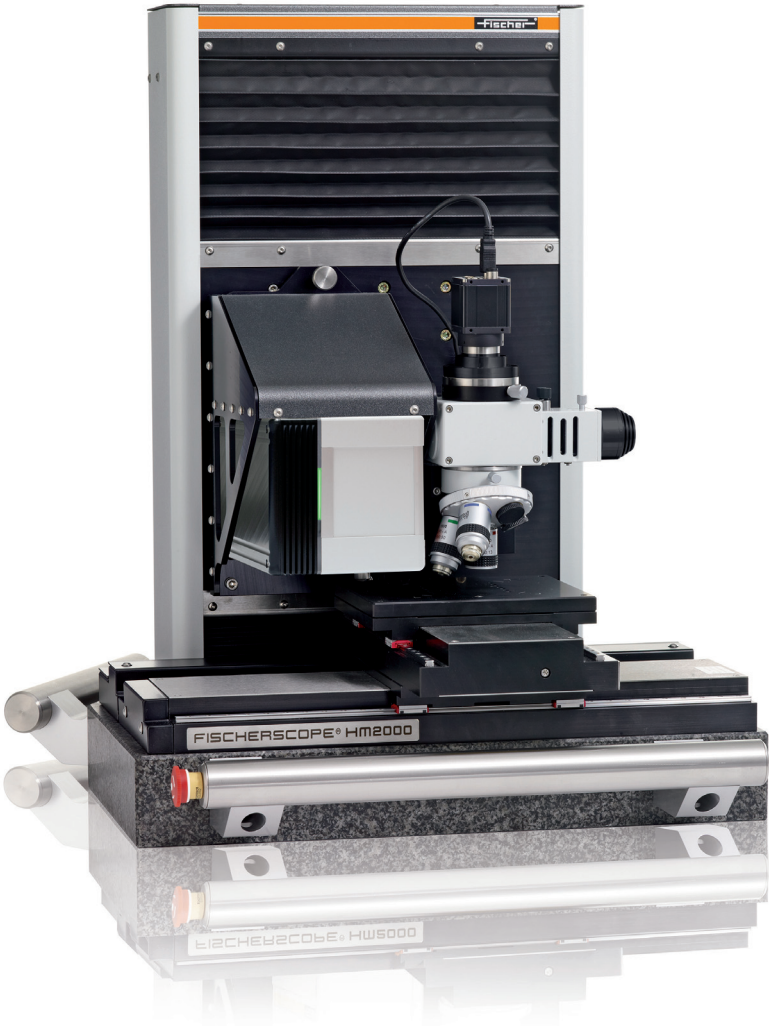


FISCHERSCOPE® HM2000

Automated Nanoindentation Measuring System with Measuring Head HT2000 for bulk material and coatings thicker than 1 µm (0.04 mils)



Description

The FISCHERSCOPE® HM2000 is an automated nanoindentation measuring system and employs the instrumented indentation test method according to ISO 14577 and ASTM E2546. The instrument allows for demanding measuring applications with difficult positioning and is perfectly suitable for measurements in development, quality assurance, incoming inspection and process control.

Typical fields of application

- Lacquer, plastic or hard material coatings (PVD, CVD)
- Electroplated coatings (decorative, functional)
- Characterisation of hard anodic coatings
- Materials used specifically in medical technology applications
- Electronic components, connectors, bond wires, etc.
- Plasma-applied coating systems

Measurable characteristic material quantities

Material characteristics computed according to ISO 14577:

- Martens hardness HM
- Indentation hardness H_{IT} (convertible to Vickers Hardness HV)
- Modulus of indentation E_{IT}
- Indentation creep C_{IT}
- Percent elastic portion η_{IT} of the indentation work W_{elast}/W_{total}
- ESP – mode, partial load and unload measurements, for depth-dependant determination of quantities like E_{IT} , H_{IT}

Design

The measuring head HT2000 contains the indenter, the test load generating unit, and the position measurement unit for determining the indentation depth, as well as the entire electronic system. The controlled touchdown of the measuring head leads to a very small machine compliance.

Features

- Quick measurements without extensive sample preparation, the HM2000 requires only 30 seconds for its travel to the measuring position and the zero point determination.
- In-situ zero point determination during the measurement
- Programmable XY-stage for automated measurements
- User-friendly handling through motor-driven Z-axis
- Microscope with three different magnification settings for accurate positioning on the measurement location
- Natural stone base provides dimensional stability, prevents temperature swings and buffers against vibrations
- Measurement of dark surfaces without sample pretreatment
- Intuitive handling with the software WIN-HCU®
- Excellent temperature stability of the measuring head HT2000 means the creep behaviour of materials can be determined precisely with measuring times up to several hours.

The modular design allows for later upgrades with even higher quality optics, a measuring stage with greater repeatability precision, an Atomic Force Microscope (AFM) and a heated sample support for temperature dependent measurements.

General Specification

Intended use	Nanoindentation on lacquer coatings, electroplated coatings, hard material coatings, polymers, metals, glasses and much more
Design	Bench top unit with PC, measuring head, positioning device made of natural hard stone, programmable XY-stage, motorised z-axis, joystick for controlling the XY-stage and Z-axis.
Damper system	6 damper pads

Measuring Head HT2000

Hardness measurement range	0.001 – 120 000 N/mm ² : near diamond hardness
Test load range	0.1 – 2000 mN
Load resolution	≤ 150 nN
Distance resolution	≤ 10 µm
Noise floor	< 175 µm

Microscope Camera magnification

Objective	4x, 20x and 40x
Video picture (field of vision)	1600 µm x 1200 µm, 320 µm x 240 µm, 160 µm x 120 µm

Indenters

Design	Standard: Vickers, Optional: Berkovich, Knoop, hard metal spheres Ø 0.4 mm or Ø 2.0 mm, special shapes on request
Approach speed of the indenter	≤ 0.7 µm/sec
Maximum indentation depth	500 µm

Sample Stage

Design	Programmable XY-stage
Sample placement area	180 mm x 150 mm
Maximum Travel	170 mm x 140 mm
Repeatability precision X/Y	≤ 2 µm (direction-independent)
Max. specimen height	130 mm
Max. specimen weight	2 kg

Options

XY-stage with greater precision	Repeatability precision X/Y: $\pm 0.5 \mu\text{m}$ (unidirectional)
Microscope with higher-resolution	5x, 20x, 50x and 100x with Video picture $1400 \mu\text{m} \times 1000 \mu\text{m}$, $350 \mu\text{m} \times 250 \mu\text{m}$, $140 \mu\text{m} \times 100 \mu\text{m}$ / Autofocus / Automatic objective detection
Measurement chamber	Measurement chamber and base frame
Sample holders	Universal sample support incl. heating station and heat plate, universal vice, support for polished micro-section samples, foil clamping device
SHS200 Heating Stage	Heated sample support up to $200 \text{ }^\circ\text{C}$, for temperature dependent measurements
Nanite AFM	Atomic force microscope (AFM) for visualising and quantifying structures in the nanometre range

Electrical Data

Main voltage, mains frequency	100 to 240 V $\pm 10 \%$ 47 – 63 Hz, 360 VA
Power consumption	max. 100 W (without evaluation PC)
Protection class	IP20

Dimensions

External dimensions (Height x width x depth)	630 mm x 650 mm x 610 mm
Weight	120 kg

Environmental Conditions

Operating temperature	Climatic chamber class 2 $10 \text{ }^\circ\text{C} - 40 \text{ }^\circ\text{C}$ / $50 \text{ }^\circ\text{F} - 104 \text{ }^\circ\text{F}$
Storage/Transport temperature	$0 \text{ }^\circ\text{C} - 50 \text{ }^\circ\text{C}$ / $32 \text{ }^\circ\text{F} - 122 \text{ }^\circ\text{F}$
Admissible air humidity	$\leq 95 \%$, non-condensing

Evaluation Unit

Software	WIN-HCU®
Operating system	Windows®

Standards

CE approval	EN 61010
Standards	DIN EN ISO 14577, ASTM E 2546

Order

FISCHERSCOPE® HM2000	605-471
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