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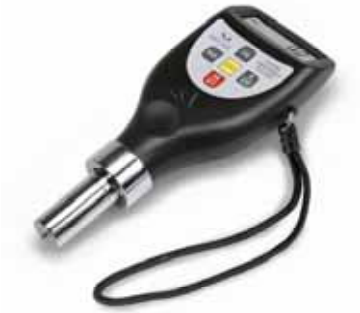
Instruction Manual
HD

DIGITAL HARDNESS TESTER



Models: **HD, Shore A**
HD, Shore C
HD, Shore D

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1. Features

This instrument is designed to determine the indentation hardness of materials ranging from cellular products to rigid plastics. Each Durometer type has got a specific scale (i.e. A,C,D) and is capable of producing a value between 0 and 100.
Shore A is designed to measure the penetration hardness of rubber, elastomers and other rubber substances like neoprene, silicone and vinyl. It can be also used for soft plastics, felt, leather and similar materials.
Shore C is designed for various foams and sponges.
Shore D is used for plastics, Formica, epoxies and plexi-glass.

* The instrument meets the following standards: DIN 53505, ISO 868 and ISO 7619 as well as ASTM D 2240 and JIS K 7215.
* The exclusive micro- computer uses LSI- circuit and crystal time base to offer high accuracy to the measure-ment result.
* The digital display gives exact readings with no guessing or errors.
* The instrument can communicate with PC for recording, printing and analysing by the optional software and cable for RS-232C interface.
* Automatic power-off to conserve energy.
* With the test stand, as well optional accessory, a much Better accuracy and repetitiveness can be obtained, due to the constant measurement force. Errors caused by different artificially applied forces are eliminated.

2. Specifications

Display: 4 digits, 10mm LCD

Range: 10 to 90 H (A, C, D)

Resolution: 0.1

Measurement deviation: error ≤ ± 1

Power supply: 4x 1.5 V AA (UM-3) batteries

Operating conditions:
Temperatures: 0 to 50°C
Humidity: < 80%

Size: 162 x 65 x 28mm (6.4 x 2.6 x 1.1 inch)

Weight: about 170g (not including batteries)

PC interface: RS-232C interface

Power off: 2 modes
1. Manual power off any time by pressing the Power ON/OFF key until “off” is shown on the display.
2. Automatically power off, two seconds after the last key operation.

Accessories: Carrying case
Operation manual
Test block

Optional accessory: Cable and software for RS-232C

3. Description of parts and keys

3- 1 Sensor
3- 2 Display
3- 3 Multifunction key (on/ off)
3- 4 MAX- key
3- 5 Zero- key
3- 6 CAL-Key
3- 7 N/AVE (average) key
3- 8 RS-232C interface
3- 9 Battery compartment/ cover
3-10 Indicator of max. value (on the LCD screen)
3-11 Indicator of average value (on the LCD screen)
3-12 State of average value (on the LCD screen)
3-13 Number of measurements in the state of average value (on the LCD screen)

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4. Measuring procedure

4.1 Test first sample

Shore A: 6mm thickness minimum
Shore D: 3mm thickness minimum

- The first sample should allow measurements to be taken at least 12mm from any edge.
- The surface of the first sample should be flat and parallel to allow the presser face to contact the first sample over an area with a minimum radius of 6mm of the durometer's sensor.
  The first sample may also be constructed with layered pieces to achieve the necessary thickness requirements. However, measurements taken on these layered samples may not agree with those taken on solid samples due to the surface: the surfaces between the layers may never be in complete contact to one another.

4.2 The power on key ON/OFF has to be pressed to power on the tester.

4.3 The MAX- key has to be pressed and MAX appears on the display.

4.4 The durometer is held vertically with the tip of the indenter at least 12mm from any edge. Now the presser foot is applied as rapidly as possible, without shocks, to the first sample. The foot is to be kept parallel to the surface of the first sample. Just sufficient force is to be applied to obtain firm contact between the presser foot and the first sample. This state is held for 1 or 2 sec. until the maximum value is obtained automatically. Step 3.3 and 3.4 is to be repeated.

4.5 To take the next measurement the Zero- key has to be pressed and step 4.4 is to be repeated.
The MAX- key can also be pressed until the symbol MAX disappears from the display. Then step 4.3 and 4.4 can to be repeated.

4.6 If something else than the maximum reading is required, the mark MAX does not have to be set. In this case, the reading on the display is the actual value. The durometer is held in place without motion and, after normally one second, the measurement result can be read on the display.

4.7 How to take the average value

4.7.1 To take the average value of many different measurements, the key "N/AVE" has to be pressed and held until the desired number of measurements (1 to 9 digits with the prefix "No" which stands for the times of measurements used to calculate the average value) is reached and appears on the display.
Then this key has to be released. On the display Appears the symbol "N".
Every time if the "N/AVE" key is to be pressed and released, the digit will increase for 1. The digit will jump back to "1" while the "N/AVE" key is pressed at "9".

4.7.2 The digit is to be adjusted to the number needed and the MAX- key or the Zero- key is to be pressed to return to the measurement mode. Otherwise it has to be waited for a few seconds until "0" appears on the display.

4.7.3 Now measurements can be taken as described in step 4.3 to 4.5. Every test measurements should have a distance to the next one of at least 6mm.
Every time a measurement is taken, the reading and the times of measurements are shown on the display. When the times of measurements are equal to the number set before, the instrument first displays the reading of the last and then the average value of the last "N" measurements, followed by two beeps.
The symbol "AVE" is indicated on the display.

4.7.4 To take the next average value, step 4.7.3 has to be repeated.

4.7.5 To release from the average measurement, the N/AVE- key has to be pressed until the symbol "N" disappears.

5. Calibration

5.1 Zero calibration

The durometer is to be held vertically with the tip of the indenter hanging in the air. On the display "0" should be shown. If not, the Zero key has to be pressed.

5.2 Calibration

5.2.1 The indenter has to be inserted into the hole of the calibrated test block. Enough force is to be applied to get a firm contact between between the test block and the presser foot.

5.2.2 The reading should agree with the value stamped on the test block. If not, a calibration should be performed.

5.2.3 The power ON/OFF key has to be pressed and not released until "CAL" appears on the display.
The reading is varying with the depth of indentation.
The indenter is to be placed onto a flat surface i. ex. glass. By pressing the CAL-key, it can be returned to Measurement state.
Enough force is to be applied to make firm the contact between the hard surface and the presser foot.
The reading on the display should be between 21.5±0.2.
Steps 5.2.1 to 5.2.3 are to be repeated until the measurement result is correct.
It has to be noted that the durometer will return to Measurement state about 8 seconds after the power ON/OFF- key has been released and not pressing the CAL-key. In this case the calibration will be invalid.

6. Battery replacement

6.1 If the battery symbol appears on the display, batteries should be replaced.

6.2 The battery cover has to be removed and the batteries are to be taken off.

6.3 The batteries are to be installed correctly into the case, carefully paying attention to polarity.

7. Annotations

Readings below 10 HD for Shore D may be inexact and should not be transferred to some materials.
Measurements should then be made with a Shore A type.
Readings above 90 HA for Shore A should be performed with a Shore D durometer.

Designed in regard to these standards:
*** DIN 53505**
*** ASTM D2240**
*** ISO 7619**
*** JIS K7215**

8. Declaration of conformity

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Konformitätserklärung

Declaration of conformity for apparatus with CE mark
Konformitätserklärung für Geräte mit CE-Zeichen
Déclaration de conformité pour appareils portant la marque CE
Declaración de conformidad para aparatos con marca CE
Dichiarazione di conformità per apparecchi contrassegnati con la marcatura CE

English	We hereby declare that the product to which this declaration refers conforms with the following standards.
Deutsch	Wir erklären hiermit, dass das Produkt, auf das sich diese Erklärung bezieht, mit den nachstehenden Normen übereinstimmt.
Français	Nous déclarons avec cela responsabilité que le produit, auquel se rapporte la présente déclaration, est conforme aux normes citées ci-après.
Español	Manifestamos en la presente que el producto al que se refiere esta declaración est¨a de acuerdo con las normas siguientes
Italiano	Dichiariamo con ciò che il prodotto al quale la presente dichiarazione si riferisce è conforme alle norme di seguito citate.

Shore Hardness Gauge: SAUTER HD

Mark applied	EU Directives	Standards
CE	2004/108/EC	EN61326:1997+A1:1998+A2:2001 EN 55022 EN61000-4-2/-3

Date: 07.01.2009

Signature:
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Management

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