Miniature Plane-Mirror Interferometer

SP-Series

SIOS Meßtechnik GmbH

Design and Operation

Series SP miniature interferometers with plane-mirror reflectors are precision length measuring instruments with a wide range of possible applications. They can be adapted geometrically and functionally to specific tasks. The miniaturized sensor head enables them to be used even in confined spaces.

Not only plane mirrors and other optical-quality surfaces but also tilt-invariant reflectors, such as ball and hollow reflectors, may be used as reflectors. The laser light is transmitted to the sensor head through fiber-optic cables.

The miniature interferometer converts the measuring movement of the plane mirror in the direction of the optical axis of the measuring beam into an interference signal. This interferometric signal, is transmitted to the supply and evaluation unit, and output as a length value. Operation and display take place optionally on a separate display unit or on a PC with optional data acquisition and display software.

Major Performance Features

- Flexible, ultraprecise length measuring system
- Adaptable to specific customer requirements
- Single-beam measuring principle minimizes Abbe errors
- Plane mirrors and also tilt-invariant reflectors suitable
- The measured object can also be moved perpendicularly to the direction of measurement according on the size of the reflecting surface
- The functionality can be extended by arranging additional optics in the path of the measuring beam
- HeNe laser with high frequency stability as the metrological standard
- Correction of environmental influences on the wavelength of the laser light
- The sensor head may be made of aluminum, stainless steel or invar
- Open interfaces for OEM software under Windows and Linux

Applications

- Precision laser-interferometric length measuring system as a measuring or calibration instrument for installing in measuring tables, microscope stages, positioning tables, measuring machines, machine tools, hardness and material testing instruments
- Multiple coordinate measurements, e.g. on planar tables, made by processing the output signals from two sensor heads simultaneously in a supply and evaluation unit
- Calibration of length measuring instruments
- Eccentricity and concentricity measurements
- Non-contact surface measurements

Technical Data		Model SP 120	Model SP 2000
Measurement range (Max. distance reflector - sensor head)	mm	100	2000
Resolution	pm	20	20
Maximum tilting angle (Center of rotation in centre of reflector) Plane mirror Ball / hollow reflektor	 arcmin degree	 ±1.5 ±26	 ±1.5 ±26
Laser wavelength	nm	632.8	632.8
Frequency stability of the HeNe laser (after warm-up time)		$3 \cdot 10^{-7}$	$2 \cdot 10^{-8}$
Warm-up time of the HeNe laser	min	1	10...20
Operating temperature range	°C	15...30	
Maximum displacement speed of the measuring reflector	mm/s	800	
Dimensions (W x D x H): Sensor head with alignment base Optoelectronic supply and evaluation unit	 mm mm	 115 x 90 x 54 450 x 400 x 150	
Mass: Sensor head with alignment base Optoelectronic supply and evaluation unit	 g kg	 700 ca 8	
Interfaces standard optional		RS232C, USB Digital 32-bit parallel interface Digital incremental signals (TTL level) Analog incremental signals ($1V_{PP}$)	
Cable length between sensor head and electronics unit	m	3, optionally up to 10	
Line voltage / frequency	VAC/Hz	100...240 /47...60	
Laser safety class according to EN 60825-1:2007 and ANSI Z136.1 (CDRH)		2M II	

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