MICRO-EPSILON

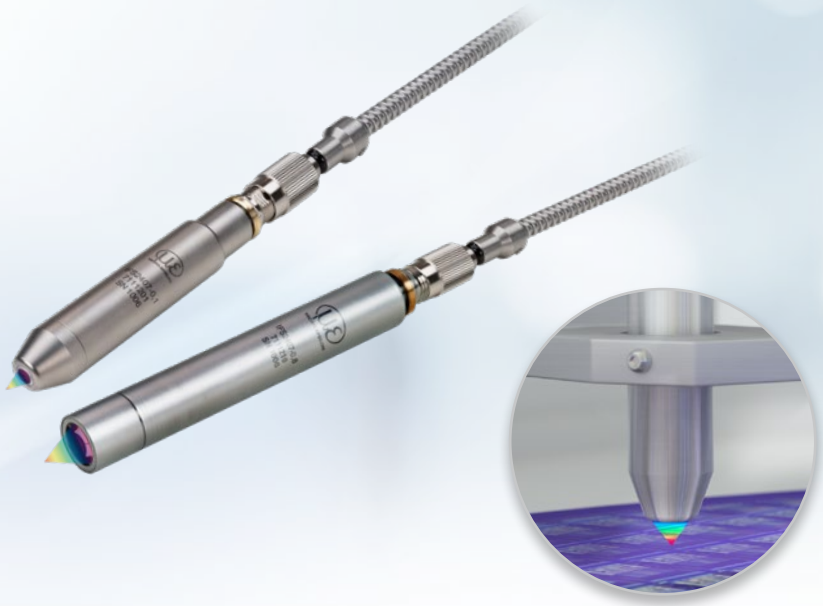
More Precision

confocalDT // Confocal chromatic sensor system



High precision sensors for displacement and thickness measurements
confocalDT IFS2407

- Compact sensors from ø12 mm
- Submicron resolution
- For one-sided thickness measurements
- Suitable for precise distance measurements
- Very small light spot
- Large tilt angle

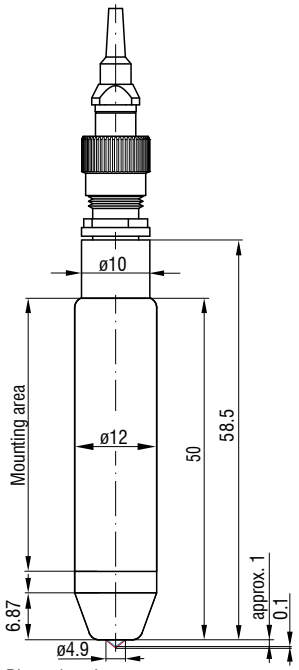


Model		IFS2407-0.1	IFS2407-0.1(001)	IFS2407-0.8
Measuring range		0.1 mm	0.1 mm	0.8 mm
Start of measuring range	approx.	1 mm	1 mm	5.9 mm
Resolution	Static [1]	< 1 nm	< 1 nm	< 9 nm
	Dynamic [2]	< 6 nm	< 6 nm	< 75 nm
Linearity [3]	Displacement and distance	< ±0.04 µm	< ±0.04 µm	< ±0.2 µm
	Thickness	-	-	< ±0.4 µm
Light spot diameter		3 µm	4 µm	6 µm
Maximum measuring angle [4]		±48°	±48°	±30°
Numerical aperture (NA)		0.80	0.70	0.50
Min. target thickness [5]		0.005 mm	0.005 mm	0.04 mm
Target material		reflective, diffuse as well as transparent surfaces (e.g. glass)		
Connection		pluggable optical fiber via FC socket; for cable type and cable length, see accessories		
Mounting		Radial clamping (mounting adapter see accessories)		
Temperature range	Storage	-20 °C ... +70 °C		
	Operation	+5 °C ... +70 °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)		IP65 (front)		
Material		Stainless steel housing, glass lenses		
Weight [6]		approx. 36 g	approx. 36 g	approx. 40 g
Special features		Sensor with high numerical aperture	Light-intensive sensor	-

[1] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat
[2] RMS noise relates to mid of measuring range (1 kHz)
[3] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery
[4] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values
[5] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.
[6] Sensor weight without optical fiber

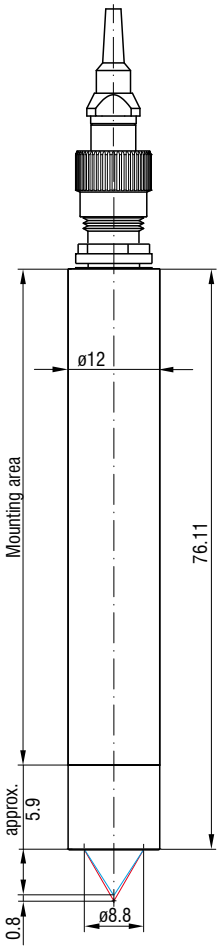
Dimensions

IFS2407-0,1
IFS2407-0,1(001)



Dimensions in mm

IFS2407-0,8



Dimensions in mm

High precision sensors for displacement and thickness measurements
confocalDT IFS2407

- Compact sensors from ø12 mm
- Submicron resolution
- For one-sided thickness measurements
- Suitable for precise distance measurements
- Very small light spot
- Large tilt angle

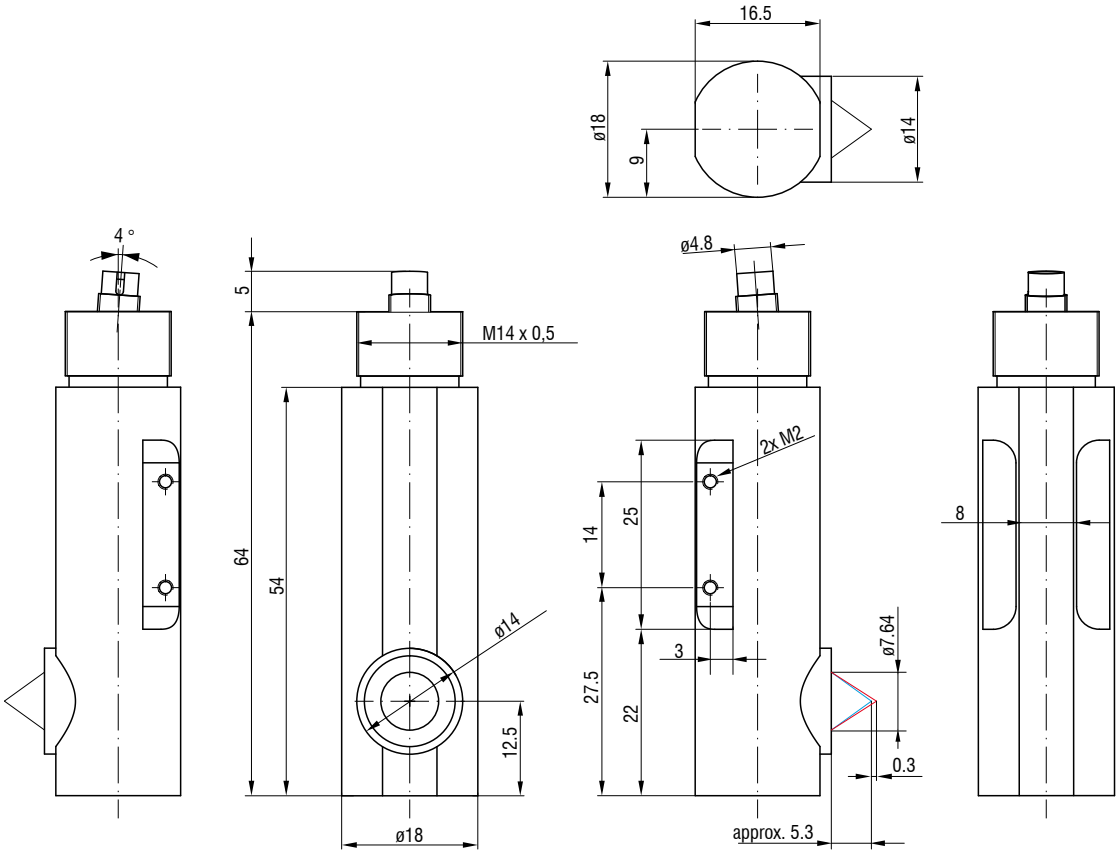


Model		IFS2407/90-0.3	IFS2407-1.5	IFS2407-3	IFS2407-6
Measuring range		0.3 mm	1.5 mm	3 mm	6 mm
Start of measuring range	approx.	5.3 mm	17 mm	28 mm	32 mm
Resolution	Static [1]	< 3 nm	< 3 nm	< 7 nm	< 8 nm
	Dynamic [2]	< 20 nm	< 36 nm	< 63 nm	< 90 nm
Linearity [3]	Displacement and distance	< ±0.10 µm	< ±0.16 µm	< ±0.45 µm	≤ ±0.9 µm
	Thickness	< ±0.20 µm	< ±0.4 µm	< ±0.9 µm	≤ ±1.8 µm
Light spot diameter		6 µm	5.5 µm	9 µm	14 µm
Maximum measuring angle [4]		±27°	±43° (±70°) [5]	±30°	±23°
Numerical aperture (NA)		0.50	0.70	0.53	0.45
Min. target thickness [6]		0.015 mm	0.075 mm	0.15 mm	0.3 mm
Target material		reflective, diffuse as well as transparent surfaces (e.g. glass)			
Connection		pluggable optical fiber via FC socket; for cable type and cable length, see accessories			
Mounting		Mounting holes (2x M2)	Radial clamping (mounting adapter see accessories)		
Temperature range	Storage	-20 °C... +70 °C			
	Operation	+5 °C... +70 °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)		IP65 (front)			
Material		Stainless steel housing, glass lenses	Aluminum housing, glass lenses		
Weight [7]		approx. 30 g	approx. 800 g	approx. 550 g	approx. 350 g

[1] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat
[2] RMS noise relates to mid of measuring range (1 kHz)
[3] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery
[4] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values
[5] Maximum sensor measuring angle up to which a usable signal can be achieved on diffusely reflecting metallic surfaces, with accuracy decreasing toward the limit values
[6] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.
[7] Sensor weight without optical fiber

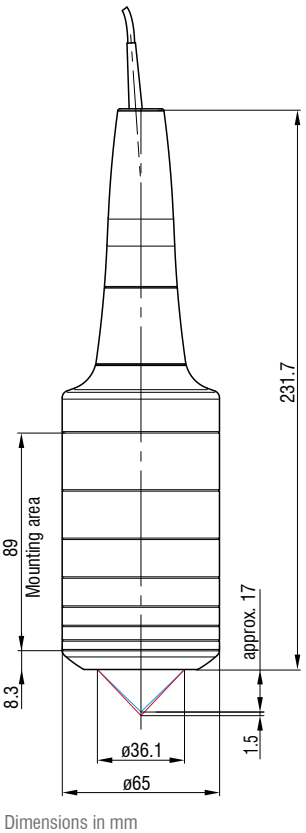
Dimensions

IFS2407/90-0,3



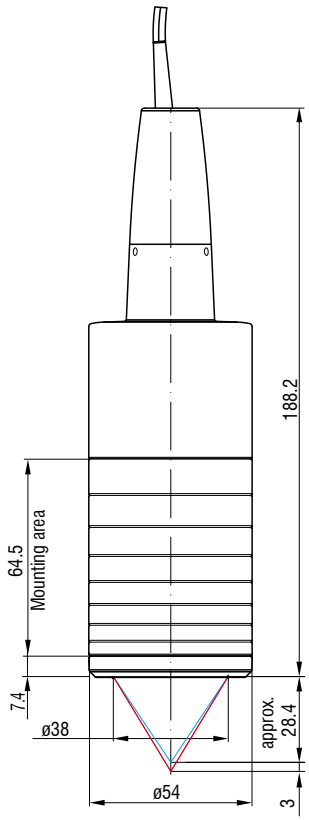
Dimensions in mm

IFS2407-1,5



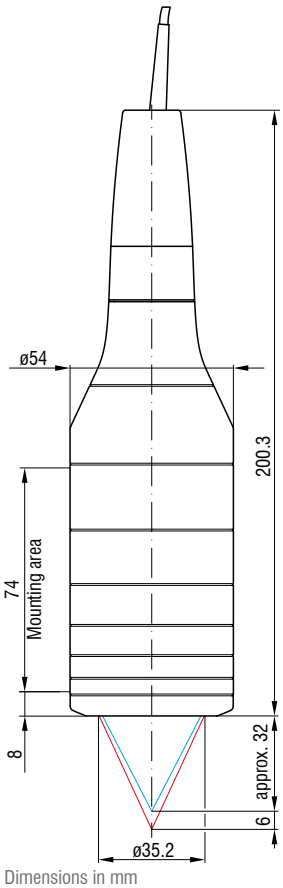
Dimensions in mm

IFS2407-3



Dimensions in mm

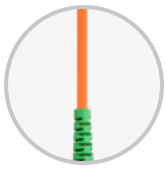
IFS2407-6



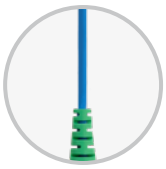
Dimensions in mm

Accessories
Optical fibers and vacuum feedthrough

All Micro-Epsilon confocal controllers are compatible with any IFS240x sensor.
The IFS2402 and IFS2403 sensors already have integrated optical fibers.



Standard optical fibers



Optical fibers suitable for drag chains



Protective hose for mechanical stress



Robot-compatible optical fibers



Vacuum / UHV version
HT version

Sensor-specific optical fibers [1]		IFS2404 Measuring ranges 2 /4	IFS2404 Measuring ranges 1/3/6/18	IFS2405	IFS2406	IFS2407	IFS2407-HT
C2404-x	with FC/APC and E2000/APC connectors; fiber core diameter 20 µm (0.3 m, 2 m, 3 m, 5 m, custom lengths up to 50 m)	✔ [2]	⊘	⊘	⊘	⊘	⊘
C2401-x	with FC/APC and E2000/APC connectors (3 m, 5 m, 10 m, customer-specific length up to 50 m)	⊘	✔	✔	✔	✔	⊘
Other versions:							
C2401/PT3-x	Optical fiber with protective hose for mechanical stress (3 m, 5 m, 10 m, customer-specific length up to 50 m)						
C2401-x(01)	Optical fiber core diameter 26 µm (3 m, 5 m, 15 m)						
C2401-x(10)	Drag-chain suitable optical fiber (3 m, 5 m, 10 m)						
C2401-x(20)	Robot-suitable optical fiber (3 m, 5 m, 10 m)						
C2400-x	2x FC/APC connectors (3 m, 5 m, 10 m, customer-specific length up to 50 m) [5]	⊘	✔	✔	✔	✔	⊘
Other versions:							
C2400/PT-x	Optical fiber with protective hose for mechanical stress (3 m, 5 m, 10 m, customer-specific length up to 50 m) [5]						
C2400/PT-x-Vac	Optical fiber with protective hose suitable for use in vacuum (3 m, 5 m, 10 m, customer-specific length up to 50 m) [5]						
C2407-x	with DIN plug and E2000/APC (0.3 m, 2 m, 3 m, 5 m)	⊘	⊘	⊘	⊘	✔ [3]	⊘
C2404/PT3-x/UHV	Optical fiber with protective hose in a vacuum-compatible design (0.8 m, 1 m, custom lengths up to 50 m) [4] [5]	✔	⊘	⊘	⊘	⊘	✔
C2404/PT3-xHT/UHV	Optical fiber with protective hose, vacuum-compatible design, and rated up to 200 °C (2 m, custom lengths up to 50 m) [4] [5]	⊘	⊘	⊘	⊘	⊘	✔

[1] Bending radius: static 30 mm, dynamic 40 mm
[2] The IFS2404-2 and IFS2404/90-2 sensors come standard with a 2-meter cable.
For the IFS2404-2(001) and IFS2404/90-2(001) sensors, use the C2401-x(01) cable. It has a standard length of 3 meters.
[3] Only IFS2407/90-0,3
[4] Bending radius: static 60 mm, dynamic 60 mm
[5] Cannot be plugged directly into the controller. An FC/FC coupler or C2405 + C2401-x vacuum feedthrough is required

Sensor cable extension

CE2402 cable with 2x E2000/APC connectors

CE2402-x	Sensor cable extension (3 m, 10 m,13 m, 30 m, 50 m)
CE2402/PT3-x	Sensor cable extension with protective hose for mechanical stress (3 m, 10 m, customer-specific length up to 50 m)

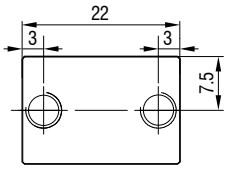
Light source accessories

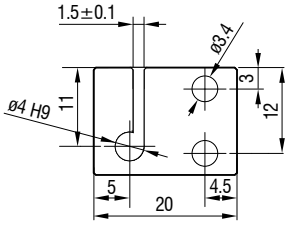
IFL2422/LED	Lamp module for IFC2422 and IFC2466
IFL24x1/LED	Lamp module for IFC2421 and IFC2465

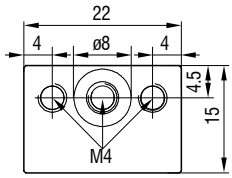
Accessories
Mounting adapter

Sensor mounting adapter

MA2402 for 2402 sensors



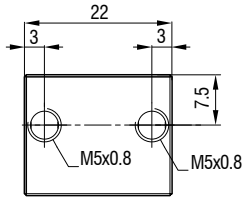


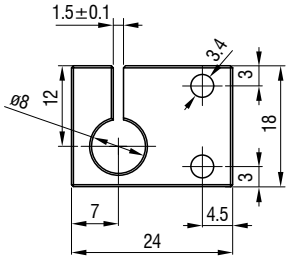


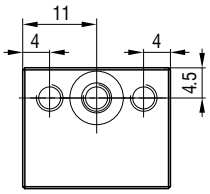


Sensor mounting adapter

MA2403 for IFS2403 sensors



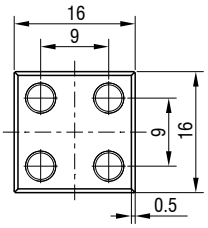


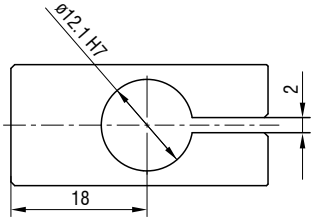


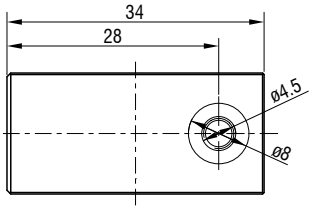


Sensor mounting adapter

MA2404-12 for IFS2404-2 / IFS2404/90-2 / IFS2404-4 / IFS2407-0,1 / IFS2407-0,8 sensors





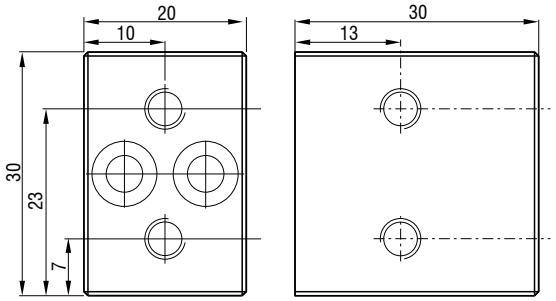




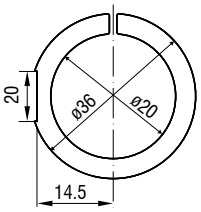
Sensor mounting adapter

MA2400 for IFS2404/IFS2405/IFS2406/IFS2407 sensors (consisting of mounting block and mounting ring)

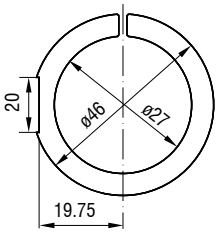
Mounting block



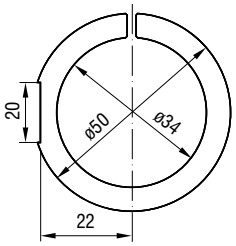
Mounting rings



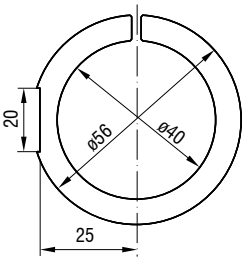
MA 2406-20 for sensors
IFS2406-2,5
IFS2406/90-2.5



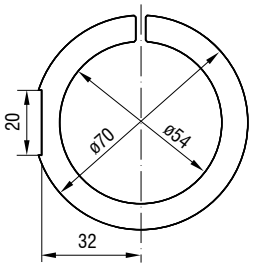
MA 2400-27 for sensors
IFS2404-1 / -3 / -6
IFS2405-0,3 / -1
IFS2406-3 / -10



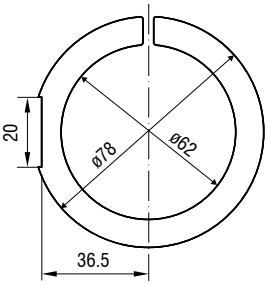
MA 2405-34 for sensors
IFS2405-3
IFS2404-18



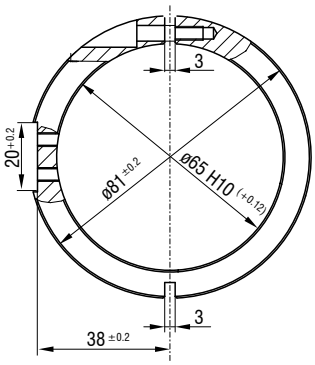
MA 2405-40 for sensor
IFS2405-6



MA 2405-54 for sensors
IFS2405-10
IFS2407-3 / -6



MA 2405-62 for sensors
IFS2405-28 / -30



MA2407-65 for sensor
IFS2407-1,5

Dimensions in mm,
not to scale.



Accessories
Mounting adapter for individual sensors

- Manual adjustment mechanism for easy and fast adjustment
- Optimal sensor alignment for best possible measurement results
- Ideally suitable for machine integration



Particularly for high resolution sensors with a small inclination angle, perpendicular installation is required. The JMA-xx mounting adapter enables fine alignment of the sensor to the target via the simple adjustment mechanism. This makes it easy to compensate for minor mounting deviations or tilted measuring objects.

- 1 JMA-xx
- 1 Sensor holder for smaller diameters (not with JMA-27)
- 1 Hexagon screwdriver for positioning
- Setup guide

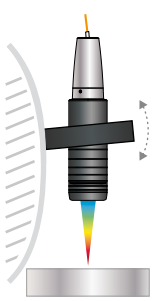
Scope of supply

Model		JMA-08	JMA-12	JMA-20	JMA-27
Tilting range	X	±4° (continuously adjustable)			
	Y	±4° (continuously adjustable)			
Shifting range	X	±2 mm (continuously adjustable)			
	Y	±2 mm (continuously adjustable)			
Shock (DIN EN 60068-2-27)		15 g / 6 ms on XYZ axis, 1000 shocks each			
Vibration (DIN EN 60068-2-6)		2 g / 20 ... 500 Hz in XYZ axis, 10 cycles each			
Adjustment mechanism		Screw setting mechanism via M3x0.25 screw with hexagon socket 1.5			
Mounting		2x 2 mounting holes for M4x1			
Sensor mounting		Radial clamping for ø 8 mm	Radial clamping for ø 12 mm	Radial clamping for ø 20 mm	Radial clamping for ø 27 mm
Compatibility		confocalDT: IFS2403 series	confocalDT: IFS2404-2 /-4 IFS2407-0,1 /-0,8	confocalDT: IFS2406-2,5/VAC	confocalDT: IFS2404-1 /-3 /-6 IFS2405-0.3 IFS2405-1 IFS2406-3 IFS2406-10

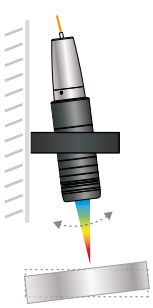
Application examples:

Alignment

Subsequent correction of the mounting position

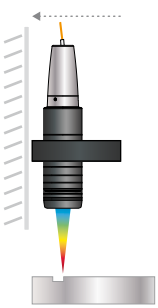


Compensates for incorrect target position



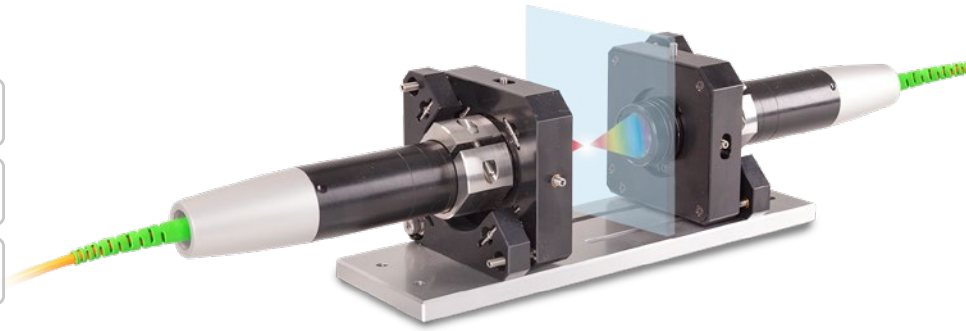
Positioning

Shifting the sensor to target area



Accessories
Mounting adapter for two-sided thickness measurements

- Optimal alignment of the optical axes enables high precision in two-sided thickness measurements
- Pre-assembled for easy installation and fast commissioning
- Ideally suitable for machine integration



For two-sided thickness measurements, the JMA-Thickness mounting adapter supports the alignment of the measuring points to one another. This means that the measuring points are arranged absolutely congruent to each other so that the sensors are positioned exactly on an optical axis. This prevents measurements at an offset and a reliable measurement result is achieved with the highest possible precision.

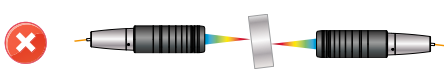
When delivered, the two mounting adapters are pre-mounted on a mounting plate and aligned with one another. This simplifies installation and the measuring system can be put into operation more quickly. After installation into the machine, the plate can be removed, if necessary.

Scope of supply

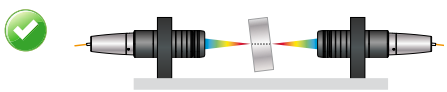
- 2 JMA-xx
- 1 JMP mounting plate
- 1 Hexagon screwdriver 1.5 mm
- 1 Allen wrench 2.5 mm
- 1 Allen wrench 3.0 mm
- 1 Setup guide
- Two optional reducing sleeves
  (depending on the package and the corresponding sensor)

Model JMA-Thickness	-08	-12	-20	-27
Shock (DIN EN 60068-2-27)	15 g / 6 ms on XYZ axis, 1000 shocks each			
Vibration (DIN EN 60068-2-6)	2 g / 20 ... 500 Hz in XYZ axis, 10 cycles each			
Adjustment mechanism	Screw setting mechanism via M3x0.25 screw with hexagon socket 1.5			
Sensor mounting	Radial clamping for ø 8 mm	Radial clamping for ø 12 mm	Radial clamping for ø 20 mm	Radial clamping for ø 27 mm
Compatibility	confocalDT: IFS2403 series	confocalDT: IFS2404-2 /-4 IFS2407-0,1 /-0,8	confocalDT: IFS2406-2,5/VAC	confocalDT: IFS2404-1 / -3 / -6 IFS2405-0.3 IFS2405-1 IFS2406-3 IFS2406-10

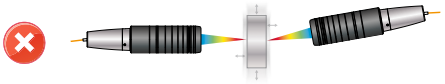
More precision with two-sided thickness measurements



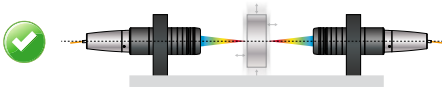
Without JMA-Thickness:
Measurement error with tilted target



With JMA-Thickness:
Measures exactly at the opposite position



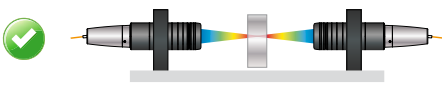
Without JMA-Thickness:
Incorrect thickness measurement with vibrations



With JMA-Thickness:
Sensors are on one optical axis –
provides stability even with vibrating objects



Without JMA-Thickness:
Sensors positioned incorrectly – no thickness measurement possible



With JMA-Thickness:
Optimal positioning support – object visible for both sensors

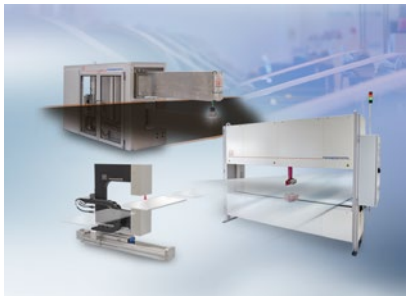
Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



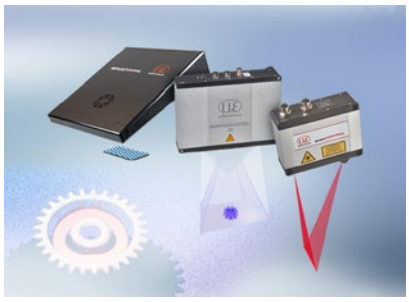
Measuring and inspection systems for metal strips, plastics and rubber



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

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