MICRO-EPSILON

More Precision

interferoMETER // High precision absolute interferometers

Stable thickness measurement with submicrometer resolution
interferoMETER 5400-TH

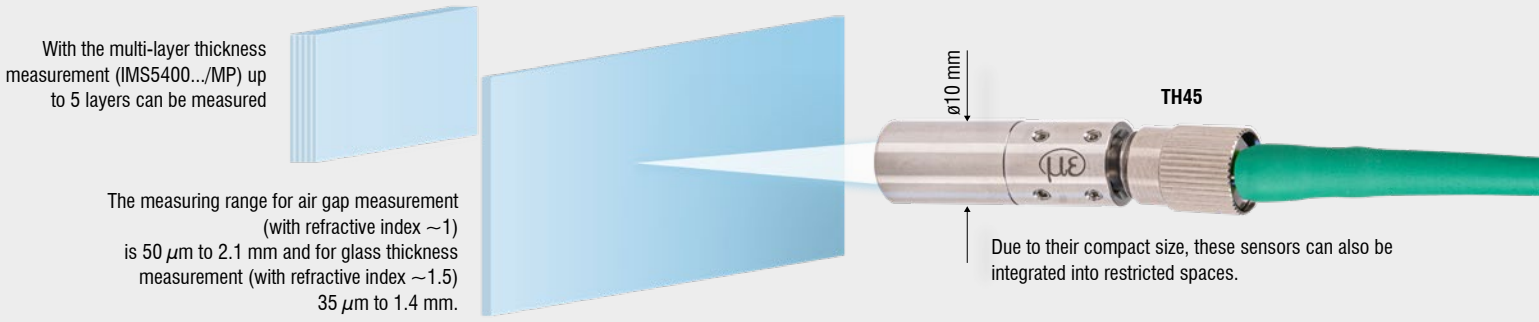
- Nanometer-accurate thickness measurement, even with varying distances
- Stable measurement from a long distance
- Precise thickness measurement of up to 5 layers
- Measuring rate up to 6 kHz for high speed measurements
- INTER FACE Ethernet / EtherCAT / RS422 / PROFINET / EtherNet/IP
- Flexible industrial integration

Stable thickness measurement with varying distances

The IMS5400-TH absolute interferometer opens up new perspectives in industrial thickness measurements. The interferometer is used for highly accurate thickness measurements from a relatively large distance. The large thickness measuring range allows the measurement of thin layers, flat glass and films. As the absolute 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.

Reliable even with vibrating materials

A decisive advantage 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.



Controller

Model		IMS5400-TH	IMS5400MP-TH
Resolution [1]		< 1 nm	
Measuring rate		continuously adjustable from 100 Hz to 6 kHz	
Linearity [2]		< ±100 nm [3]/ < ±200 nm [4]	
Temperature stability		temperature compensated, stability < 10 ppm between +15 ... +35 °C	
Multi-peak measurement		1 layer	up to 5 layers
Light source		NIR-SLED, narrow wavelength band at approx. 840 nm; pilot laser: laser LED, wavelength 635 nm	
Laser class		Class 1 according to DIN EN 60825-1: 2015-07; Pilot laser: Class 1, power (< 0.2 mW)	
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 / PROFINET [5]/ EtherNet/IP [5]	
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 fiber optic cable via E2000 socket (controller); see accessories for cable lengths; 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)	
Mounting		Free-standing, DIN rail mounting	
Temperature range	Storage	-20 ... +70 °C	
	Operation	+15 ... +35 °C	
Shock (DIN EN 60068-2-27)		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 EN 60529)		IP40	
Material		Aluminum housing, passive cooling	
Control and indicator elements		Multifunction button: two adjustable functions and reset to factory settings after 10 s; web interface for setup: selectable presets, freely selectable averaging, data reduction, setup management; 6 x color LEDs for intensity, range, SLED, pilot laser, status and power; pilot laser: can be switched on for sensor alignment	

[1] All data at constant ambient temperature (24 ±2 °C). Measuring rate 0.5 kHz, moving average over 64 values, measured differentially between the front and back of a thin glass plate in the mid of the measuring range (2 sigma)
[2] Maximum thickness deviation when measuring an approx. 1 mm thick BK7 optical flat (n=1.5) when passing through the operating range
[3] Applies to the IMP TH45 and IMP IMP TH45/VAC sensor models
[4] Applies to the IMP TH70 sensor model
[5] Optional connection via interface module (see accessories)

Sensors for thickness measurements
interferoMETER 5400-TH

Sensors for the IMS5400 controller for thickness measurements

Model		IMP TH45	IMP TH70
Working distance		45 mm ±3.5 mm	70 mm ±2.1 mm
Measuring range	Thickness [1]	0.035 ... 1.4 mm [2]	
Temperature stability		Linearity valid for the entire temperature range	
Light spot diameter [3]		10 µm	5 µm
Measuring angle [4]		±2°	±4°
Connection	Optical	Pluggable fiber optic cable via FC socket (sensor); see accessories for cable lengths; bending radius: static 30 mm, dynamic 40 mm	
Mounting		Radial clamping, mounting adapter (see accessories)	
Temperature range	Storage	-20 ... +70 °C	
	Operation	+5 ... +70 °C	
Dimensions	Diameter	Ø10	Ø20
	Length	30 mm	approx. 75 mm
Protection class (DIN EN 60529)		IP65 / IP40 (option / VAC)	IP65
Vacuum		UHV (cable and sensor)	-
Material		Stainless steel	

[1] Values also for MP measurement

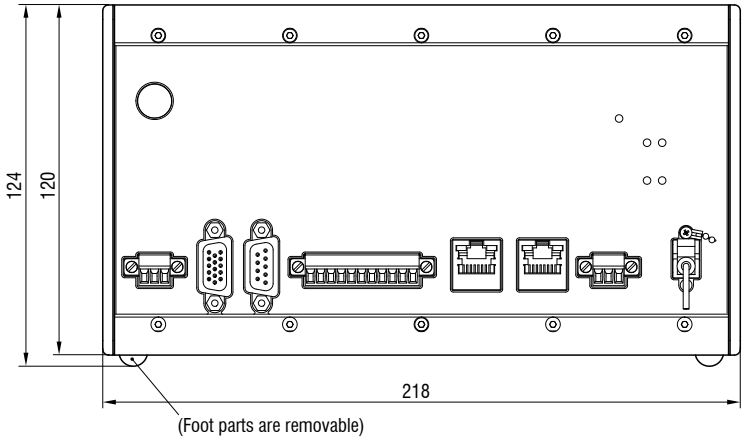
[2] All data at constant ambient temperature (24 ±2 °C). Measuring range with n=1.5; for air gap measurement between two glass plates (n~1) the measuring range is 0.05 ... 2.1 mm. The measuring object must be within the working distance.

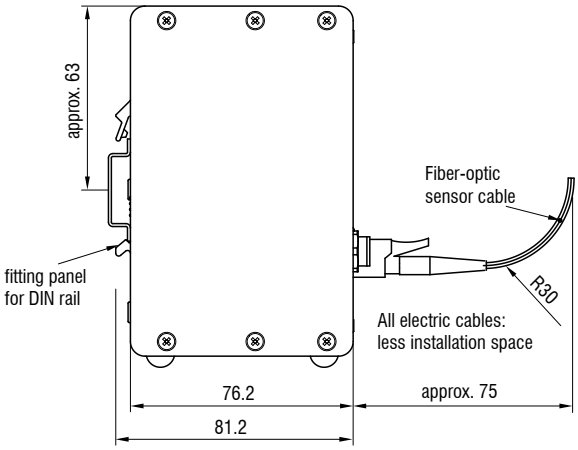
[3] With a working distance of 45 mm (TH-45) or 70 mm (TH-70)

[4] 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.

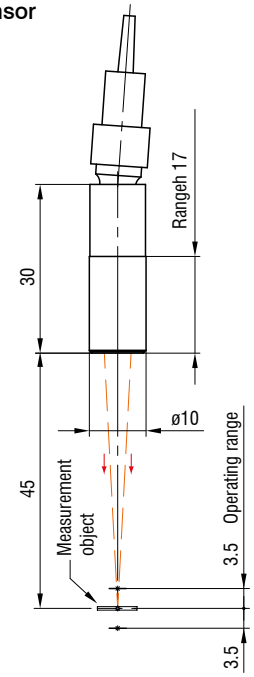
Dimensions

IMS5400-TH controller

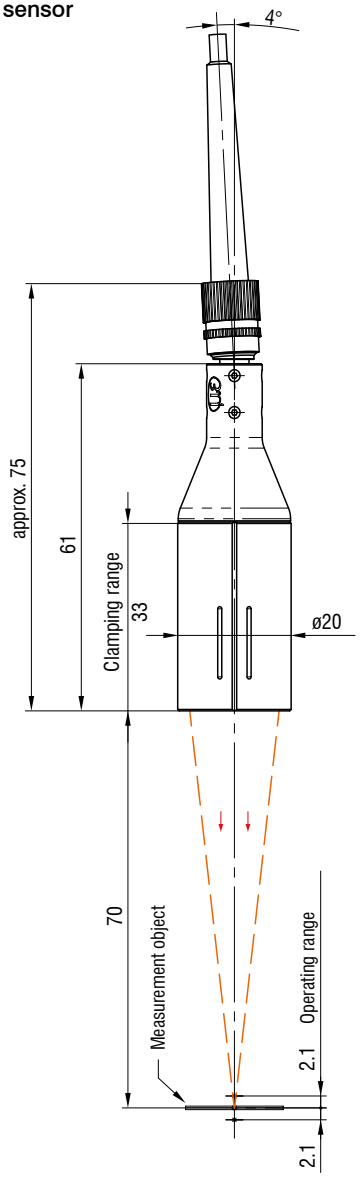




Thickness sensor
IMP TH45



Thickness sensor
IMP TH70



Connection possibilities
interferoMETER

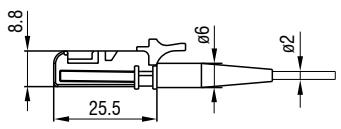
Connection options for the IMS5400 and IMS5600 controllers

Controller	Sensor Cable
IMS5400	**Standard E2000/APC (controller) and FC/APC connector (sensor)** C5401-2 Optical fiber, length 2 m C5401-3 Optical fiber, length 3 m C5401-5 Optical fiber, length 5 m C5401-10 Optical fiber, length 10 m Other lengths up to 20 m on request
IMS5600	**Drag chain E2000/APC (controller) and FC/APC connector (sensor)** C5401-3(010) Optical fiber, length 3 m C5401-5(010) Optical fiber, length 5 m C5401-10(010) Optical fiber, length 10 m Other lengths up to 20 m on request

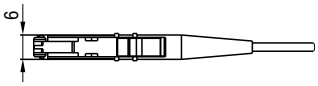
Connection options for the IMS5420 controller

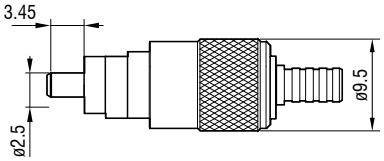
Controller	Sensor Cable
IMS5420	**Standard E2000/APC (controller) and FC/APC connector (sensor)** C5421-1 Fiber optic cable, length 1 m C5421-2 Optical fiber, length 2 m C5421-3 Optical fiber, length 3 m C5421-5 Optical fiber, length 5 m Other lengths up to 20 m on request
IMS5420	**With protection class IP67, IP9 SC socket (controller) and FC/APC connector (sensor)** C5421/IP67-0,5 Optical fiber, length 0.5 m C5421/IP67-1 Optical fiber, length 1 m C5421/IP67-2 Optical fiber, length 2 m

Connector



E2000/APC Standard connector





FC/APC Standard connector

Sensors

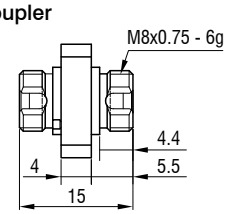
IMP DS0.5/90/VAC
IMP DS10/90/VAC
IMP DS19
IMP TH45
IMP TH70

Flange for vacuum feedthrough

Vacuum cable FC/APC connector

C5400-1/VAC	Optical fiber, length 1 m
C5400-2/VAC	Optical fiber, length 2 m
C5400-5/VAC	Optical fiber, length 5 m

FC coupler



IMP DS1/VAC sensor

Optional accessories

Adjustable mounting adapters
Sensor mounting adapter

Sensors

IMP TH24

Article designations

DS IMS5xxx-DSxx
distance measuring system
(e.g. IMS5600MP-DS19)

IMS5xxx	-DSxx
Controller model	**Sensor model**
IMS5400	DS1/VAC
IMS5400MP	DS19
IMS5600	DS19/VAC
IMS5600MP	DS0.5/90/VAC
	DS10/90/VAC

TH IMS5xxx-THxx
thickness measuring system
(e.g. IMS5400-TH45/VAC)

IMS5xxx	-THxx
Controller model	**Sensor model**
IMS5400	TH45
IMS5400MP	TH45/VAC
	TH70

TH IMS5420xx-THxx
wafer thickness measuring system
(e.g. IMS5420-TH24)

IMS5xxx	-THxx
Controller model	**Sensor model**
IMS5420	TH24
IMS5420MP	TH24(204)
IMS5420IP67	
IMS5420IP67MP	

Optional accessories
interferoMETER

Flange for vacuum feedthrough

C5405/VAC/1/CF16	CF flange
C5405/VAC/1/KF16	KF flange

Mounting adapter

MA5400- 10	Mounting adapter for IMP-DS19/ -TH45
MA5400- 20	Mounting adapter for IMP-TH70
MA2402-4	Mounting adapter for IMP-DS1

C5405/VAC/1/CF16
C5405/VAC/1/KF16

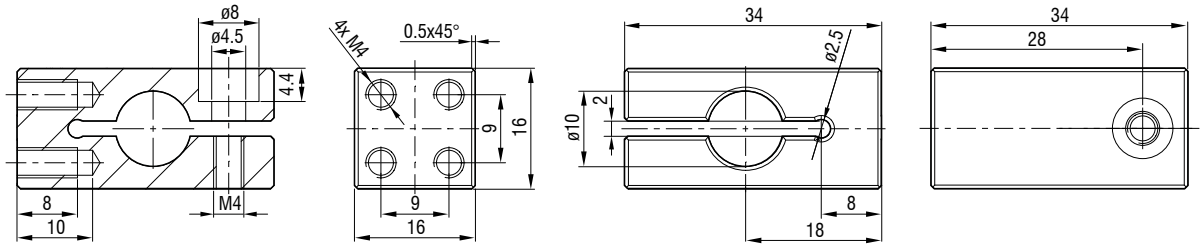
Other accessories

SC2471-x/IF2008	IMC5400/5600 connector cable+ IF2008/PCIE, length 3 m / 10 m
SC2471-x/RS422/OE	IMC5400/5600 interface cable + IF2001/USB, length 3 m / 10 m
IF2001/USB	RS422/USB converter
IF2008/PCIE	Interface card
IF2035/PNET	Interface module for PROFINET integration
IF2035-EIP	Interface module for EtherNet/IP with DIN rail housing
PS2020	Power supply 24V / 2.5A
EC2471-3/OE	Encoder cable, 3 m

Sensor mounting adapter

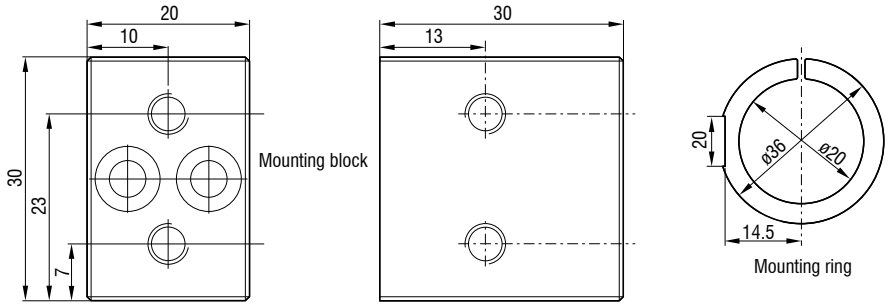
MA5400-10

Sensor mounting adapter for all interferoMETER sensors:
(exception IMP-DS1, IMP-TH70)



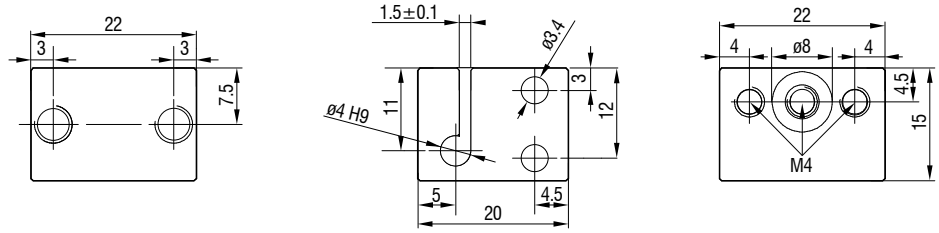
MA5400-20

Sensor mounting adapter for IMP-TH70 sensors:



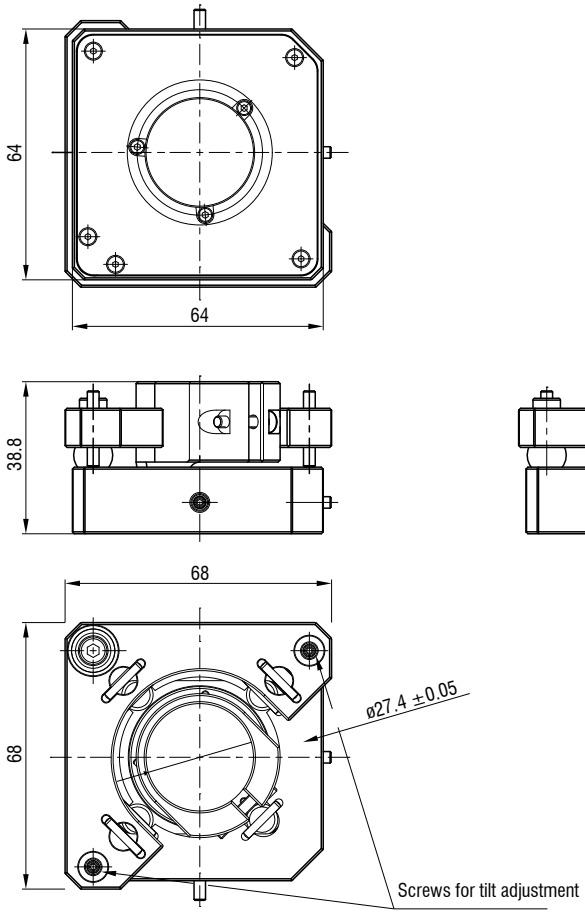
MA2402-4

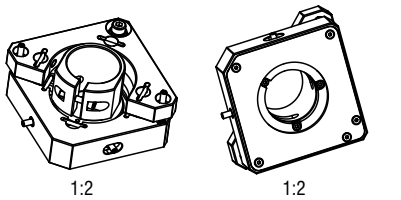
Sensor mounting adapter for IMP-DS1 sensors

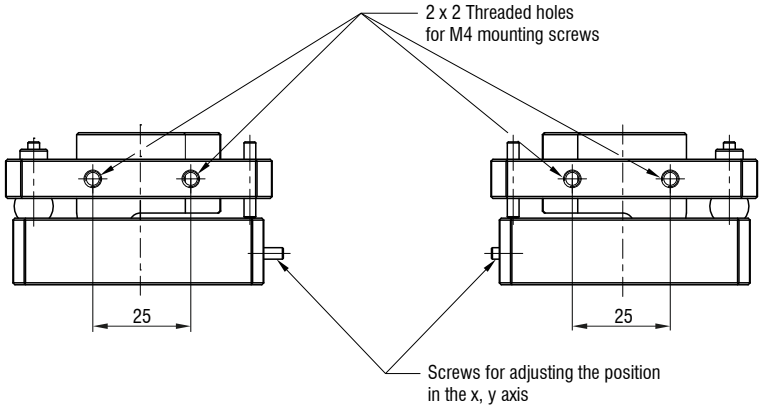


Adjustable mounting adapter

The adjustable JMA mounting adapter simplifies the alignment and fine adjustment of interferometric sensors. The sensors and adapters can be integrated into the machine and aligned directly on site. This corrects, e.g, minor deviations caused by mounting and compensates for tilted measuring objects. With two-sided thickness measurements, the mounting adapter supports the fine alignment of the two measuring points.





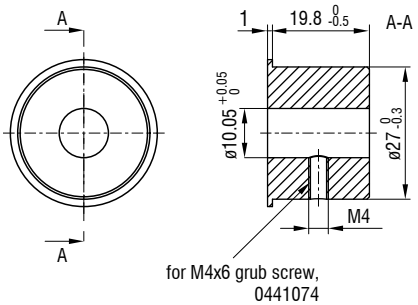


Scope of supply

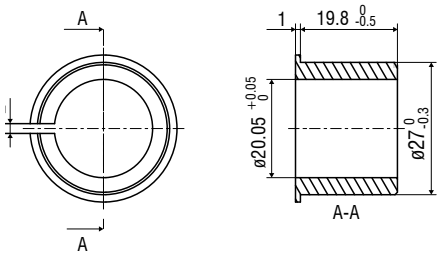
- Adjustable mounting adapter
- Sensor holder for sensors Ø10 and Ø20 mm
- Screwdriver for positioning
- Assembly instructions

Sensor holder

Sensor holder for JMA-10



Sensor holder for JMA-20

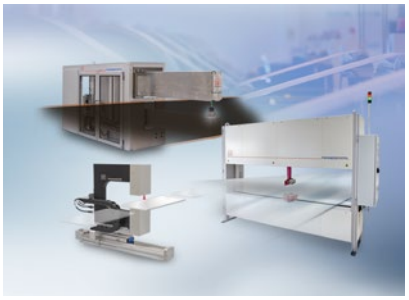


(dimensions in mm, not to scale)

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

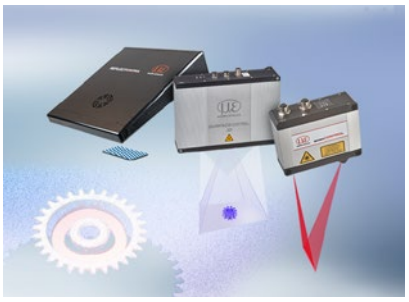
Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection

Modifications reserved / Y9761751-C052076JWN

MICRO-EPSILON

MICRO-EPSILON Headquarters
Koenigbacher Str. 15 · 94496 Ortenburg / Germany
Tel. +49 (0) 8542 / 168-0 · Fax +49 (0) 8542 / 168-90
info@micro-epsilon.com · **www.micro-epsilon.com**