, strong magnetic field, corrosive medium, dampness and dust.

Global Connections



Main Headquarters: U.S.A

Phase II Machine & Tool, Inc.

21 Industrial Avenue
Upper Saddle River NJ 07458 USA
Tel: (201) 962-7373
Fax: (201) 962-8353
General E-Mail: phase2@comcast.net

BEIJING, CHINA

Phase II Measuring Instruments (Beijing) Ltd.

Room 301, Bldg 2 Qing Yuan Xi Li, Haidian District, Beijing 100192, China
Tel: +86-10-59792409
Fax: +86-10-59814851
General E-mail: info@phase2china.com.cn

MEXICO

Phase II de Mexico

Calle A No. 4 Promer Piso
Col. San Marcos Azcapotzalco
C.P 02020 Mexico
Tel: 011-525-5538-39771
Fax: same
General E-mail: phase2mexico@hotmail.com

VENEZUELA

Phase II Herramientas Universales EDCM. CA.

Av. Francisco Lazo Marti CC
Plaza Santa Monica PB Local
Santa Monica, Caracas 1040 Venezuela
Tel: 212-690-28-21
Fax: 212-693-29-16
E-mail: edcphm@movistar.net