MICRO-EPSILON

More Precision

interferoMETER // High precision absolute interferometers

Absolute distance measurements with nanometer resolution
interferoMETER 5400-DS

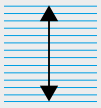
- Absolute measurement with nanometer resolution
- Compact and robust sensors with large offset distance
- Measuring rate up to 6 kHz for high speed measurements
- Ethernet / EtherCAT / RS422 / PROFINET / EtherNet/IP
- Robust controller with passive cooling
- Easy configuration via web interface
- Flexible industrial integration

Absolute distance measurements with nanometer resolution
The IMS5400-DS absolute interferometer opens up new perspectives in industrial distance measurements. The controller has an intelligent evaluation feature and enables absolute measurements with nanometer resolution at a relatively large offset distance. Compared to other absolute measuring optical systems, the IMS5400-DS offers an unsurpassed combination of accuracy, measuring range and offset distance.

Small light spot for the smallest of details and structures
The sensors generate a small light spot over the entire measuring range.

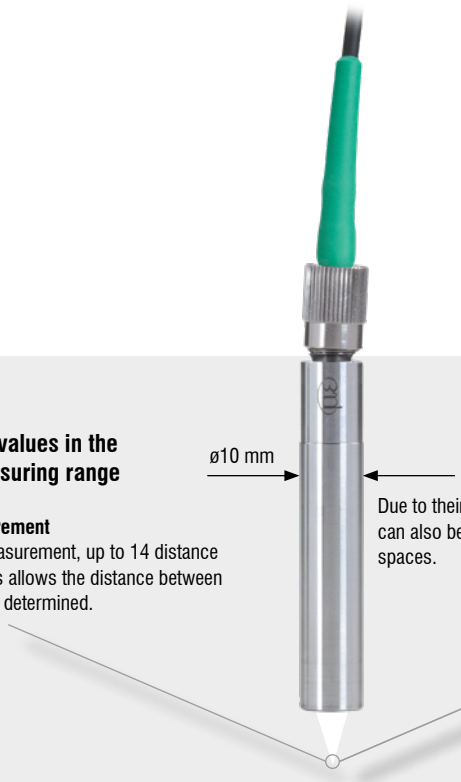
The light spot diameter is only 10 µm in the mid of the measuring range and enables the detection of small details, for example structures on semiconductors and miniature electronic components.

Absolute measurement of step profiles
Unlike interferometers based on relative measurements, the IMS5400-DS also enables the measurement of step profiles. Thanks to the absolute measurement, the scanning is performed with high signal stability and precision. When measuring on moving objects, the differences in height of heels, steps and depressions can thus be reliably detected.

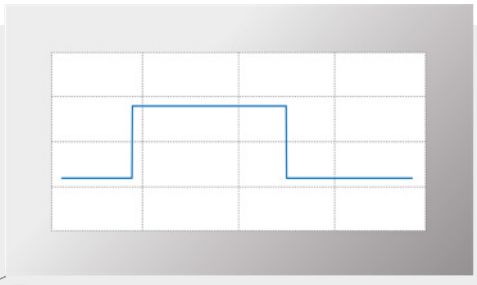


14 distance values in the 2.1 mm measuring range

Multi-peak distance measurement
With multi-peak distance measurement, up to 14 distance values can be evaluated. This allows the distance between the glass and the mask to be determined.



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



Absolute measurement of step profiles
Due to the absolute thickness measurement, step profiles are detected with high signal stability and subnanometer resolution.

Controller

Model		IMS5400-DS	IMS5400MP-DS
Resolution [1]		< 1 nm	
Measuring rate		continuously adjustable from 100 Hz to 6 kHz	
Linearity [2]		< ±50 nm	< ±50 nm for the first distance; < ±150 nm for each further distance
Temperature stability		temperature compensated, stability < 10 ppm between +15 ... +35 °C	
Multi-peak measurement		-	up to 13 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 [3]/ 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 deviation from reference system over the entire measuring range, measured on front surface of ND filter
[3] Optional connection via interface module (see accessories)

Sensors for distance measurements
interferoMETER 5400-DS/5600-DS

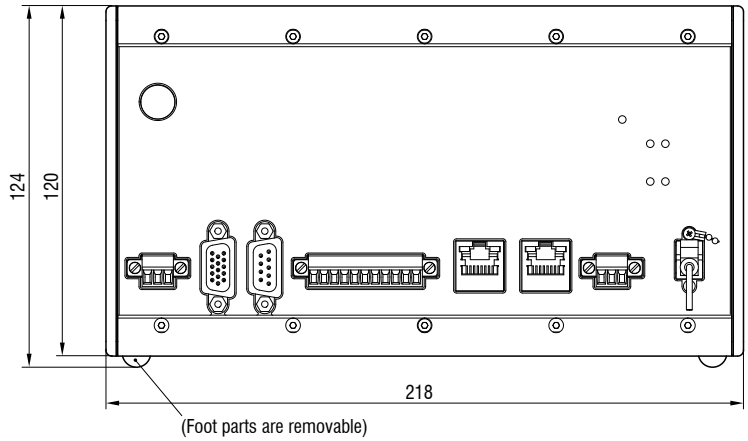
Sensors for the IMS5400 / IMS5600 controllers for distance measurement

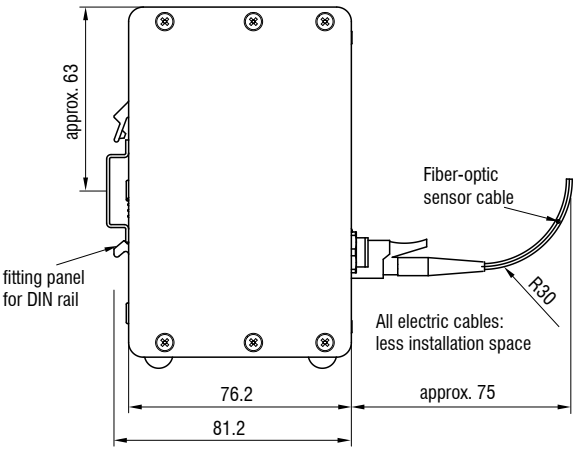
Model		IMP DS1/VAC	IMP DS0.5/90/VAC	IMP DS10/90/VAC	IMP DS19
Measuring range	Distance	1 mm	1.5 mm	1.5 mm	2.1 mm
	Thickness [1]	0.01 ... 0.7 mm	0.01 ... 1.0 mm	0.01 ... 1.0 mm	0.01 ... 1.3 mm
Start of measuring range		1 mm	0.5 mm	10 mm	19 mm
Temperature stability		Linearity: typ. 0.1 nm / K (without offset shift)			
Light spot diameter [2]		10 µm			
Measuring angle [3]		±2°			
Target material		Glass, reflecting or diffuse surfaces [4]			
Connection	Optical	Sensor with integrated vacuum optical fiber; length 2 m and FC/APC connector. Extension via pluggable optical fiber FC socket (vacuum feedthrough); cable lengths see accessories; bending radius: static 30 mm, dynamic 40 mm	Pluggable fiber optic cable via FC socket (vacuum feedthrough); pluggable UHV fiber optic cable via FC socket (feedthrough and sensor with vacuum capability); cable lengths see accessories; 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	Ø4	Ø10	Ø10	Ø10
	Length	23 mm	approx. 78.1 mm	approx. 68.6 mm	55 mm
Protection class (DIN EN 60529)		IP40	IP40	IP40	IP65; IP40 (option/VAC)
Vacuum		UHV (cable and sensor)	UHV (cable and sensor)	UHV (cable and sensor)	Optional UHV (cable and sensor)
Material		Stainless steel; optional: titanium housing	Stainless steel	Stainless steel; optional: titanium housing	Stainless steel; optional: titanium housing

[1] Application for MP measurement
[2] All data at constant ambient temperature (24 ±2 °C). In the mid of the measuring range
[3] Maximum sensor tilt angle that produces a usable signal on polished glass (n = 1.5) in the mid of the measuring range. The accuracy decreases when approaching the limit values.
[4] Non-transparent materials require optically dense surface at a wavelength of 840 nm

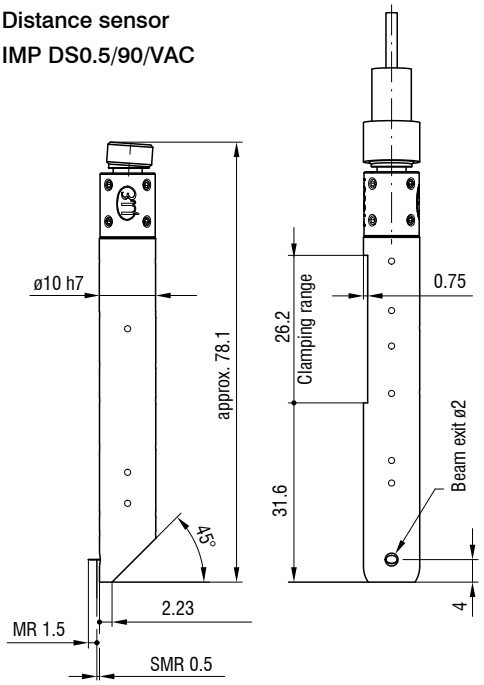
Dimensions

IMS5400-DS / IMS5600-DS controller

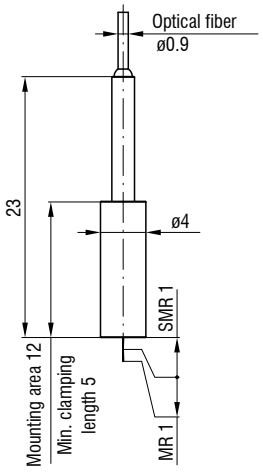




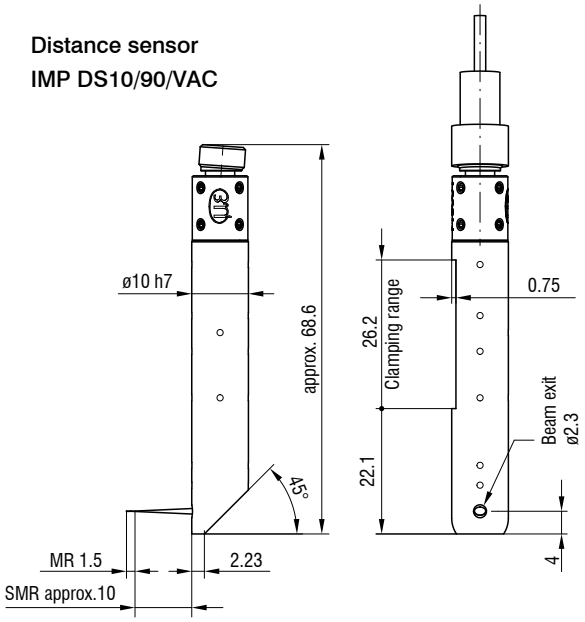
Distance sensor
IMP DS0.5/90/VAC



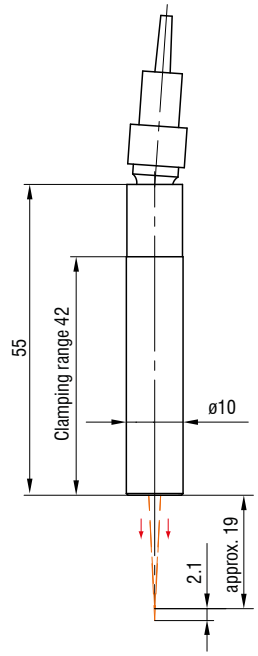
Distance sensor
IMP DS1/VAC



Distance sensor
IMP DS10/90/VAC



Distance sensor
IMP-DS19



Connection possibilities
interferoMETER

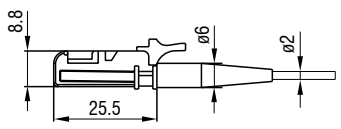
Connection options for the IMS5400 and IMS5600 controllers

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

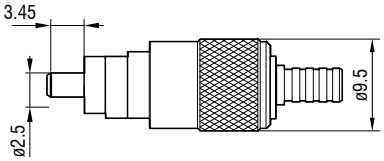
Connection options for the IMS5420 controller

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

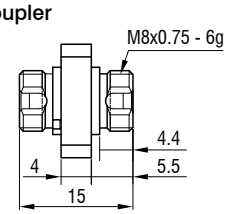
IMP DS0.5/90/VAC
IMP DS10/90/VAC
IMP DS19
IMP TH45
IMP TH70

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

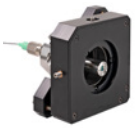
FC coupler



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

Other accessories

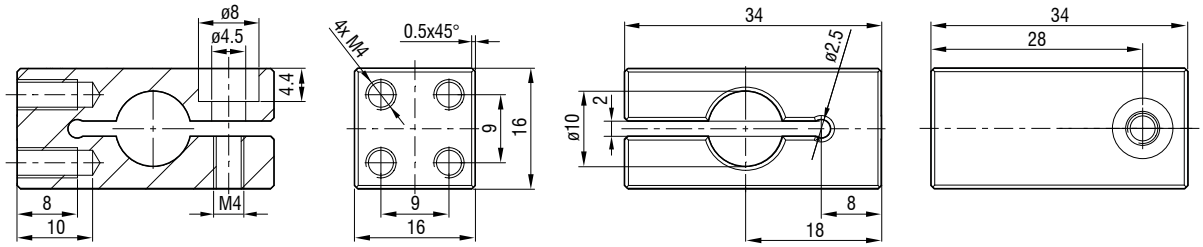
SC2471-x/IF2008	IMC5400/5600 connector cable+ IF2008/PCIE, length 3 m / 10 m
SC2471-x/RS422/OE	IMC5400/5600 interface cable + IF2001/USB, length 3 m / 10 m
IF2001/USB	RS422/USB converter
IF2008/PCIE	Interface card
IF2035/PNET	Interface module for PROFINET integration
IF2035-EIP	Interface module for EtherNet/IP 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

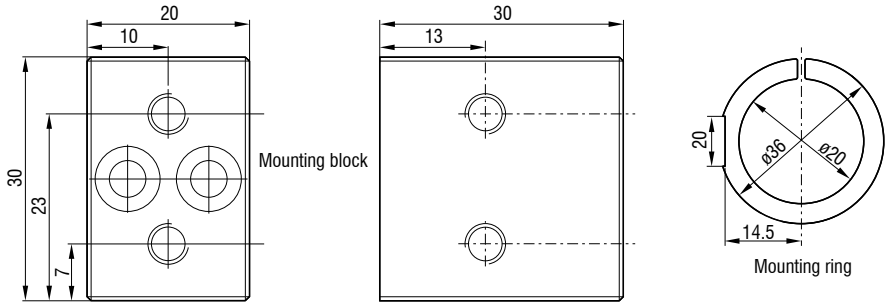
MA5400-10

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



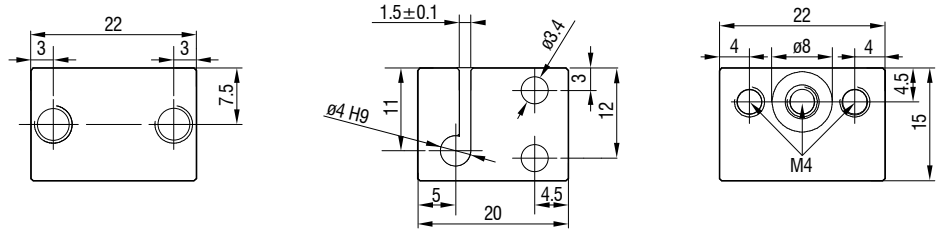
MA5400-20

Sensor mounting adapter for IMP-TH70 sensors:



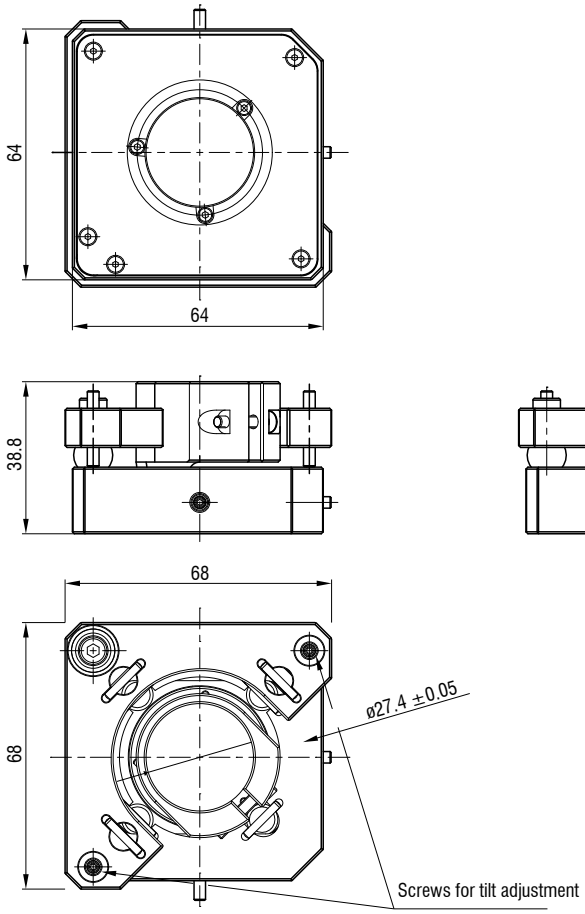
MA2402-4

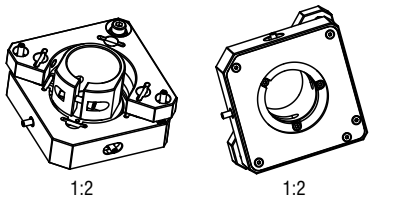
Sensor mounting adapter for IMP-DS1 sensors

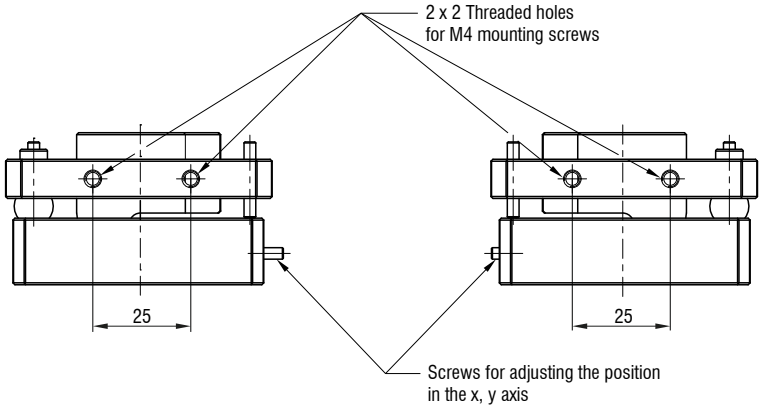


Adjustable mounting adapter

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.





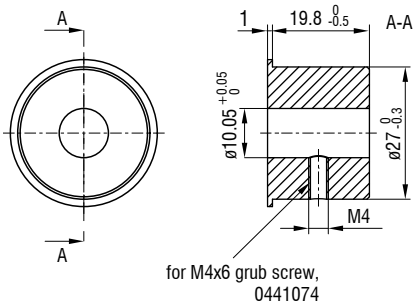


Scope of supply

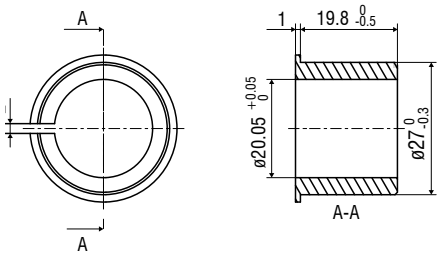
- Adjustable mounting adapter
- Sensor holder for sensors Ø10 and Ø20 mm
- Screwdriver for positioning
- Assembly instructions

Sensor holder

Sensor holder for JMA-10



Sensor holder for JMA-20



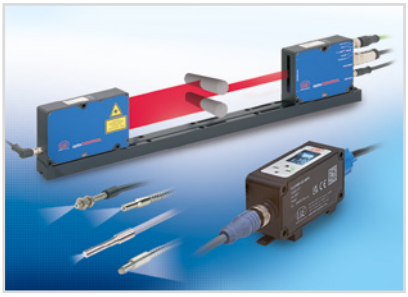
(dimensions in mm, not to scale)

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, position and dimension

Sensors and measurement devices for non-contact temperature measurement

Measuring and inspection systems for quality assurance



Optical micrometers, 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-C012094GKE

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