More Precision

interferoMETER IMS5400-TH // White light interferometer for high precision thickness measurement
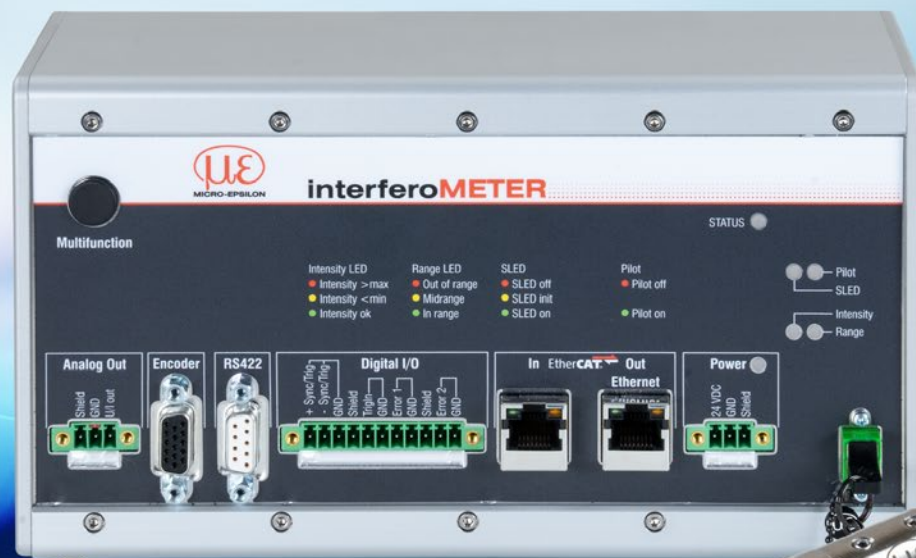
White light interferometer for stable thickness measurement with submicron accuracy

interferoMETER 5400-TH

- *Nanometer-precise thickness measurements even with varying distances and vibrating targets*

- *Stable measurement from a large distance, even of anti-reflection coated targets*

- *Industry optimized sensors with robust metal housing and flexible cables*

- *Measuring rate up to 6 kHz for high speed measurements*

- *Ethernet / EtherCAT / RS422*

Stable thickness measurement with varying measurement distances

The IMS5400-TH white light interferometer opens up new perspectives in industrial thickness measurement. The interferometer is used for highly accurate thickness measurements from a relatively large distance. A decisive advantage here is the distance-independent measurement, where a stable nanometer-accurate thickness value is achieved. This is how the target can move within the measuring range without influencing the accuracy. The large thickness measuring range allows the measurement of thin layers, flat glass and films. Since the white light interferometer works with an SLED in the near infrared range, it is possible to measure the thickness of optically non-dense objects such as anti-reflective coated glass.
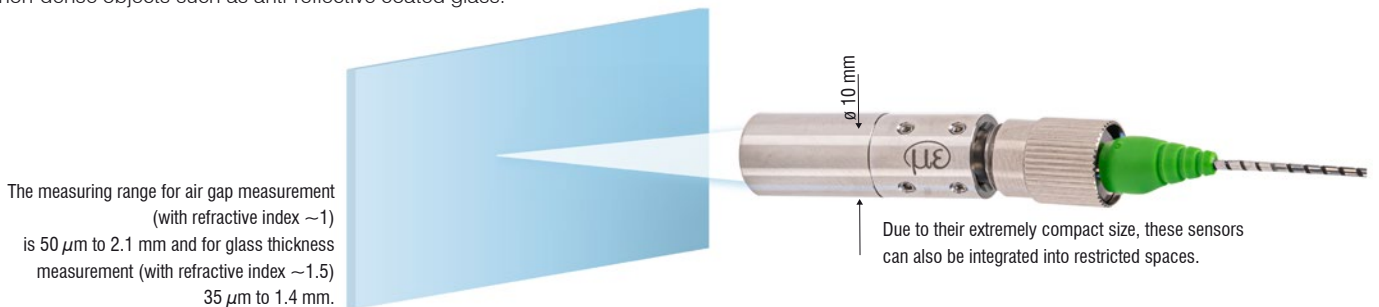
The measuring range for air gap measurement (with refractive index ~1) is 50 μm to 2.1 mm and for glass thickness measurement (with refractive index ~1.5) 35 μm to 1.4 mm.

ø 10 mm

Due to their extremely compact size, these sensors can also be integrated into restricted spaces.

Various interfaces for advanced automation

Integrated interfaces such as Ethernet, EtherCAT and RS422 as well as encoder connections, analog outputs, synchronization inputs and digital I/Os enable the connection to modern control systems and production programs.

Integration in industrial environments

Robust sensors and a controller in a metal housing make the system ideally suitable for integration into production lines. These compact sensors are extremely space-saving and can also be integrated in confined spaces. The controller is installed in the control cabinet via DIN rail mounting and provides very stable measurement results due to active temperature compensation and passive cooling. Cable lengths up to 20 m allow a spatial separation of sensor and controller. The sensor can be aligned easily and quickly due to the integrated pilot laser. Unlike conventional interferometers, initial operation and parameter set up are conveniently performed via web interface and do not require any software installation.

Model	IMS5400-TH	
Working distance	45 mm ±3.5 mm	
Measuring range (thickness)	0.035 … 1.4 mm [1]	
Resolution [2]	< 1 nm	
Measuring rate	continuously adjustable from 100 Hz to 6 kHz	
Linearity [3]	< ±100 nm	
Temperature stability	Sensor	Linearity valid for the entire temperature range
	Controller	temperature compensated, stability < 10 ppm between +15 ... +35 °C
Light source	NIR-SLED, wavelength 840 nm	
Laser safety class	Class 1 in accordance with DIN EN 60825-1 : 2015-07	
Light spot diameter [4]	10 μm	
Max. tilt angle [5]	±2°	
Supply voltage	24 VDC ±15 %	
Power consumption	approx. 10 W (24 V)	
Signal input	sync in, trigger in, 2x encoders (A+, A-, B+, B-, index)	
Digital interface	Ethernet / EtherCAT / RS422	
Analog output	4 … 20 mA / 0 ... 10 V (16 bit D/A converter)	
Switching output	Error1-Out, Error2-Out	
Digital output	sync out	
Connection	optical	pluggable optical fiber via E2000 socket (controller) and FC socket (sensor); standard length 3 m, 5 m and 10 m; other cable lengths on request; bending radius: static 30 mm, dynamic 40 mm
	electrical	3-pin supply terminal strip; encoder connection (15-pin, HD-sub socket, max. cable length 3 m, 30 m with external encoder supply); RS422 connection socket (9-pin, Sub-D, max. cable length 30 m); 3-pin output terminal strip (max. cable length 30 m); 11-pin I/O terminal strip (max. cable length 30 m); RJ45 socket for Ethernet (out) / EtherCAT (in/out) (max. cable length 100 m)
Installation	Sensor	Clamping, mounting adapter (see accessories)
	Controller	free-standing, DIN rail mounting
Temperature range	Storage	-20 … +70 °C
	Operation	Sensor: +5 … +70 °C; Controller: +15 … +35 °C
Shock (DIN-EN 60068-2-29)	15 g / 6 ms in XY axis, 1000 shocks each	
Vibration (DIN EN 60068-2-6)	2 g / 20 … 500 Hz in XY axis, 10 cycles each	
Protection class (DIN-EN60529)	IP40 (controller and sensor)	
Vacuum	optional UHV (cable and sensor)	
Material	Sensor	Stainless steel
	Controller	Aluminum housing, passive cooling
Control and display elements	multifunction button: two adjustable functions and reset to factory setting after 10 s; web interface for setup: selectable presets, freely selectable averaging possibilities, data reduction, setup management; 6 x color LEDs for intensity, range, SLED, pilot laser, status and power; pilot laser: switchable for sensor alignment (laser LED 635 nm, laser class 1, performance < 0.2 mW)	

All data at constant ambient temperature (24 ± 2 °C)

[1] Measuring range with n=1.5; for air gap measurement between two glass plates (n~1) the measuring range is 0.05 ... 2.1 mm.
The measurement object must be within the working distance.

[2] Measuring rate 0.5 kHz, moving averaging over 64 values, measured on an approx. 1 mm thick BK7 optical flat (2 sigma)
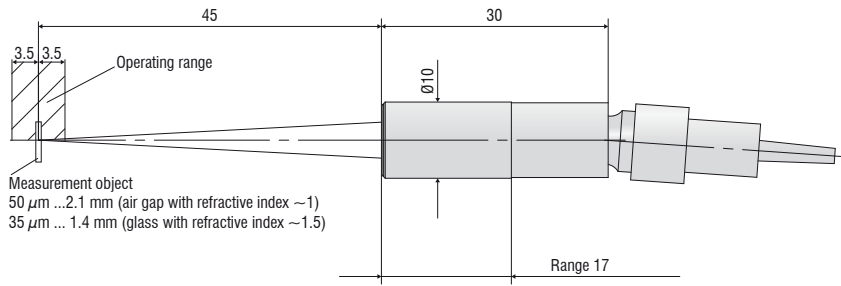
[3] Maximum thickness deviation when measuring on an approx. 1 mm thick BK7 optical flat (n=1.5) when passing through the measuring range
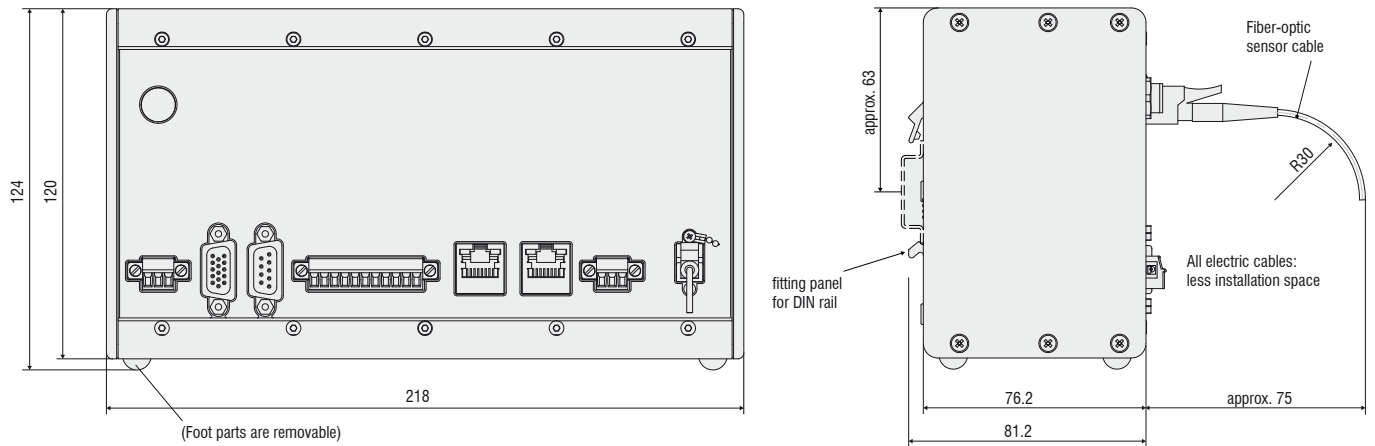
[4] With working distance = 45 mm

[5] Maximum sensor tilt angle that produces a usable signal on an approx. 0.6 mm thick BK7 optical flat in the mid of the measuring range.
The accuracy decreases when approaching the limit values.

Dimensions

Sensor

45 30

3.5 3.5 Operating range

Ø10

Measurement object
50 μm ...2.1 mm (air gap with refractive index ~1)
35 μm ... 1.4 mm (glass with refractive index ~1.5)

Range 17

Controller

124 120

218

(Foot parts are removable)

approx. 63

fitting panel
for DIN rail

Fiber-optic
sensor cable

R30

All electric cables:
less installation space

76.2 approx. 75

81.2

Accessories: Sensor mounting adapter

ø8

ø4.5

4.4

8

M4

10

(dimensions in mm, not to scale)

4x M4 0.5x45°

9 16

9

16

34

ø2.5

ø10 2

8

18

34

28