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.

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.
<table>
<thead>
<tr>
<th>Model</th>
<th>IM5400-TH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working distance</td>
<td>45 mm ± 3.5 mm</td>
</tr>
<tr>
<td>Measuring range (thickness)</td>
<td>0.035 ... 1.4 mm ¹</td>
</tr>
<tr>
<td>Resolution ²</td>
<td>&lt; 1 nm</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>continuously adjustable from 100 Hz to 6 kHz</td>
</tr>
<tr>
<td>Linearity ³</td>
<td>&lt; ±100 nm</td>
</tr>
<tr>
<td>Temperature stability</td>
<td>Linearity valid for the entire temperature range</td>
</tr>
<tr>
<td>Light source</td>
<td>NIR-SLED, wavelength 840 nm</td>
</tr>
<tr>
<td>Laser safety class</td>
<td>Class 1 in accordance with DIN EN 60825-1 : 2015-07</td>
</tr>
<tr>
<td>Light spot diameter ⁴</td>
<td>10 µm</td>
</tr>
<tr>
<td>Max. tilt angle ⁵</td>
<td>±2°</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 VDC ± 15 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>approx. 10 W (24 V)</td>
</tr>
<tr>
<td>Signal input</td>
<td>sync in, trigger in, 2x encoders (A+, A-, B+, B-, index)</td>
</tr>
<tr>
<td>Digital interface</td>
<td>Ethernet / EtherCAT / RS422</td>
</tr>
<tr>
<td>Analog output</td>
<td>4 ... 20 mA / 0 ... 10 V (16 bit D/A converter)</td>
</tr>
<tr>
<td>Switching output</td>
<td>Error1-Out, Error2-Out</td>
</tr>
<tr>
<td>Digital output</td>
<td>sync out</td>
</tr>
<tr>
<td>Connection</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>Installation</td>
<td>Sensor: Clamping, mounting adapter (see accessories)</td>
</tr>
<tr>
<td></td>
<td>Controller: free-standing, DIN rail mounting</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Storage: -20 ... +70 °C</td>
</tr>
<tr>
<td></td>
<td>Operation: Sensor: +5 ... +70 °C, Controller: +15 ... +35 °C</td>
</tr>
<tr>
<td>Shock (DIN EN 60068-2-29)</td>
<td>15 g / 6 ms in XY axis, 1000 shocks each</td>
</tr>
<tr>
<td>Vibration (DIN EN 60068-2-6)</td>
<td>2 g / 20 ... 500 Hz in XY axis, 10 cycles each</td>
</tr>
<tr>
<td>Protection class (DIN-EN60529)</td>
<td>IP40 (controller and sensor)</td>
</tr>
<tr>
<td>Vacuum</td>
<td>optional UHV (cable and sensor)</td>
</tr>
<tr>
<td>Material</td>
<td>Sensor: Stainless steel</td>
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<tr>
<td></td>
<td>Controller: Aluminum housing, passive cooling</td>
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</tbody>
</table>

### 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)

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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.
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.

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

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- **Ethernet / EtherCAT / RS422**
Dimensions

Sensor

Controller

Accessories: Sensor mounting adapter

(Foot parts are removable)

(dimensions in mm, not to scale)

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