









# 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
-  Ethernet / EtherCAT / RS422 / PROFINET / EtherNet/IP
-  Flexible industrial integration



### Stable thickness measurement with varying distances

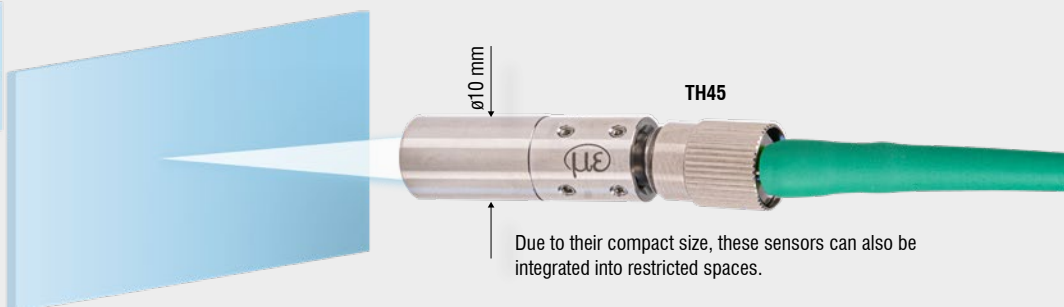
The IMS5400-TH absolute interferometer opens up new perspectives in industrial thickness measurements. The interferometer is used for highly accurate thickness measurements from a relatively large distance. The large thickness measuring range allows the measurement of thin layers, flat glass and films.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

With the multi-layer thickness measurement (IMS5400.../MP) up to 5 layers can be measured

The measuring range for air gap measurement (with refractive index  $\sim 1$ ) is 50  $\mu\text{m}$  to 2.1 mm and for glass thickness measurement (with refractive index  $\sim 1.5$ ) 35  $\mu\text{m}$  to 1.4 mm.



# Controller

Model		IMS5400-TH	IMS5400MP-TH
Resolution <sup>[1]</sup>		< 1 nm	
Measuring rate		continuously adjustable from 100 Hz to 6 kHz	
Linearity <sup>[2]</sup>		< ±100 nm <sup>[3]</sup> / < ±200 nm <sup>[4]</sup>	
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 <sup>[5]</sup> / EtherNet/IP <sup>[5]</sup>	
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	

<sup>[1]</sup> 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)

<sup>[2]</sup> Maximum deviation from reference system over the entire measuring range, measured on front surface of ND filter

<sup>[3]</sup> applies to the IMP TH45 and IMP MP-TH45 sensor models

<sup>[4]</sup> applies to the IMP TH70 and IMP MP-TH70 sensor models

<sup>[5]</sup> 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 $\pm$ 3.5 mm	70 mm $\pm$ 2.1 mm
Measuring range	Thickness <sup>[1]</sup>	0.035 ... 1.4 mm <sup>[2]</sup>	
Temperature stability		Linearity valid for the entire temperature range	
Light spot diameter <sup>[3]</sup>		10 $\mu$ m	5 $\mu$ m
Measuring angle <sup>[4]</sup>		$\pm$ 2°	$\pm$ 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	

<sup>[1]</sup> Values also for MP measurement

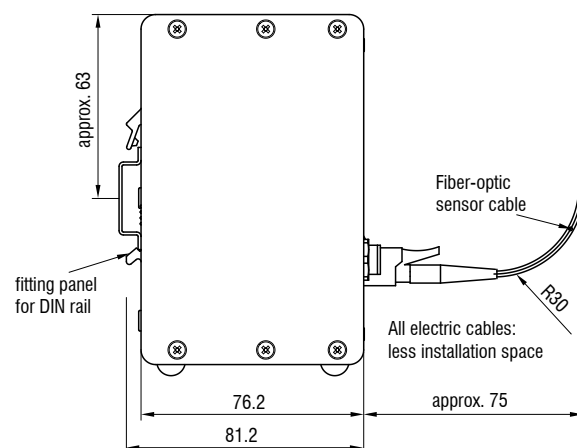
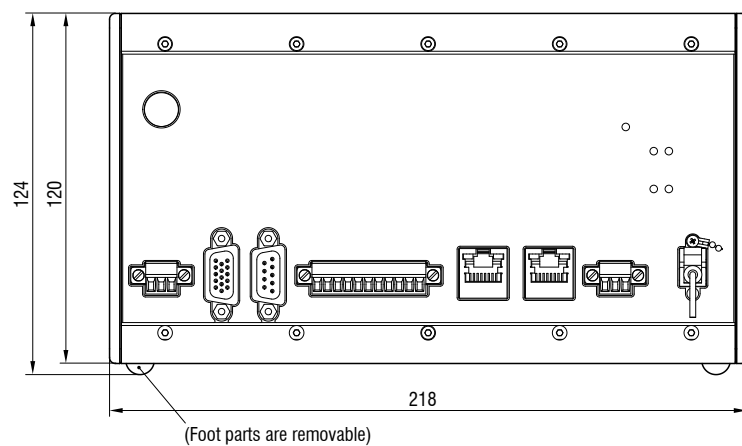
<sup>[2]</sup> All data at constant ambient temperature (24  $\pm$ 2 °C). Measuring range with n=1.5; for air gap measurement between two glass plates (n~1) the measuring range is 0.05 ... 2.1 mm. The measuring object must be within the working distance.

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

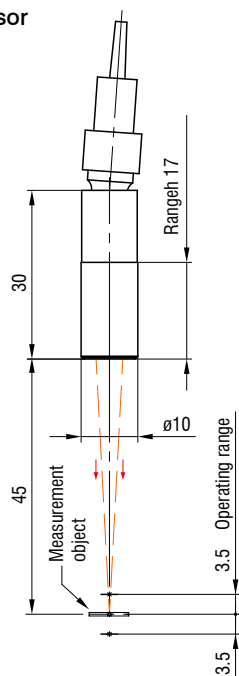
<sup>[4]</sup> Maximum sensor tilt angle that produces a usable signal on an approx. 0.6 mm thick BK7 optical flat in the mid of the measuring range. The accuracy decreases when approaching the limit values.

# Dimensions

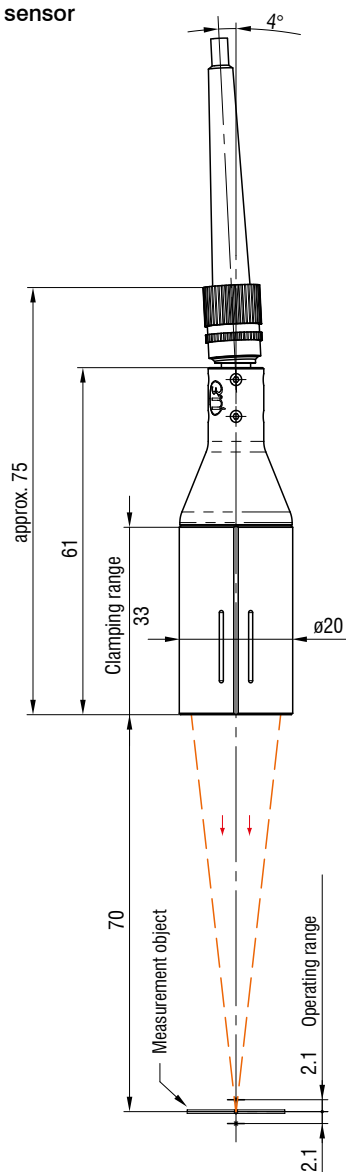
## IMS5400-TH controller



## Thickness sensor IMP TH45



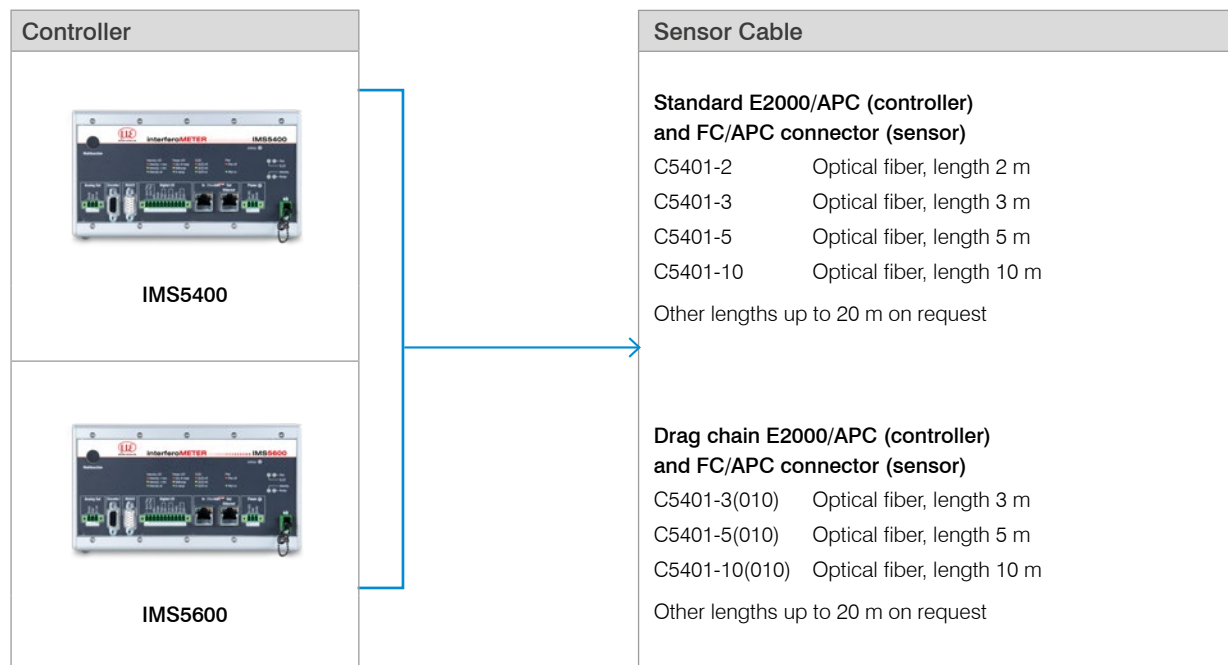
## Thickness sensor IMP TH70



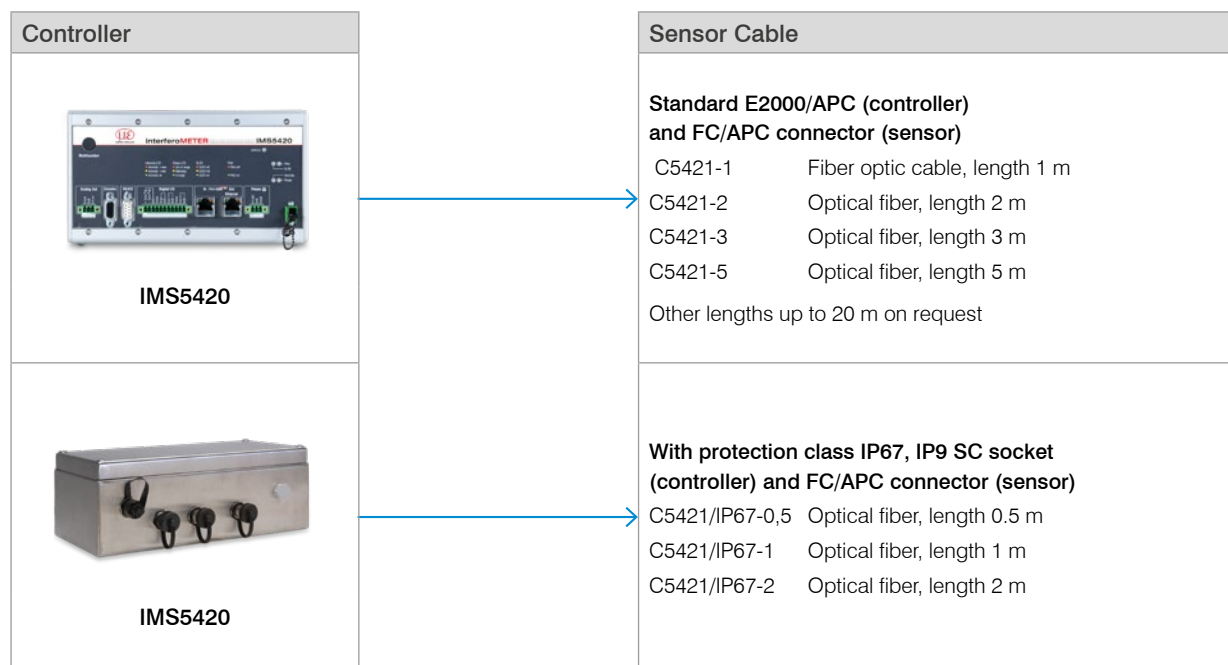
# Connection possibilities

## interferoMETER

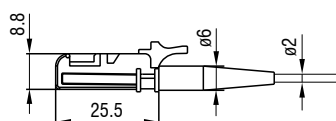
Connection options for the IMS5400 and IMS5600 controllers



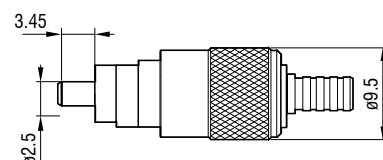
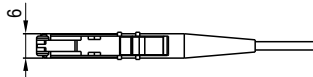
Connection options for the IMS5420 controller



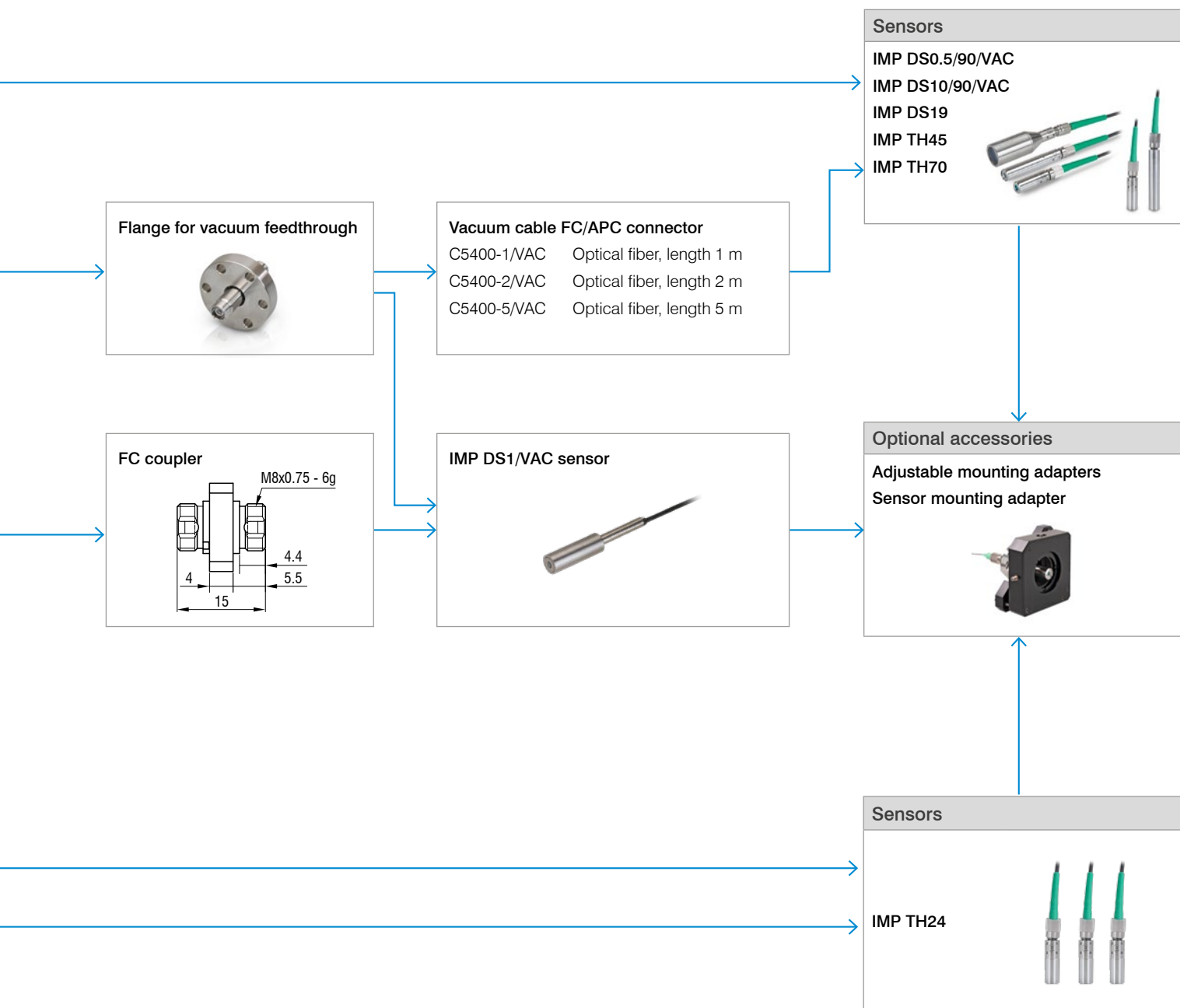
Connector



E2000/APC Standard connector



FC/APC Standard connector



## Article designations

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

IMS5xxx	-DSxx
<b>Controller model</b>	<b>Sensor model</b>
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
<b>Controller model</b>	<b>Sensor model</b>
IMS5400	TH45
IMS5400MP	TH45/VAC
	TH70

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

IMS5xxx	-THxx
<b>Controller model</b>	<b>Sensor model</b>
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

### 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

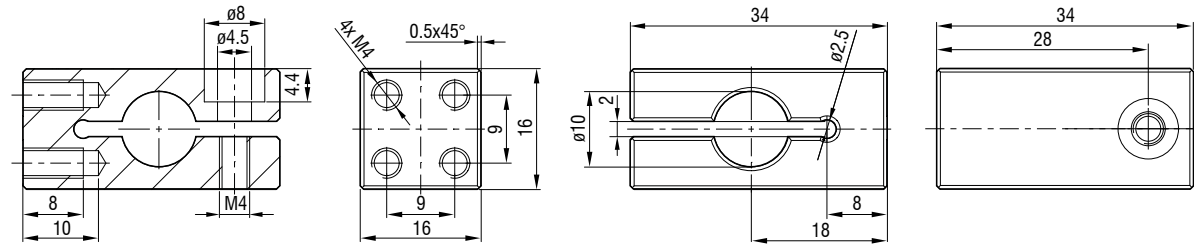


C5405/VAC/1/CF16  
C5405/VAC/1/KF16

### Sensor mounting adapter

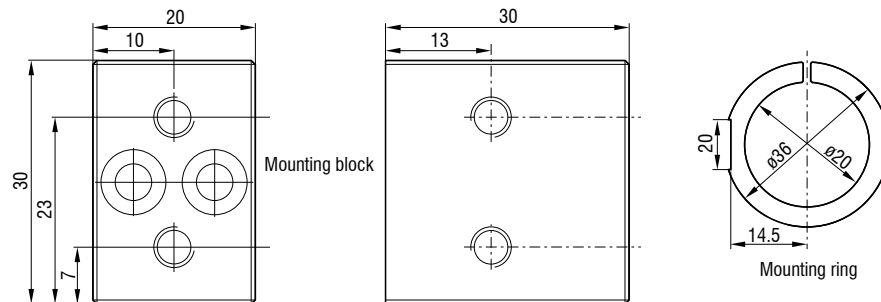
#### MA5400-10

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



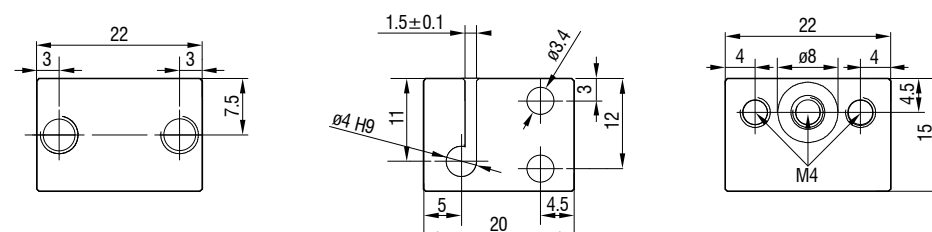
#### MA5400-20

Sensor mounting adapter for IMP-TH70 sensors:



#### MA2402-4

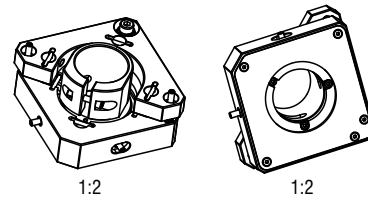
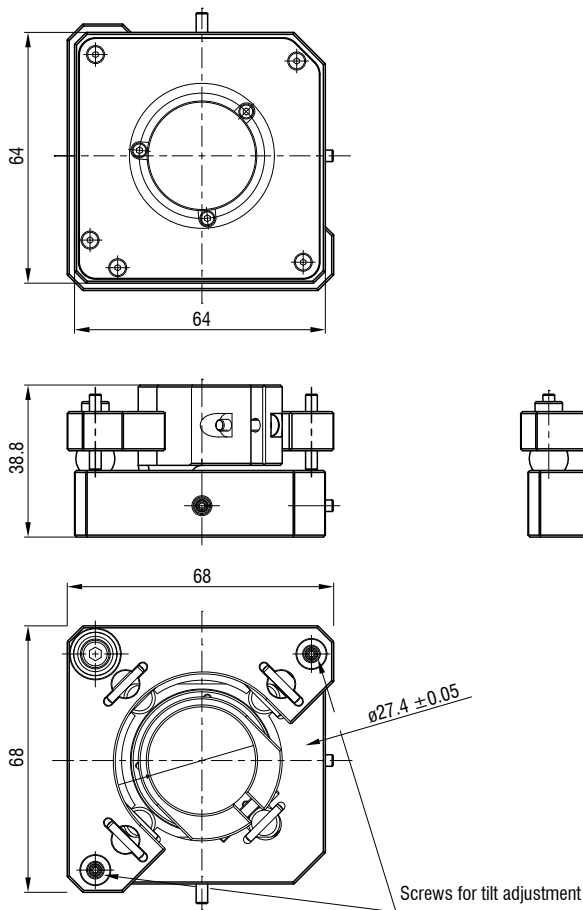
Sensor mounting adapter for IMP-DS1 sensors





## 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.

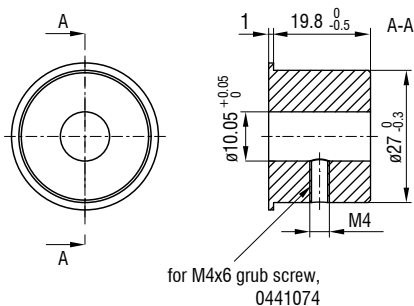


## Scope of supply

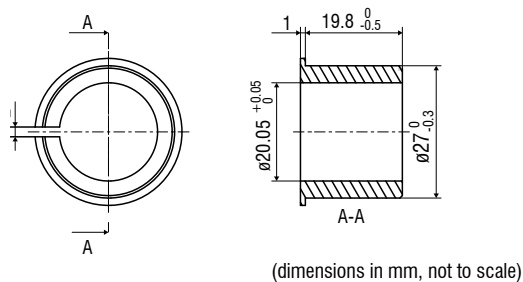
- Adjustable mounting adapter
- Sensor holder for sensors  $\varnothing 10$  and  $\varnothing 20$  mm
- Screwdriver for positioning
- Assembly instructions

## Sensor holder

Sensor holder for JMA-10



Sensor holder for JMA-20



## Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



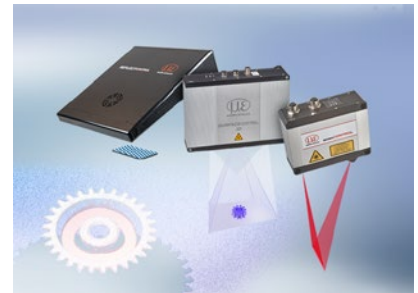
Measuring and inspection systems for metal strips, plastics and rubber



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