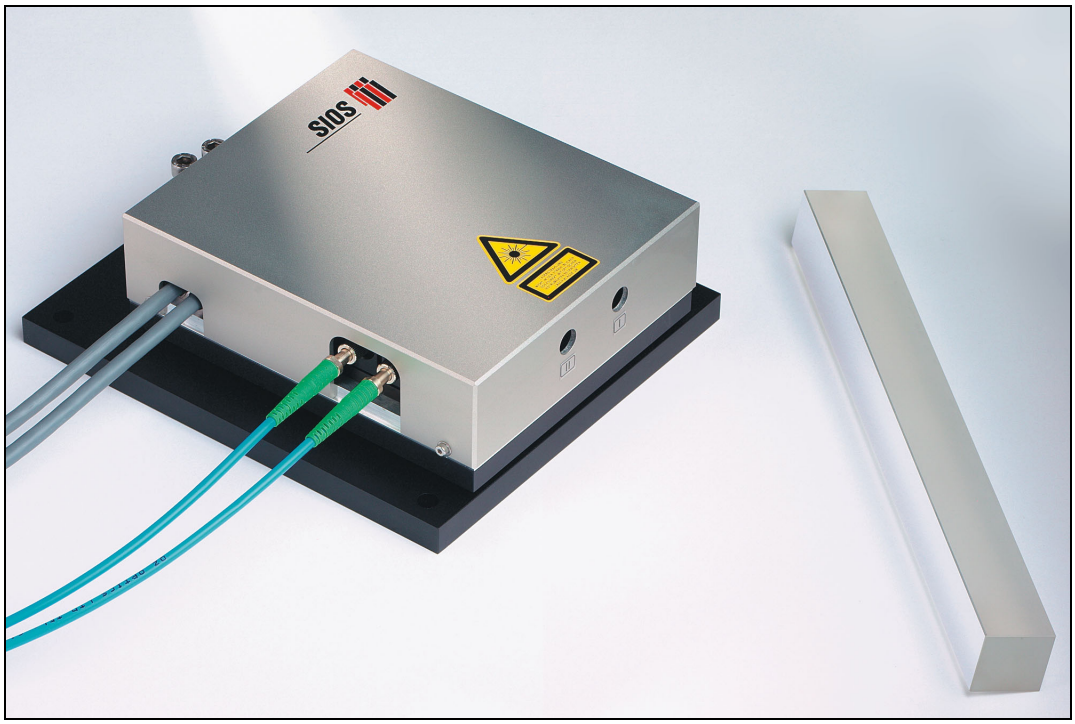
# Miniature Double Plane Mirror Interferometer



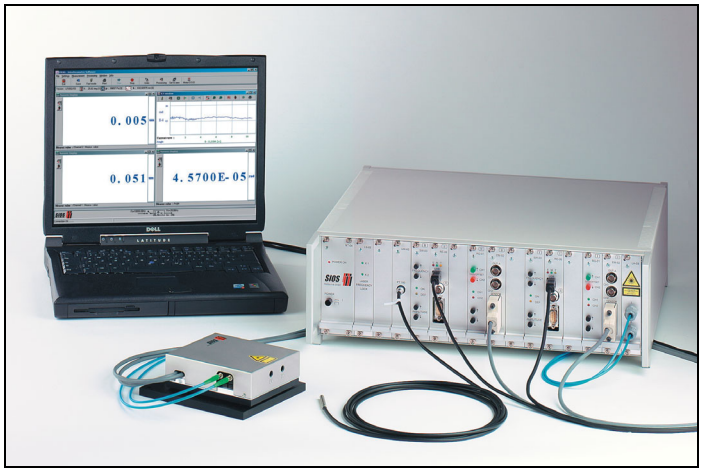

## SP-D Series

SIOS Meßtechnik GmbH

## Design and Operation

Our Series SP-D double plane mirror interferometers are designed for incorporation into customer-supplied systems, and are used for simultaneously making pairs of nanoprecision length measurements. The differences in these pairs of length measurements and the separations between their two beams are then used for accurately determining the associated angles involved, where the angular measurement range is approximately two minutes of arc and independent of beam separation. In cases involving small length changes, focusing their external beams on the objects being measured allows to increase the angular measurement range to ± 30 minutes of arc.

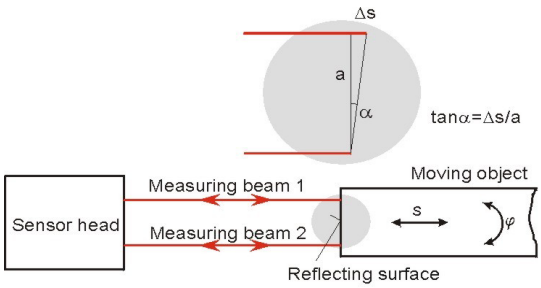
Their laser light sources are coupled to their sensor heads via fiberoptic cables. Their miniature interferometers convert motions of their moving mirrors into pairs of optical interference signals that are transmitted to their electronic power supply/ signal processing modules for processing. Their He-Ne- lasers, which are frequency stabilized on models designed for making longer length measurements, along with corrections for environmental shifts in laser wavelength, provide the basis for their high metric precision. A PC running custom software package is employed for operating their electronics modules and displaying measurement results.




## Major Performance Features

- Allow to make ultraprecise simultaneous length and angular measurements.
- Employ high-frequency-stability He-Ne-lasers as light sources.
- Fiberoptic-coupled sensor heads
- Their beam separations may be tailored to suit customers' special requirements.
- Compensate for shifts in laser wavelength due to environmental influences.

## Operating Principle




## Applications

- Making measurements on plane tables, microscope stages, positioning systems, coordinate-measuring machines, or machine tools.
- They also allow to correct angular errors on dual-axis and multi-axis coordinate measuring machines.
- Measuring linear displacements relative to reference points
- Deformation studies
- Noncontacting surface profiling
- Materials testing, e.g., dilatometry

| Technical Data | | Model SP 120-D | Model SP 2000-D |
|---|---|---|---|
| Length measurement range | mm | 100 | 2,000 |
| Length Resolution | nm | 1 | 1 |
| Length Resolution, optional at extra cost | nm | 0.1 | 0.1 |
| Beam separation | mm | 2…4, ≥ 10 | 2…4, ≥ 10 |
| Angular measurement range | arcmin | ± 2 | ± 2 |
| Angular Resolution at length resolution of 1 nm: | | | |
| Beam separation: 2 mm | arcsec | 0.1 | 0.1 |
| Beam separation: 4 mm | arcsec | 0.05 | 0.05 |
| Beam separation: 12.7 mm | arcsec | 0.02 | 0.02 |
| Beam separation: 25.4 mm | arcsec | 0.01 | 0.01 |
| Angular measurement range with beam focussing | arcmin | 30 | 30 |
| Nominal laser wavelength | nm | 632.8 | 632.8 |
| Laser frequency stability (after warm-up period) | | $3 \cdot 10^{-7}$ | $2 \cdot 10^{-8}$ |
| Laser warm-up period | min | 1 | 10...20 |
| Operating temperature range | °C | 15…30 | 15…30 |
| Maximum moving-reflector translation range | mm/s | 600 | 600 |
| Interface: serial | | RS 232 C | RS 232 C |
| optional at extra cost | | USB | USB |
| Cable length between sensor head and electronics module | m | 3, optionally up to 25 | 3, optionally up to 25 |
| Line voltage / frequency | VAC / Hz | 100…240 / 47…60 | 100…240 / 47…60 |

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