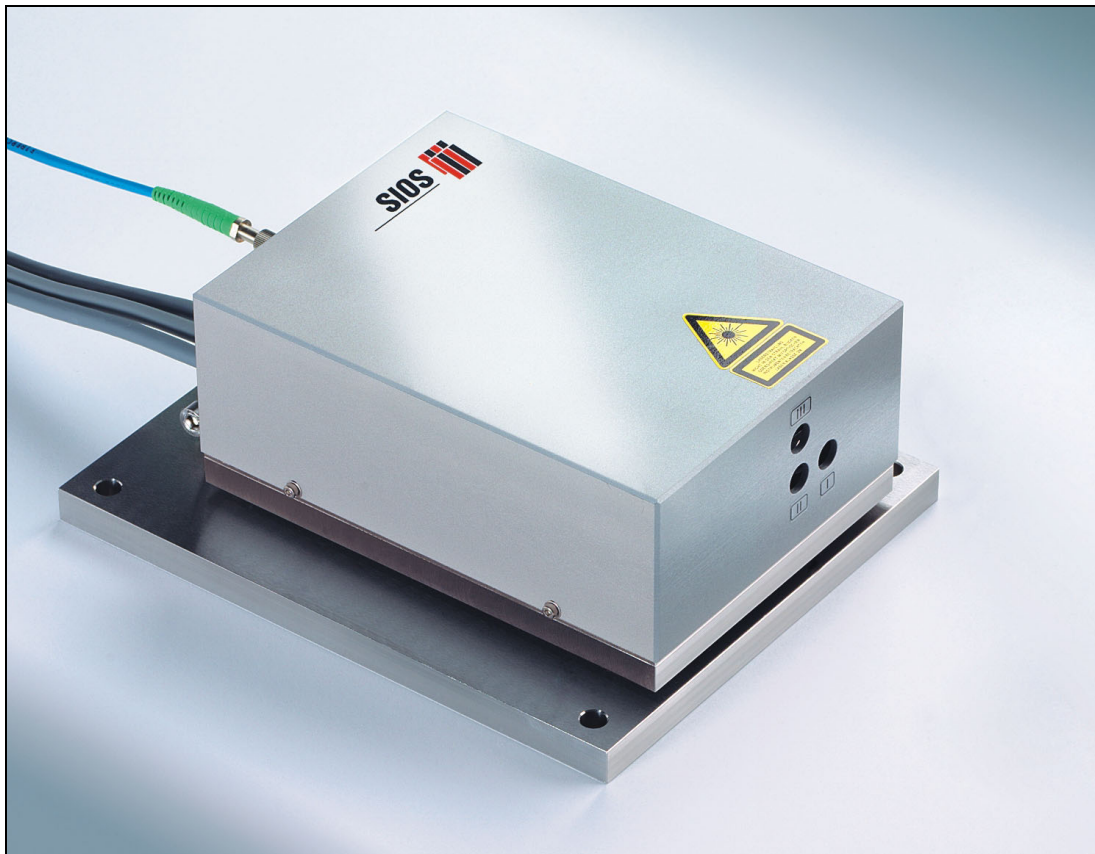


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# Triple-Beam Plane-Mirror Interferometer



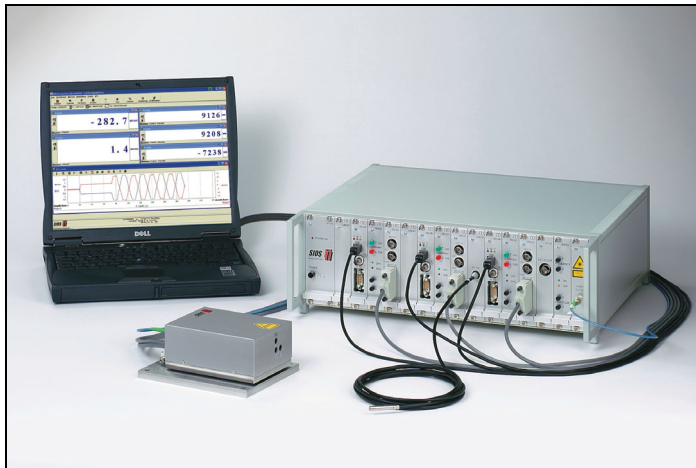
## SP-TR Series

## Design and Operation

Our triple-beam interferometers, which combine three interferometers in a single unit and thus allow making simultaneous, nanometer-precision, triaxial, length measurements, are intended for incorporation into customer-supplied systems. Angles may be determined with high precisions from the differences between pairs of length measurements and the respective beam separations involved. The dynamic ranges for pitch and roll measurements are approximately two minutes of arc.

A He-Ne-laser emitting an ultrastable wavelength supplies all three interferometers in order that all three length measurements will be based on the same reference length. A single fiberoptic lightguide conducts its output beam from the interferometric sensor head. Motions of the moving mirrors are converted into modulated signals that are transmitted to the electronic power-supply/signal-processing unit.

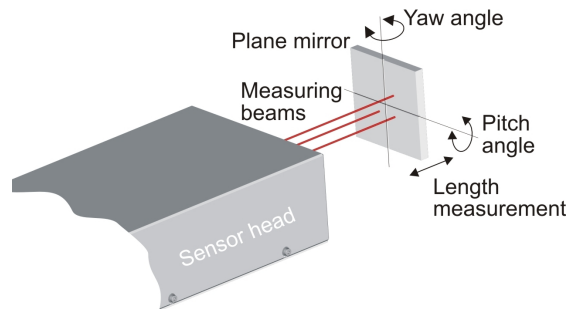
The He-Ne-laser, which is frequency stabilized in cases where large displacements are to be measured, along with corrections for barometric-pressure and ambient-temperature variations, form the basis for high metric precisions. Operation of the electronic power-supply/signal-processing unit and display of measurement data employ a PC running the associated software package.



## Major Performance Features

- Simultaneous, ultraprecise, triaxial length measurements as well as pitch and yaw angle measurements
- A single laser supplies the beams for all three measuring arms
- Factory-made calibration of beam separations

## Operating Principle



## Applications

- Laser-interferometric measurements on guides and translation, microscope, and positioning stages
- High-precision pitch and roll corrections during biaxial or multiaxial length measurements
- Calibrating metrological equipment and machine tools
- Differential measurements (dilatometry, materials testing)
- Angular measurements over extended ranges ( $> \pm 2$  arcmin; available on special order)

| Technical Data   | Model SP 2000-TR      | Model SP 120-TR       |
|--|-----------------------|-----------------------|
| Length measuring ranges, each axis                                     | mm                    | mm                    |
| Length resolution  | nm                    | nm                    |
| Optional length resolution   | nm                    | nm                    |
| Pitch and roll measuring ranges  | arcmin                | arcmin                |
| Horizontal and vertical beam separations                               | mm                    | mm                    |
| Angular resolution at 1 nm length resolution                           | arcsec                | arcsec                |
| Laser wavelength   | nm                    | nm                    |
| Laser frequency stability (after warmup period)                        | $2 \cdot 10^{-8}$     | $3 \cdot 10^{-7}$     |
| Laser warmup period  | min                   | min                   |
| Maximum moving-mirror translation rate                                 | mm/s                  | mm/s                  |
| Operating-temperature range  | °C                    | °C                    |
| Interfaces   | RS 232 C<br>USB<br>2M | RS 232 C<br>USB<br>2M |
| Laser-safety class per DIN EN 60825-1                                  |                       |                       |
| Length of cable interconnecting sensor head and signal-processing unit | m                     | m                     |
| Electrical-supply-line voltage/frequency                               | VAC / Hz              | VAC / Hz              |

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