

Durometer

**SCHMIDT**  
control instruments



Edition HPS 05.S.E

HPS Series

Model HPSA  
HPSB  
HPSC  
HPSD  
HPSDO  
HPSO  
HPSAO

# Instruction Manual

Valid as of: 01.02.2010 • Please keep the manual for future reference!



SCHMIDT · 1<sup>ST</sup> IN TENSIONMETERS WORLDWIDE

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## 1 Warranty and Liability

In principle, the supply of the device is subject to our "General Conditions of Sale and Delivery." These have been provided to the operating company on conclusion of the contract, at the latest.

Warranty:

- SCHMIDT durometers are warranted for 12 months.

Parts subject to wear, measuring springs or damage by improper use are not covered by the warranty. No warranty or liability will be accepted for bodily injury or property damage resulting from one or several of the following causes:

- Misuse or abuse of the device.
- Improper mounting, commissioning, operation and maintenance of the device (e.g. verification interval).
- Operation of the device if any safeguards are defective or if any safety and protection precautions are not properly installed or not operative.
- Failure to comply with the notices in the Operating Instructions regarding transport, storage, mounting, commissioning, operation, maintenance and setup of the device.
- Any unauthorized structural alteration of the device.
- Insufficient inspection of device components that are subject to wear.
- Opening the device or improper repair work.
- Disasters caused by the effects of foreign objects or by force majeure.

### 1.1 Notices within the Operating Instructions

The fundamental prerequisite for the safe handling of this device and its troublefree operation is the knowledge of the basic safety notices and safety instructions.

These Operating Instructions contain the most important notices for the safe operation of the device.

These Operating Instructions, in particular the safety notices, must be observed by any person who works with the device. In addition, the local valid rules and regulations for the prevention of accidents must be complied with.

The representations within the Operating Instructions are not true to scale.

The dimensions given are not binding.

General indications of direction, such as FRONT, REAR, RIGHT, LEFT apply when viewing the front of the device.

### 1.2 Responsibilities of the Operating Company

In compliance with the EC Directive 89/655/EEC, the operating company agrees to only permit persons to work with the device who:

- are familiar with the basic regulations on industrial safety and accident prevention and who have been trained in handling the device.
- have read and understood the chapter on safety and the warning notices in these Operating Instructions and have confirmed this with their signatures.
- are examined regularly on their safe and conscientious working method.

### 1.3 Responsibilities of the Personnel

All persons who work with the device agree to perform the following duties before starting work:

- to observe the basic regulations on industrial safety and accident prevention.
- to read the chapter on safety and the warning notices in these Operating Instructions and to confirm with their signatures that they have understood them.

## 1.4 Informal Safety Measures

The Operating Instructions must always be kept on hand where the device is operated. Apart from the Operating Instructions, the general and local valid regulations on accident prevention and environmental protection must be provided and complied with.

## 1.5 Training of the Personnel

Only trained and instructed personnel is permitted to work with the device. The responsibilities of the personnel must be clearly defined for mounting, commissioning, operation, setup, maintenance and repair. Trainees may only work with the device under the supervision of an experienced personnel

## 1.6 Intended Use

The device is intended exclusively to be used as durometer.

Any other use or any use exceeding this intention will be regarded as misuse.

Under no circumstances shall HANS SCHMIDT & Co GmbH be held liable for damage resulting from misuse.

The intended use also includes:

- Complying with all notices included in the Operating Instructions and observing all inspection and maintenance works.

## 1.7 Dangers in Handling the Device

The device was designed according to the state of the art and the approved safety standards. Nevertheless, its use may cause serious or fatal injury to the user or third persons, and/or an impairment of the device or of other material assets.



**The device must not be operated in potential explosive areas and must not come into contact with aggressive substances.**

The device may only be applied:

- For its intended use in a faultless condition with regard to the safety requirements.
- Malfunctions that could impair safety must be remedied immediately.
- Personal protective equipment must be used according to the EC Directive 89/686/EEC.

## 1.8 Copyright

The copyright on these Operating Instructions remains with the company HANS SCHMIDT & Co GmbH.

These Operating Instructions are intended for the operating company and its personnel only. They contain instructions and notices that may only be reproduced on the prior written permission of

HANS SCHMIDT & Co GmbH

and under indication of the complete reference data.

Violations will be prosecuted.

## 1.9 Declaration of Conformity

Our mechanical durometers do not belong to the EC machinery directive 2006/42/EC and do not have a CE mark.

## 2 Available Models

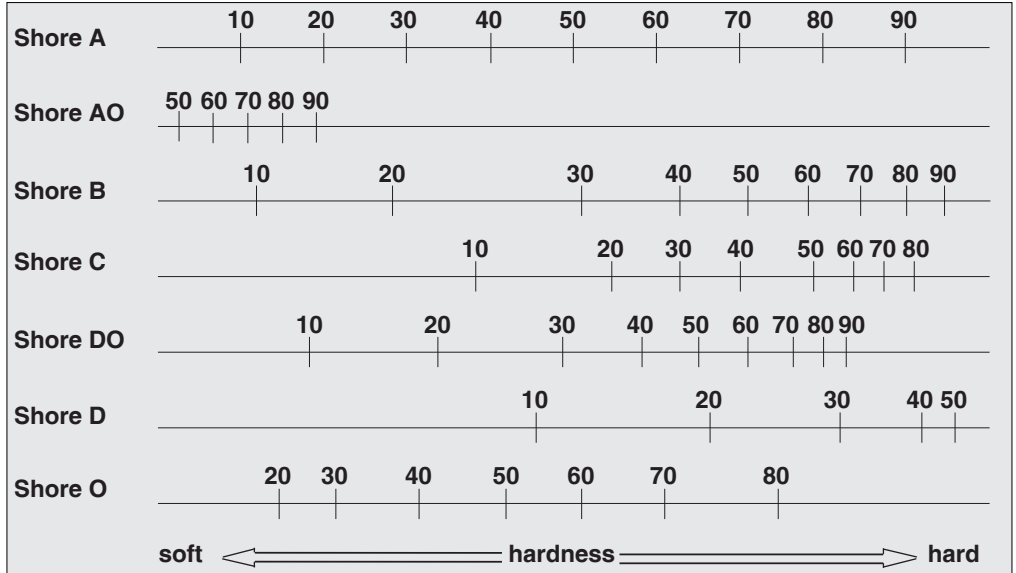
General information on Shore hardness testing:

The principle used to measure hardness is based on measuring the resistance force of the penetration of a sensing pin of defined geometry into the test material under a known spring load. The amount of penetration is measured and indicated on a scale with 100 Shore graduation marks.

As the amount of penetration of the sensing pin is 2.5 mm max., the material to be tested should have a minimum thickness of 6 mm.



The hardness scale covers a range from 0 to 100, where 0 corresponds to the minimum and 100 to the maximum hardness value.

**The overview of the application limits of the individual SHORE hardness test procedures is only for comparative purpose and is no reference chart**





Model	Shore	Typical Applications	Examples
HPSA	A	Soft rubber, elastomers, natural rubber products, soft PVC, etc.	Rubber rollers, rubber hoses, leather, etc.
HPSB	B	Use when off the high end of the "A" scale	Typewriter rollers, etc.
HPSC	C	Medium hard rubber or plastics	Golf balls, etc.
HPSDO	DO	Plastics, medium hard to hard elastomers, rubber materials and textile fabrics	Plastic automotive components, etc.
HPSD	D	Hard rubber, rigid thermoplastic products, formica, hard plastic materials	Acrylic glass, polystyrene, etc.
HPSO	O	Soft elastomers, soft elastic materials, medium fast textiles	
HPSAO	AO	Foams, steering wheels and inner linings of motor vehicles	

## 2.1 Specifications



Model	HPSA	HPSB
<b>Indentor:</b>	Truncated Cone 35°  1.25 mm Ø	Tapered Pin 30°  1.25 mm Ø
<b>Application Range:</b>	10 - 90 Shore A	10 - 90 Shore B
<b>Worldwide Standards:</b>	DIN 53505 according ISO 868, ISO 7619-1 ASTM D 2240	ASTM D 2240
<b>Accuracy:</b>	± 1 hardness unit	± 1 hardness unit
<b>Display Range:</b>	0 - 100 Shore A units	0 - 100 Shore B units
<b>Depth of Indentation:</b>	0 - 2.5 mm	0 - 2.5 mm
<b>Test Pressure*:</b>	approx. 12.5 N	approx. 12.5 N
<b>Measuring Spring Force:</b>	0.55 - 8.065 N	0.55 - 8.065 N
<b>Scale Diameter:</b>	54 mm	54 mm
<b>Working Face Diameter:</b>	18 mm Ø	18 mm Ø
<b>Housing Diameter:</b>	44.5 mm Ø	44.5 mm Ø
<b>Weight net (gross):</b>	approx. 300 g (appx. 500 g)	approx. 300 g (approx. 500 g)
<b>Dimensions (L x W x H):</b>	50 x 58 x 110 mm	50 x 58 x 110 mm

\* Pressure on test material surface when outer shell is in measuring position (colored line)


Model	HPSC	HPSD
<b>Indentor:</b>	Truncated Cone 35°  1.25 mm Ø	Tapered Pin 30°  1.25 mm Ø
<b>Application Range:</b>	10 - 90 Shore C	10 - 90 Shore D
<b>Worldwide Standards:</b>	ASTM D 2240	DIN 53505 according ISO 868, ISO 7619-1 ASTM D 2240
<b>Accuracy:</b>	± 1 hardness unit	± 1 hardness unit
<b>Display Range:</b>	0 - 100 Shore C units	0 - 100 Shore D units
<b>Depth of Indentation:</b>	0 - 2.5 mm	0 - 2.5 mm
<b>Test Pressure*:</b>	approx. 50 N	approx. 50 N
<b>Measuring Spring Force:</b>	...4.45 - 44.5 N	...4.45 - 44.5 N
<b>Scale Diameter:</b>	54 mm	54 mm
<b>Working Face Diameter:</b>	18 mm Ø	18 mm Ø
<b>Housing Diameter:</b>	44.5 mm Ø	44.5 mm Ø
<b>Weight net (gross):</b>	approx. 300 g (appx. 500 g)	approx. 300 g (approx. 500 g)
<b>Dimensions (L x W x H):</b>	50 x 58 x 110 mm	50 x 58 x 110 mm

\* Pressure on test material surface when outer shell is in measuring position (colored line)

## 2.1 Specifications (Cont.)

Model	HPSDO	HPSO
<b>Indentor:</b>	U-grooved 3/32" 	U-grooved 3/32" 
<b>Application Range:</b>	20-80 Shore DO	20-80 Shore O
<b>Worldwide Standards:</b>	ASTM D 2240	ASTM D 2240
<b>Accuracy:</b>	± 1 hardness unit	± 1 hardness unit
<b>Display Range:</b>	0 - 100 Shore DO units	0 - 100 Shore O units
<b>Depth of Indentation:</b>	0 - 2.5 mm	0 - 2.5 mm
<b>Test Pressure*:</b>	approx. 50 N	approx. 12.5 N
<b>Measuring Spring Force:</b>	...4.45 - 44.5 N	0.55 - 8.065 N
<b>Scale Diameter:</b>	54 mm	54 mm
<b>Working Face Diameter:</b>	18 mm Ø	18 mm Ø
<b>Housing Diameter:</b>	44.5 mm Ø	44.5 mm Ø
<b>Weight net (gross):</b>	approx. 300 g (appx. 500 g)	approx. 300 g (approx. 500 g)
<b>Dimensions (L x W x H):</b>	50 x 58 x 110 mm	50 x 58 x 110 mm

\* Pressure on test material surface when outer shell is in measuring position (colored line)

Model	HPSAO
<b>Indentor:</b>	Ball Ø 5 mm 
<b>Application Range:</b>	< 20 Shore O
<b>Worldwide Standards:</b>	ISO 7619-1
<b>Accuracy:</b>	± 1 hardness unit
<b>Display Range:</b>	0 - 100 Shore AO units
<b>Depth of Indentation:</b>	0 - 2.5 mm
<b>Test Pressure*:</b>	approx. 12.5 N
<b>Measuring Spring Force:</b>	0.55 - 8.065 N
<b>Scale Diameter:</b>	54 mm
<b>Working Face Diameter:</b>	44.5 mm Ø
<b>Housing Diameter:</b>	44.5 mm Ø
<b>Weight net (gross):</b>	approx. 300 g (approx. 500 g)
<b>Dimensions (L x W x H):</b>	50 x 58 x 110 mm

\* Pressure on test material surface when outer shell is in measuring position (colored line)

## 2.2 Delivery Includes

Durometer  
 Operating manual  
 Specific Test Report 2.1 as per EN 10204  
 Carrying case

## 2.3 Unpacking

Unpack the instrument and inspect it for any shipping damage.  
 Notices of defect must be announced immediately, at the latest within 7 days on receipt of the goods.

### 3 Operating Procedure

#### 3.1 Notices Before Starting Measurement



Have you read and understood the Operating Instructions, in particular Chapter 1 „Basic Safety Notices“ ?

You are not permitted to operate the instrument before doing so.

Before working with the instrument you must put on your personal protective clothing, if necessary. For example, eye protectors, gloves, etc.

#### 3.2 Measuring with the Durometer

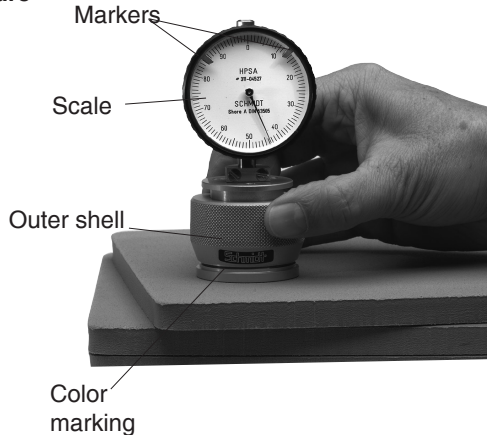
##### General information

The material to be tested must comply to the applicable standard. Use of other material will lead to incorrect measurement results.

Example for Shore A hardness:

The material to be tested must be thicker than 6 mm. When testing thinner material, you may need to place several samples on top of each other until a thickness of 6 mm is reached. Each test sample has to be tested in at least three different points. The points should be > 5 mm apart and > 13 mm away from the sample edges. The hardness reading must be recorded 3 seconds after pressing down the knurled outer shell. When testing material with a significant tendency to yield, the value can be read after 15 seconds. The duration of the measurement must be indicated in the test report. Two movable markers can be rotated around the faceplate to mark any desired measuring range within the display range.

##### Measurement procedure



- Place the instrument on the material to be tested. The durometer must be level, and the sensing pin must be perpendicular to the material to be tested. Any angle other than perpendicular may cause error.
- Holding the knurled, spring-loaded outer shell between fingers, press downwards until the lower edge of the shell meets the red line marked on the housing. This ensures that the same amount of pressure is applied from measurement to measurement and prevents measuring errors.
- Record the reading after approx. 3 seconds. The hardness scale covers a range from 0 to 100, where 0 corresponds to the minimum and 100 to the maximum hardness value. Each test sample has to be tested in at least three different points.



### 3.3 Verification of Calibration

The Shore durometer is calibrated against industry standards as specified in ASTM and DIN Test Procedures. Calibrated test samples (rubber plates) **CAN NOT BE USED** for verification of the calibration as these test samples are subject to change due to temperature, sunlight and other ambient conditions.

You can, however, test that the instrument is functional and undamaged by pressing the durometer down on a smooth, level surface (e.g. glass or marble). When fully pressed down, the scale pointer should make one full turn on the scale, from zero to zero. The scale pointer should return to the initial zero position when you release pressure. If it does not, return the instrument to the manufacturer for service.

Optional calibration certification must be ordered separately, prior to delivery of the instrument. Subsequent calibration is only possible at the manufacturer's facilities.



**Do not loosen the holding screws of the movement under any circumstances. Loosening these screws may alter the calibration of the instrument.**

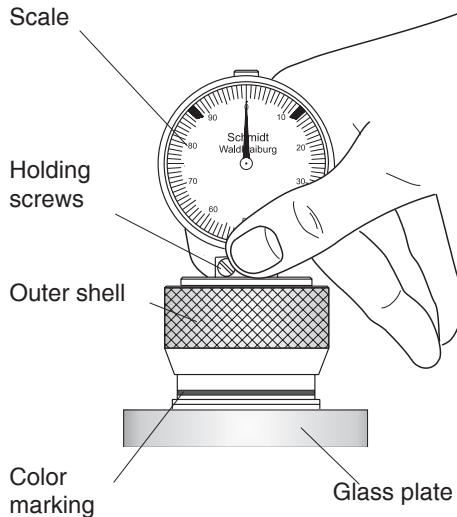


fig. 3.3

#### To verify calibration

- Press the durometer down on a glass plate (fig. 3.3).

Do not move the spring-loaded outer shell.

The scale pointer should make one full turn on the scale, from zero to zero.

#### Verification using the control ring (optional HP-P20, HP-P20-100)

- Place a control ring between the durometer and the glass plate.

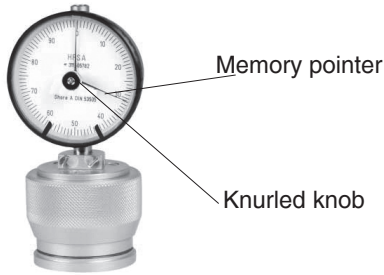
- Holding the knurled, spring-loaded outer shell between fingers, press downwards until the lower edge of the shell meets the red line marked on the housing.

The sensing pin must move freely through the cutout in the control ring.

- The scale pointer now has to indicate the Shore hardness units of the used control ring (20, 40, 60 or 80 shore) on the scale.

## 4 Optional Accessories

### Memory Pointer (Option Code M)



The durometer is available with a memory pointer which can be ordered under option code M. The memory pointer moves with the scale pointer when a measurement is taken. However, when pressure on the outer shell is released, and the scale pointer returns to zero, the memory pointer remains in position, marking the highest reading (PEAK) of the measurement.

### Before beginning a new measurement

- Rotate the knurled knob to reset the memory pointer to the zero position.

### Test Stand Model PSHP for serial testing

- Spring-loaded lever for easy use
  - Height adjustable from 0 to 200 mm
  - Travel of operating lever: 40 mm
  - Dimensions LxWxH: 162 x 100 x 320 mm
  - Net weight: approx. 2.3 kg
- Base plate and prisms optionally available, please ask for further details.



### Control rings for checking displacement



### Control Ring Model HP-P20 for checking 20 shore



### 1 Set Control Rings Model HP-P20-100 consisting of 4 control rings for checking 20, 40, 60 and 80 shore and 1 base disk as basis for the rings

## 5 Service and Maintenance

The tension meter is easy to maintain. Depending on operating time and load, the tension meter should be checked according to the locally valid regulations and conditions (as described in Chapter 3.3). The use of other test methods than the procedure described in Chapter 3.3 may cause deviating measuring results.

## 6 Cleaning

For cleaning the unit, do not use any



### **AGGRESSIVE SOLVENTS**

such as trichloroethylene or similar chemicals.



### **NO WARRANTY OR LIABILITY**

shall be accepted for damage resulting from improper cleaning.

## 7 Verification Intervals

The question of finding the right frequency of calibration accuracy verification depends on several different factors:

- Operating time and load of the SCHMIDT hardness tester
- Tolerance band defined by the customer
- Changes of the tolerance band compared to previous verifications of calibration

Therefore, the interval between verifications must be determined by the user's Quality Assurance Department based on the user's experience.

Assuming normal operating time and load as well as careful handling of the hardness tester, we recommend a verification interval of 1 year.

## 8 Correspondence

Should you have any questions regarding the tension meter or Operating Instructions, or their use, please indicate above all the following details which are given on the ID plate:

- 1) The model type
- 2) The serial number

## 9 Repairs

Shipping instructions:

We kindly ask for return free of charge for us, if possible by airmail parcel. All occurring charges, if any (such as freight, customs clearance, duty, etc.) will be billed to customer.

For return from foreign countries, we ask you to include a proforma invoice with a low value for customs clearance only, e.g. 50 Euro, each and to advise the shipment in advance by fax or eMail.



**To avoid unnecessary follow-up questions, and the resulting loss of time or possible misunderstandings, please return the tension meter with a detailed fault description to our service department. Please indicate in your order whether you require an calibration certificate with calibration report.**

**Service address: HANS SCHMIDT & Co GmbH  
Schichtstr. 16  
D-84478 Waldkraiburg  
Germany**

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control instruments

**SCHMIDT-Test-Instruments**  
*indispensable in production monitoring,  
quality control and automation*  
**We solve your measuring problems:**



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*Force Gauge*



*Torque Meter*



*Tachometer*



*Speed- and Lengthmeter*



*Electronic Lengthmeter*



*Stroboscope*



*Screen Printing Tension Meter*



*Thickness Gauge*



*Yarn Package Durometer and Shore-A Durometer*



*Sample Cutter*



*Balance*



*Moisture Meter*



*Leak Tester*



*Softometer*

**More than 70 years - Worldwide -**

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