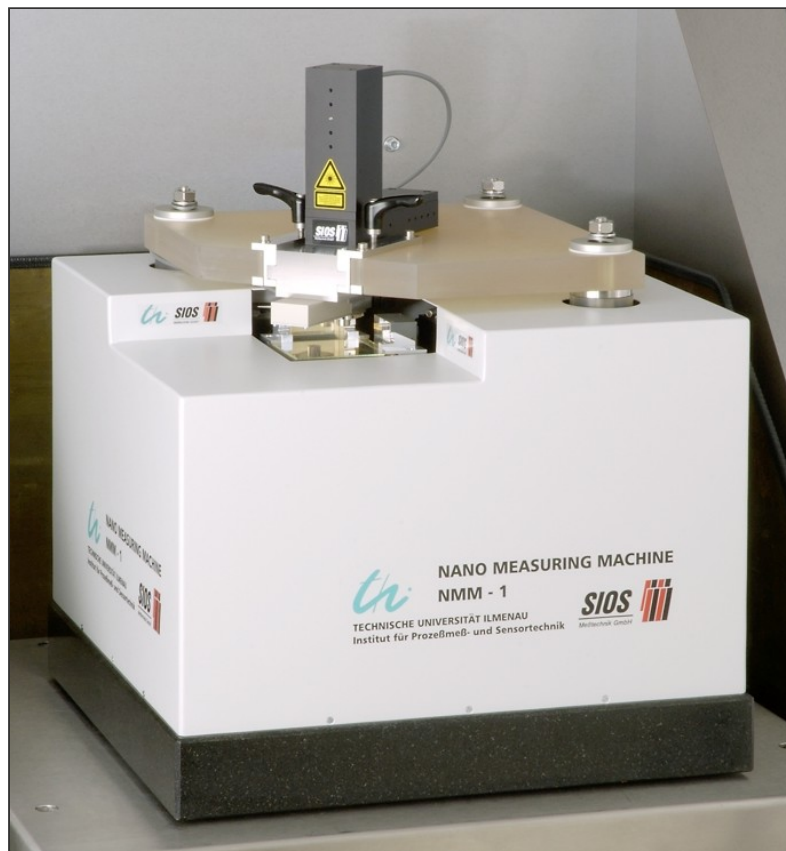

Nanopositioning and Nanomeasuring Machine



NMM-1

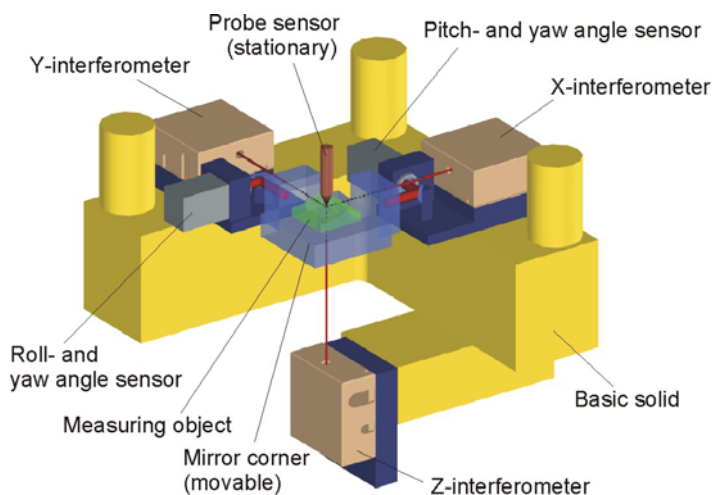
Design and Operation

The Nanopositioning and Nanomeasuring Machine is used for three-dimensional coordinate measurement in a range of 25 mm x 25 mm x 5 mm with a resolution of 0.1 nm. Its unique sensor arrangement provides Abbe error-free measurements on all three coordinate axes. The measurement axes of three miniature plane mirror interferometers for length measurements intersect with the contacting point of the probe sensor at the object being measured at a single point.

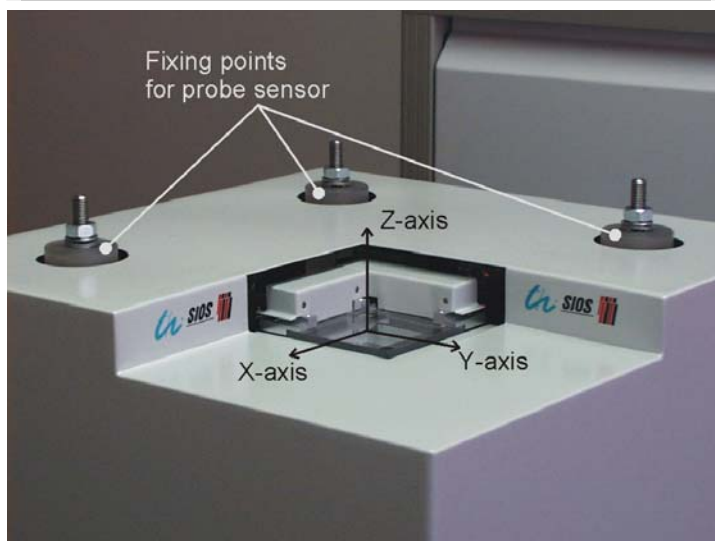
The object to be measured is placed directly on a movable mirror corner. The position of this mirror corner is monitored by the three fixed miniature interferometers. The mirror corner is positioned by a three axis driving system. Any angular deviations that may occur during the positioning process are measured and corrected by two angle sensors.

The light of three stabilized lasers are guided from the electronics unit to the interferometer heads by fiberoptic lightguides, providing a compact, thermally stable set-up of the Nanopositioning and Nanomeasuring Machine. The heart of its electronics unit is a digital signal processor (DSP) that processes all incoming signals, controls its drive system and governs the course of measurement procedures.

Basic set-up according to the comparator principle of Abbe



Measurement table of NMM-1 showing its measurement axes



Major Performance Features

- Three dimensional coordinate positioning and measuring system of the highest accuracy
- Abbe Comparator principle employed in each of the three measuring axes
- Modes of operation:
 1. as a dynamic positioning system
 2. as a measuring system operating in either continuous-scan mode or single-step mode
- Control of NMM-1 employs an easy to use script language running on the host PC equipped with a USB-interface
- An optional contact system acts as zero-indicator and is interchangeable.
- The probe sensors can be attached according to customer requirements, e.g. laser focus sensors LFS-series, scanning tunnelling and scanning atomic force microscopes, capacitive or inductive sensing systems.

Technical Data

Measuring and positioning range: 25 mm x 25 mm x 5 mm

Resolution: 0.1 nm

Driving speed, except in measurement mode:

- X,Y axis ≤ 2 mm/s
- Z axis ≤ 50 mm/s

Measuring speed depends on probe system and application

Probe sensors: external analog interface for customized probe sensor system is provided (input-voltage max. ± 10 V, resolution 16 Bit)

Length of the cable between measuring table and electronics unit: approx. 4 m

Dimensions (H x W x D):

- NMM-1: (340 x 420 x 420) mm
- Electronics unit: (700 x 553 x 600) mm

Weight:

- NMM-1: 95 kg
- Electronics unit: 75 kg

Applications

- Positioning, manipulation, processing and measurement of objects in the fields of micro-mechanics, microelectronics, optics, molecular biology and microsystems engineering with nanometric precision within a large range
- Measurement of precision parts, such as the tips of hardness testing probes, membranes and micro lenses
- Calibration of step height standards and pitch standards

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