



More Precision

confocalDT // Confocal chromatic sensor system



Confocal chromatic displacement and thickness measurements



confocalDT



Highest precision in confocal chromatic displacement and thickness measurements



The confocalDT sensor range stands for the highest precision and dynamics in confocal chromatic measurement technology. A large number of sensors and different interfaces can be used in versatile measurement tasks, e.g., in the semiconductor industry, glass industry, medical engineering and machine building.

Largest sensor portfolio for precise measurements




The right sensor for every application. Whether for use at high temperatures up to 200 °C, in confined spaces, on curved surfaces, or for nanometer-precise measurements in the semiconductor industry, confocalDT sensors are available in various series for a wide range of applications.

-  Robust sensors and industrial-grade fiber optics
-  For distance, thickness and multi-peak measurements

-  Vacuum-suitable sensors and accessories (up to UHV)
-  High temperature up to 200 °C

-  Accurate measurement with nanometer resolution
-  Miniature measurement spot

- Ethernet**
- RS422**
- Analog**
- EtherNet/IP**
- PROFINET**
- EtherCAT**








-  Configuration via web interface
-  Adjustable measuring rate up to 30 kHz
-  Fast surface compensation



Overview

confocalDT

Introduction	from p. 4
Measuring principle and special features	4 - 5
Absolute distance measurement / precise thickness measurement	6 - 7
Application examples	8 - 11
New products	12 - 15

Confocal chromatic sensors		Measuring ranges (mm)	Light direction	Measurement mode	from p. 16
confocalDT IFS2402	Miniature sensors	0.5 1.5 3.5		Distance measurement	16 - 17
confocalDT IFS2403	Hybrid sensors	0.4 1.5 4 10		Distance measurement	18 - 19
confocalDT IFS2404	Compact sensors and sensors for series applications	1 2 3 4 6 18		Distance and thickness measurements	20 - 23
confocalDT IFS2405	Precise universal sensors	0.3 1 3 6 10 28 30		Distance and thickness measurements	24 - 27
confocalDT IFS2406	Sensors for special requirements	2.5 3 10		Distance and thickness measurements	28 - 29
confocalDT IFS2407-xHT/VAC	High temperature sensors for environments up to 200 °C	0.8 2 4		Distance and thickness measurements	30 - 31
confocalDT IFS2407	High precision sensors	0.1 0.3 0.8 1.5 3 6		Distance and thickness measurements	32 - 35

Confocal chromatic controllers		Channels	Measuring rate	from p. 36
confocalDT IFC2411 / IFC2412	Compact controllers for industrial series applications	1 or 2	up to 8 kHz	36 - 39
confocalDT IFC2416 / IFC2417	Compact controllers for precise and fast inline processes	1 or 2	up to 25 kHz	40 - 43
confocalDT IFC242x	Confocal universal controllers for industrial applications	1 or 2	up to 10 kHz	44 - 45
confocalDT IFC246x	Light-intensive controllers for high speed measurements	1 or 2	up to 30 kHz	46 - 47

Confocal chromatic compact systems		Measuring ranges (mm)	Measurement mode	from p. 48
confocalDT IFD2410	Sensor system with integrated controller	1 3 6	Distance and thickness measurements	48 - 51
confocalDT IFD2415	High performance sensor system with integrated controller	1 3 10	Distance, thickness and multi-layer measurements	52 - 55

Connection possibilities and accessories	from p. 56
Connection possibilities	56 - 57
Accessories	58 - 67

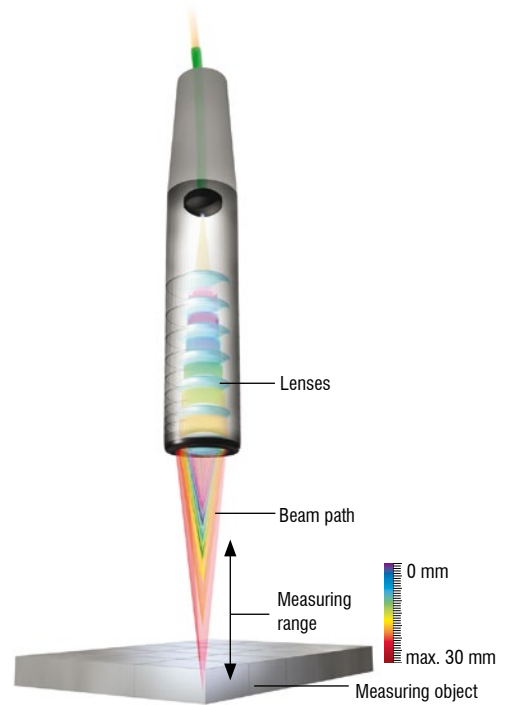
Measuring principle and special features

confocalDT

The confocal chromatic measuring principle

Polychromatic white light is focused onto the target surface by a multi-lens optical system. The special lens arrangement splits the white light into monochromatic wavelengths by controlled chromatic aberration. To each wavelength, a specific distance is assigned by factory calibration.

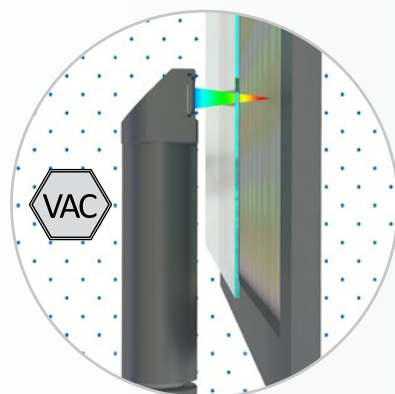
Only the wavelength that is focused exactly on the target is used for the measurement. An optical arrangement images the light reflected onto a light-sensitive sensor element. This sensor element detects the corresponding spectral color and evaluates it. In the case of multi-peak measurements, several distance points are evaluated accordingly.



Next generation: compact, vacuum-compatible and thermally stable up to 200 °C

The new confocal chromatic high-temperature sensors set standards for measurements in demanding environments. For the first time, the Micro-Epsilon portfolio includes optical sensors that can withstand temperatures up to 200 °C – with maximum measurement accuracy. Thanks to their compact design, various measuring ranges and 90° beam path, these sensors are ideal for applications with limited installation space. Their low-outgassing design also makes them suitable for use up to ultra-high vacuum (UHV).

More details from p. 30.



Ready for vacuum

The confocalDT sensors consist of passive components and do not emit any heat.

For use in vacuum, special sensors, cables and other accessories are available.

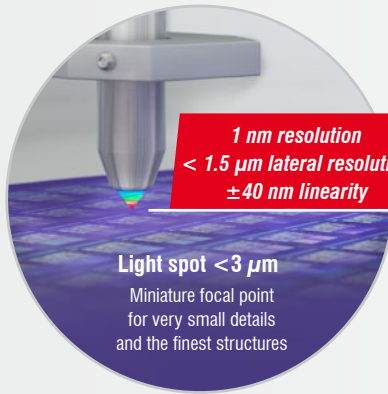
More details from p. 59.



Compact sensors for confined installation spaces

The compact design with a diameter from 4 mm enables integration in confined spaces.

With the 90° models, the required installation depth is again significantly reduced.



1 nm resolution
< 1.5 μm lateral resolution
± 40 nm linearity

Light spot < 3 μm
 Miniature focal point
 for very small details
 and the finest structures

Miniature light spot for high lateral resolution

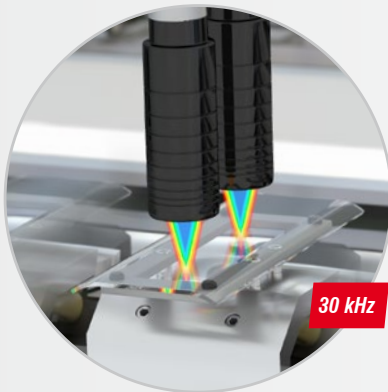
The confocalDT sensors are available with different aperture angles. A large aperture angle with a high numerical aperture (NA number) enables a small light spot (X-Y resolution) as well as a high Z-axis resolution, allowing the smallest details to be detected with high precision. The size of the light spot remains almost constant over the entire measuring range.



± 70°

Large measuring angle – ideal for curved and structured surfaces

The confocalDT IFS sensors offer a large measuring angle up to 48° on shiny surfaces. Therefore, curved and structured surfaces can be detected reliably to generate stable signals. With the IFS2407-1.5 sensor, measurement angles of up to ±70° are even possible on diffusely reflective metallic surfaces.



30 kHz

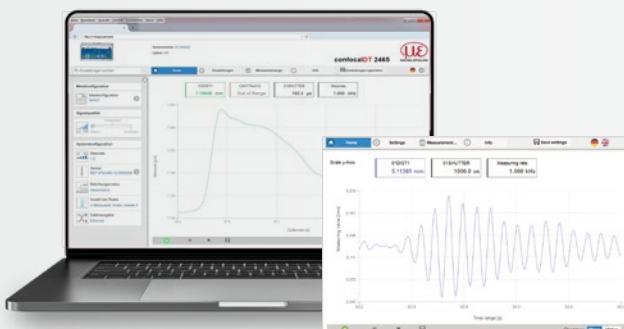
High measuring rate for dynamic measurement tasks

The confocalDT systems offer high measuring rates for highly dynamic measurement tasks. The controller dynamically regulates the exposure of the CCD line. This exposure control compensates for color and reflectivity changes of the measuring object at high measuring rates.



Robust optical fibers for all applications

Depending on the application, the confocalDT IFS sensors can be combined with different optical fibers. From standard optical fibers to versions suitable for use in drag chains, and optical fibers with protective hose for increased mechanical stress. For automated processes, robot-compatible fiber-optic cables are available. Special versions for vacuum and UHV applications are also available. More details from p. 58.



Measurement chart

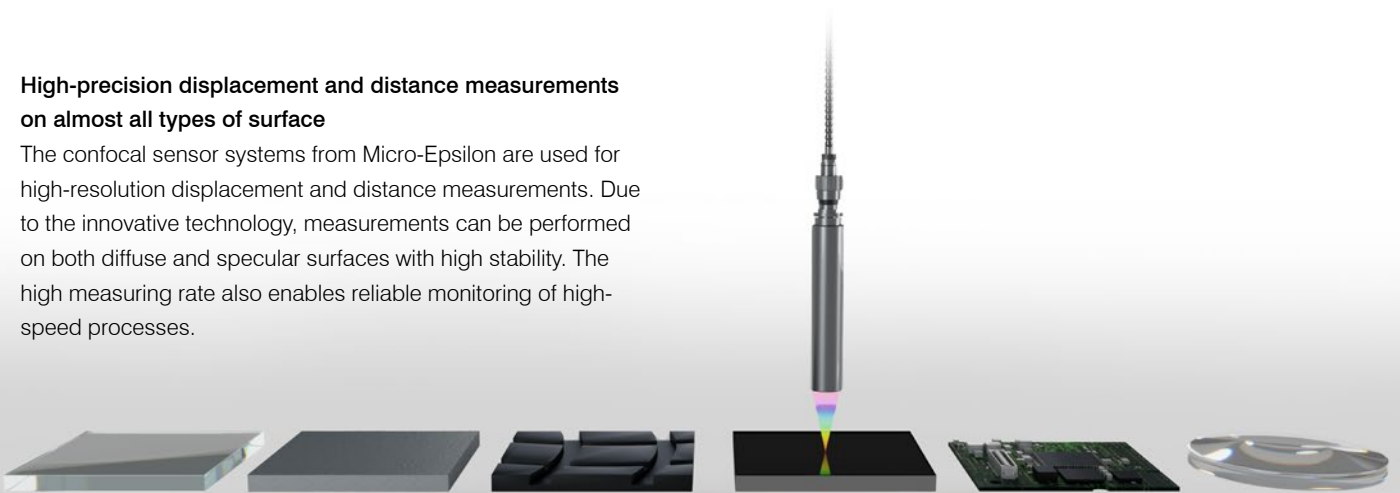
Simple operation via web interface

Setup and configuration of the controller and sensors are handled in a user-friendly web interface via Ethernet connection. No additional software is required. For thickness measurements, materials are stored in an editable materials database.

Absolute distance measurement confocalDT

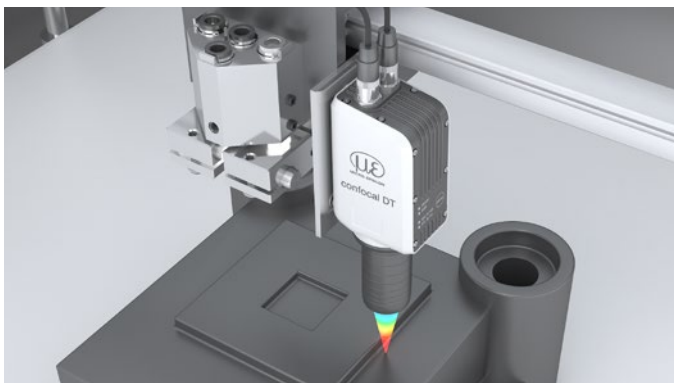
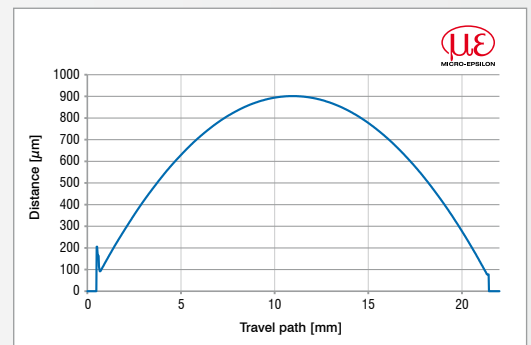
High-precision displacement and distance measurements on almost all types of surface

The confocal sensor systems from Micro-Epsilon are used for high-resolution displacement and distance measurements. Due to the innovative technology, measurements can be performed on both diffuse and specular surfaces with high stability. The high measuring rate also enables reliable monitoring of high-speed processes.



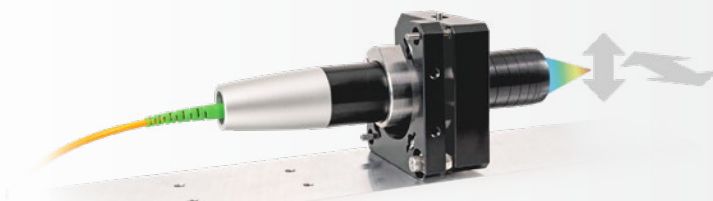
Distance measurement on transparent objects

High-precision distance measurement is required for contour measurement or positioning of glass lenses. The confocalDT sensors detect curved surfaces with nanometer resolution. In addition, the high measuring rate enables the high-speed detection of transparent targets.



High precision distance control

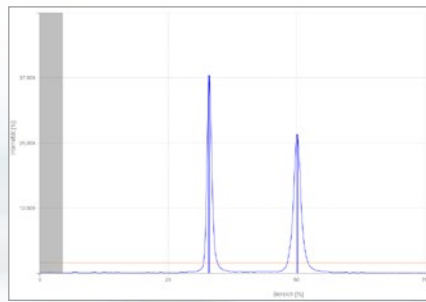
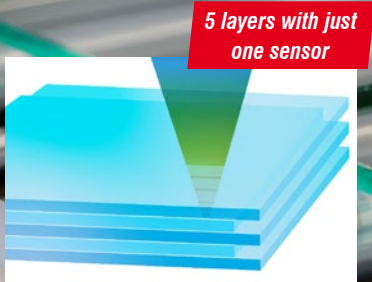
In 3D printing of complex components as well as in PCB printing, precise positioning with submicrometer accuracy is essential. Here, confocal sensors are used. They measure distance with maximum precision and at a high measuring rate, enabling reliable monitoring of dynamic printing processes.



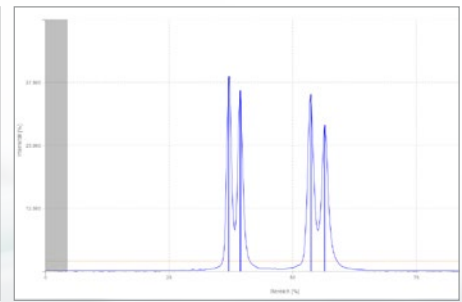
Mounting adapter for fine adjustment

To achieve orthogonal alignment of the sensor for high-precision distance measurements, a mounting adapter is available for fine adjustment.

Precise thickness measurement confocalDT



Thickness measurement signal



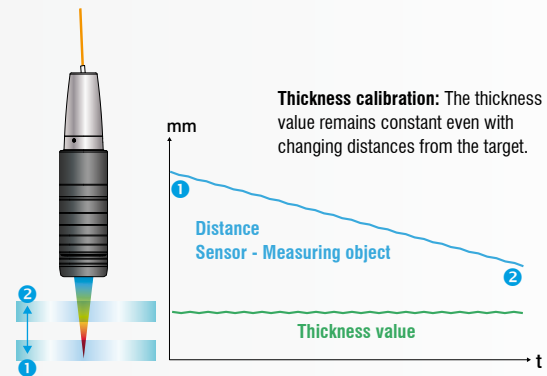
Signal with multi-layer thickness measurements (max. 6 peaks)

Micron precision in thickness measurements of transparent objects

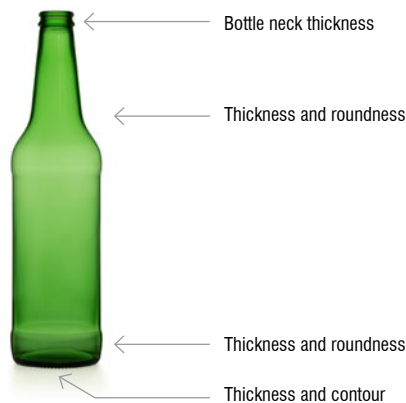
The confocalDT sensors enable the thickness measurement of transparent materials. A sensor detects the material thickness with micrometer precision. The integrated multi-layer measurement allows for the thickness of multi-layered objects, such as laminated glass, to be evaluated. In this process, the appropriate material can be selected to ensure precise thickness measurements for each layer.

Thickness calibration for precise thickness measurements regardless of distance

Changing material thickness and a varying distance between the target and the sensor produce faulty measurement values. Therefore, confocalDT controllers from Micro-Epsilon offer a thickness calibration feature. By selecting the appropriate target material, the distance-dependent error is automatically compensated for, ensuring the highest possible measurement accuracy.

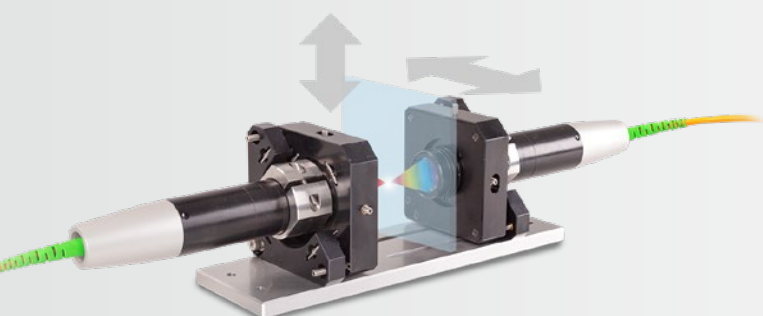


Thickness calibration: The thickness value remains constant even with changing distances from the target.



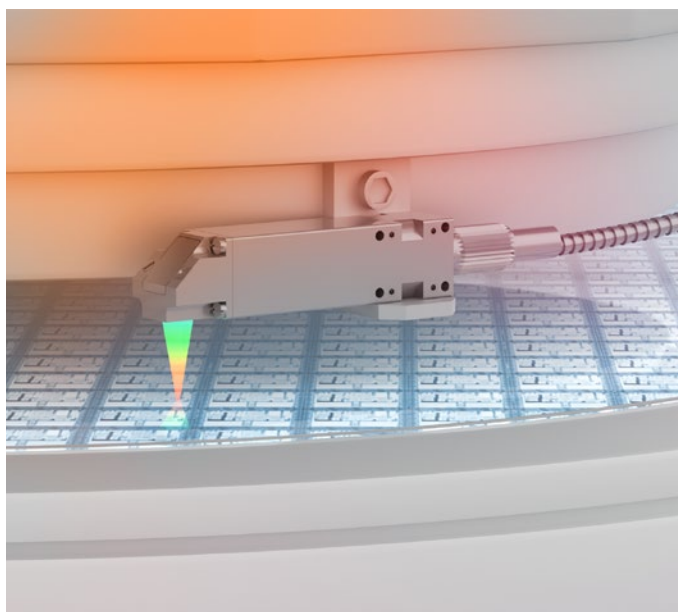
Glass thickness measurement

The confocalDT sensors are ideally suitable for one-sided thickness measurement of transparent objects such as bottles. Therefore, thicknesses between 5 μm and 30 mm can be measured. Even curved contours such as the bottle neck or bottom are detected precisely. This enables 100% inline end-of-line quality control.



Mounting adapter for two-sided thickness measurements

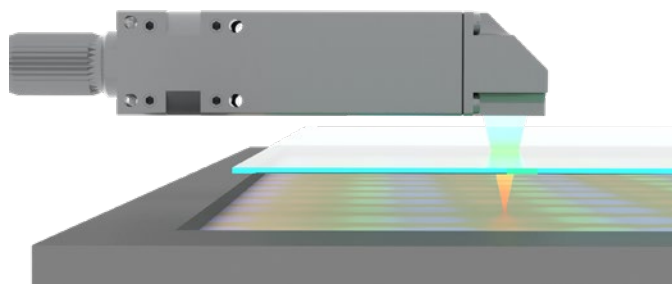
The JMA-Thickness mounting adapter is used for the congruent alignment of two sensors.



Distance measurement in wafer manufacturing

During wafer manufacturing, the numerous production steps generate mechanical stresses that can cause the wafer to warp or deform. This deformation is measured without contact and with maximum precision.

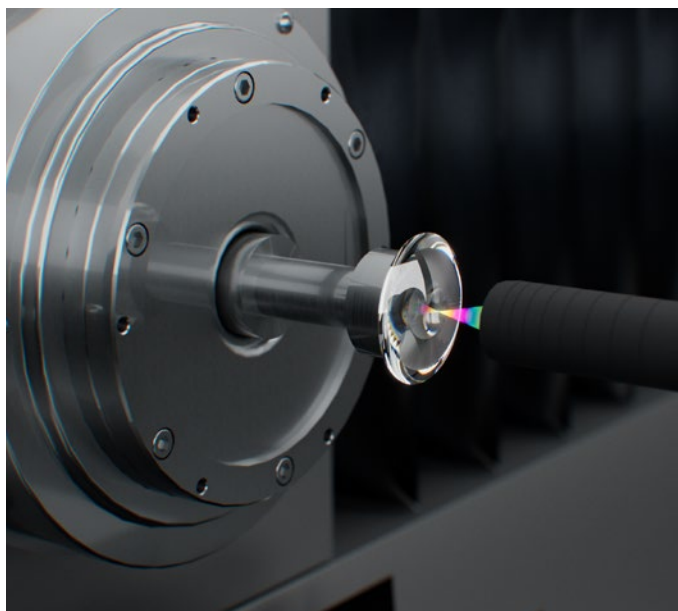
Recommended sensors: IFS2407-xHT/VAC



Positioning of glass masks

Confocal chromatic sensors monitor the gap between the mask and the glass. Thanks to the 90° design, the sensors can be integrated in an extremely space-saving manner.

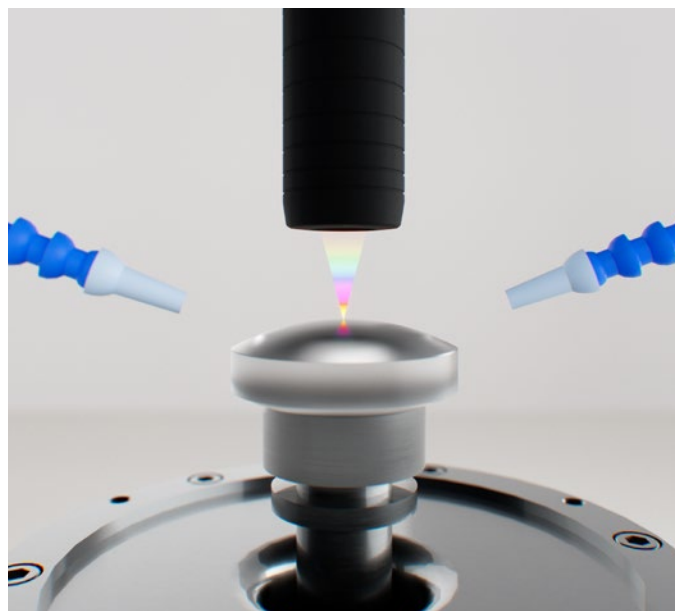
Recommended sensors: IFS2406/90-2,5



Measurement of lens profiles during the grinding process

A confocal chromatic sensor is used to measure the lens profile directly in the grinding machine without making contact. For this purpose, the sensor is pivoted into position. It measures the distance from the surface with extremely high resolution. Combined with axis/encoder data, this results in a precise profile section (radius/aspheric profile) for target/actual comparison.

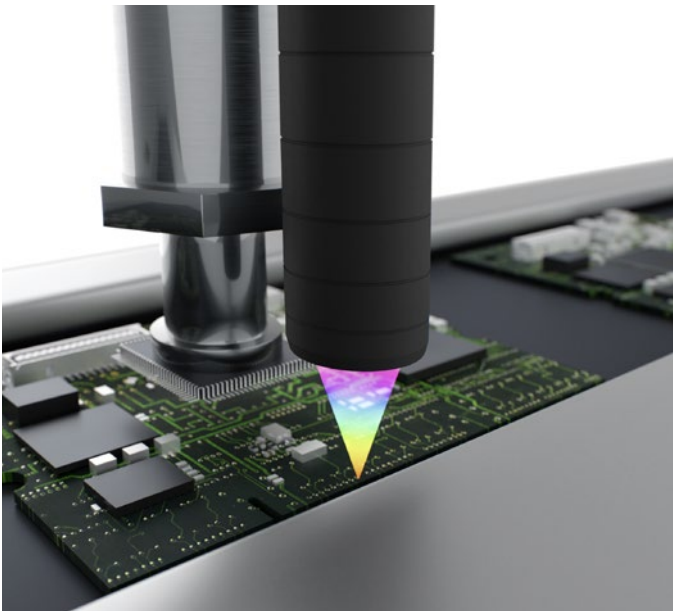
Recommended sensors: IFS2405-0.3



Polishing/grinding lenses

Simultaneous measurement of the center thickness of lenses with nanometer precision. By measuring both interfaces from one side, non-contact measurement is possible during the grinding process

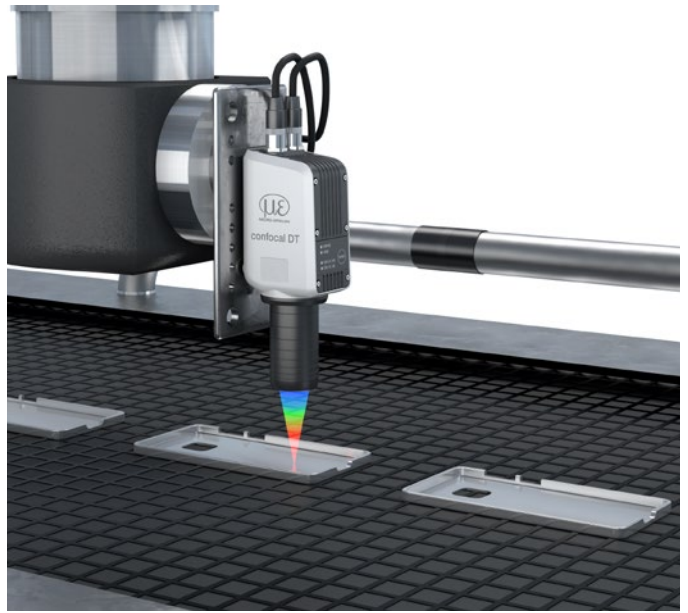
Recommended sensors: IFS2406-10



Automatic assembly of printed circuit boards

The IFS2404 sensor models are ideal for real-time position, orientation, and height monitoring in the automated placement of SMD components. This results in an efficient, automated process that delivers high quality with minimal rework.

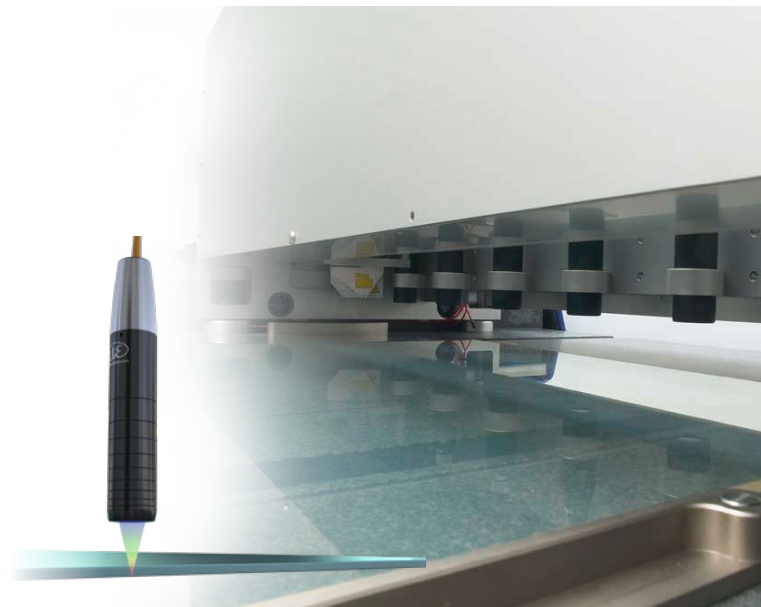
Recommended sensors: IFS2404-3



Coordinate measuring machines

The compact confocalDT 2410 / 2415 models have an integrated controller. Since no optical fiber is required, the space-saving sensor is particularly suitable for dynamic applications such as in measuring machines.

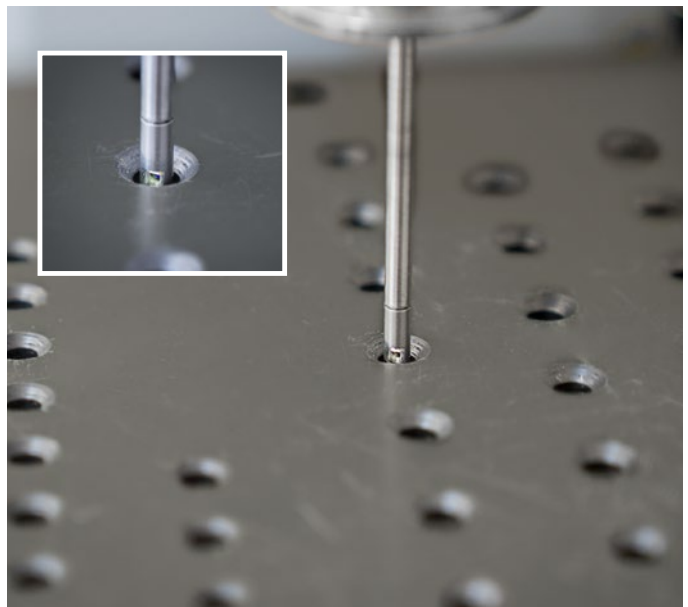
Recommended sensors: IFD2410 / IFS2415



Thickness measurement of displays and flat glass

Glass sheets for the production of displays require a homogeneous thickness profile. Confocal chromatic sensors from Micro-Epsilon determine the thickness from one side without making contact.

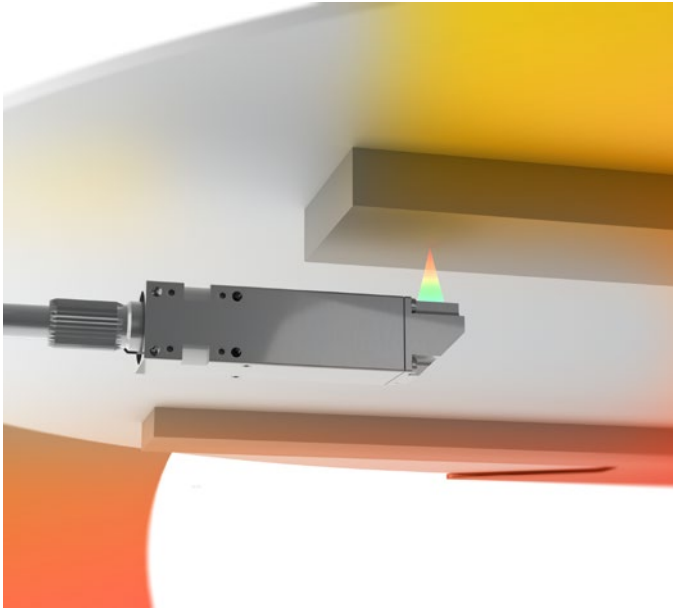
Recommended sensors: IFS2405



Confined installation space

Miniature sensors with a diameter of 4 mm are ideal for measurements in confined installation spaces, e.g., for the inspection of boreholes. Furthermore, the 90° version of these sensors enables measurement of the finest interior contours.

Recommended sensors: IFS2402



Measurement of the arm height position in vacuum

In vacuum process systems (e.g., semiconductor manufacturing), the Z-axis position (arm/gripper height) of handling or transfer arms must be precisely monitored to prevent collisions, maintain defined distances, and ensure repeatable positioning. The confocal chromatic HT sensors measure the arm height without contact and with high precision, even under challenging environmental conditions, such as temperatures up to 200 °C.

Recommended sensors: IFS2407-xHT/VAC



Thickness measurement of medical container glass

The wall and bottom thickness are crucial quality criteria for medical container glass. In order to determine the glass thickness of the bottom, confocal chromatic sensors from Micro-Epsilon are used. The thickness measurement is carried out using only one sensor without touching or damaging the glass.

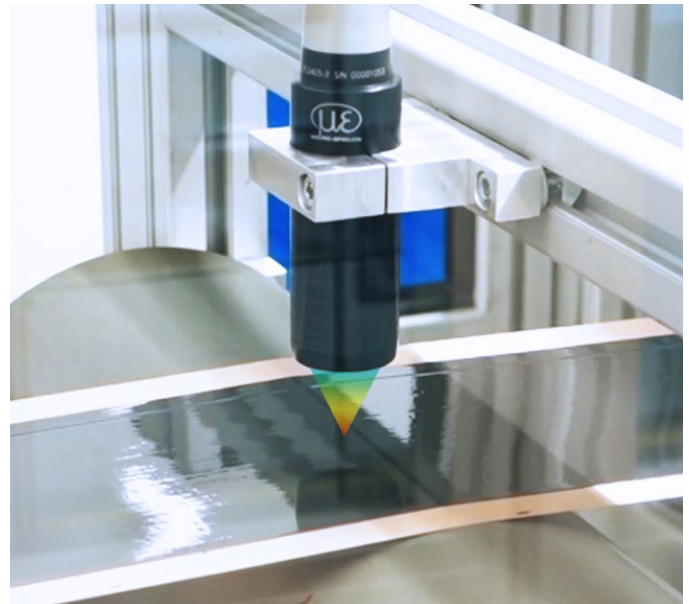
Recommended sensors: IFS2406-10



Measurement of turbine components

Micro-Epsilon's confocalDT sensors enable the precise measurement of turbine components through a combination of high dynamic response and angular stability. Reliable measurements are performed even on strongly inclined surfaces.

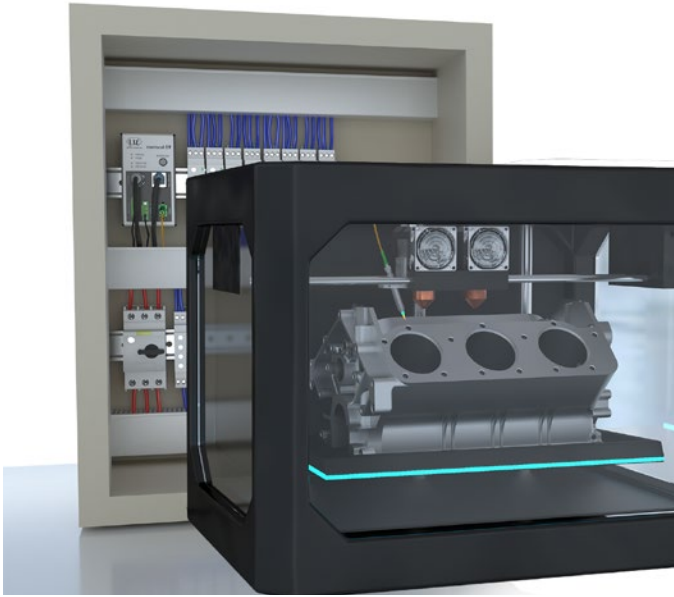
Recommended sensors: IFS2405-3



Measuring the thickness of wet layers

Confocal chromatic sensors from Micro-Epsilon monitor the coating thickness of battery film on wet materials. These sensors provide both extremely high resolution and high measuring rates. Installing multiple sensors next to each other enables simultaneous determination of coating homogeneity across the full strip width.

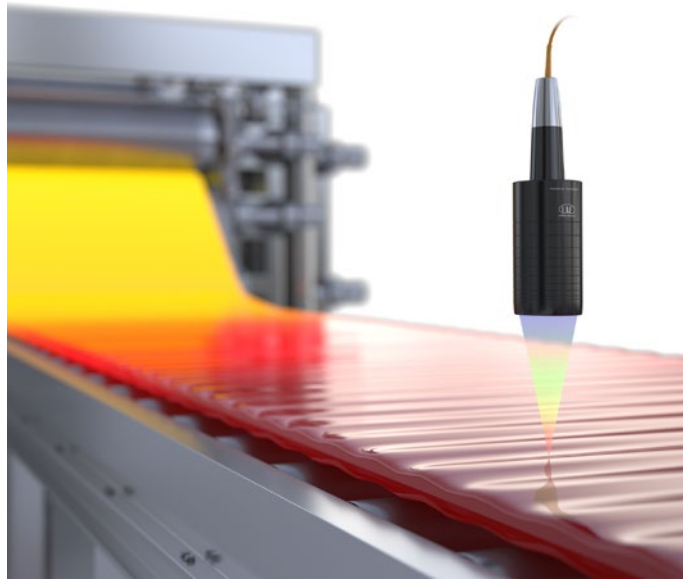
Recommended sensors: two IFS2405-6 with 2-channel controller



Displacement and distance in 3D printing machines

The compact controllers of the confocalDT 2411 series are used for distance control in industrial printers. The sensor system impresses with a measuring rate of up to 8 kHz and a resolution of up to 12 nm. Due to their compact design, the controllers can be integrated easily into the control cabinet.

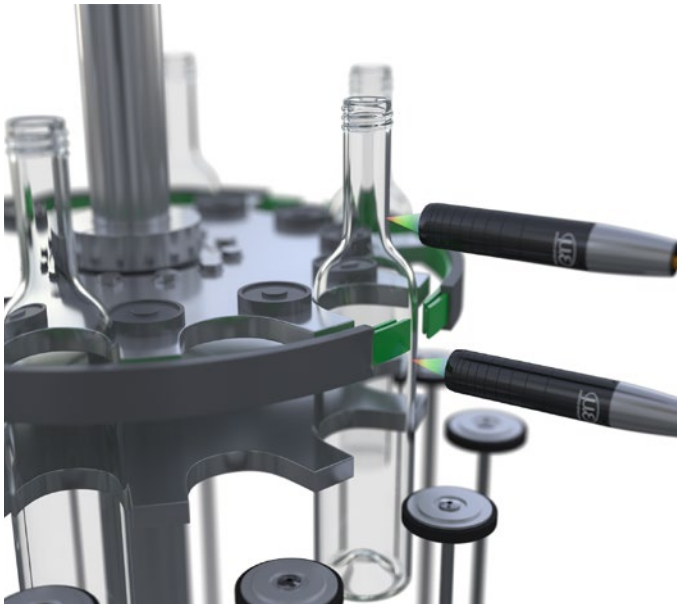
Recommended sensors: IFC2411 with IFS2404 Compact



Measuring on hot glass

Confocal sensors can also be used for the measurement of hot glass. The large offset distance allows for the sensor to be mounted from a safe distance to the hot glass.

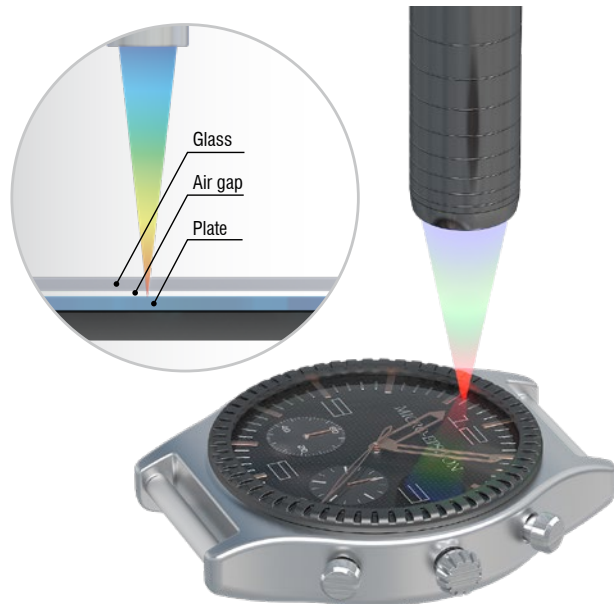
Recommended sensors: IFS2405-28



Thickness measurement on the star wheel

Fast dual-channel thickness measurement of glass bottles in the industrial production process.

Recommended sensors: IFS2406-10



Air gap measurement during the fitting of watch glass






Confocal chromatic sensors monitor the gap between the plate and the glass. Thanks to the 90° design, the sensors can be integrated in an extremely space-saving manner.

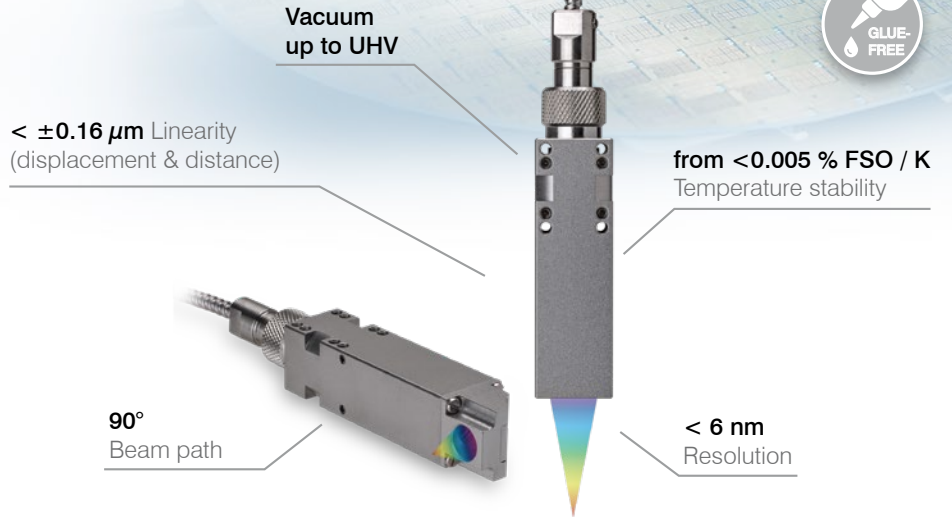
Recommended sensors: IFS2406/90-2,5

New products

confocalDT

NEW Confocal high temperature sensors for up to 200 °C
confocalDT IFS2407-xHT/VAC

-  Robust and compact sensor design
-  Submicron resolution
-  High temperature up to 200 °C
-  Suitable for vacuum applications up to UHV
-  For precise distance and thickness measurements



Compact, vacuum-compatible and thermally stable up to 200 °C

The new confocal chromatic sensors set benchmarks for distance and thickness measurements in challenging environments. For the first time, the Micro-Epsilon portfolio includes optical sensors that can withstand temperatures up to 200 °C – with maximum measurement accuracy.

Thanks to their compact design, these sensors are ideal for applications with very limited installation space. The innovative HT models are available in various measuring ranges and with a 90° beam path, and can be flexibly adapted to different installation situations.

By dispensing with organic adhesives, the high-temperature sensors made of stainless steel are low outgassing and therefore ideally suited for use up to ultra-high vacuum (UHV) – the ideal choice for measurement tasks in precision machine building and the semiconductor industry.

Maximum compatibility

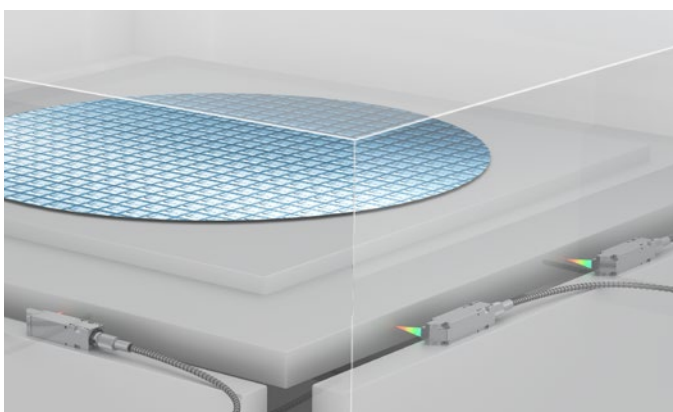
All confocalDT sensors are compatible with the IFC controllers. This enables measuring rates up to 30 kHz for fast and reliable process monitoring.

Versatile applications

Versatile designs enable the use in different industries such as the electronics and semiconductor industries, glass industry, medical technology and machine building.

Innovative technology

Their innovative technology enables these sensors to measure reliably even on diffuse and strongly reflective surfaces and under extremely challenging ambient conditions. The passive design of the confocalDT sensors avoids heat radiation into the environment. For vacuum applications, specially developed accessories are available.








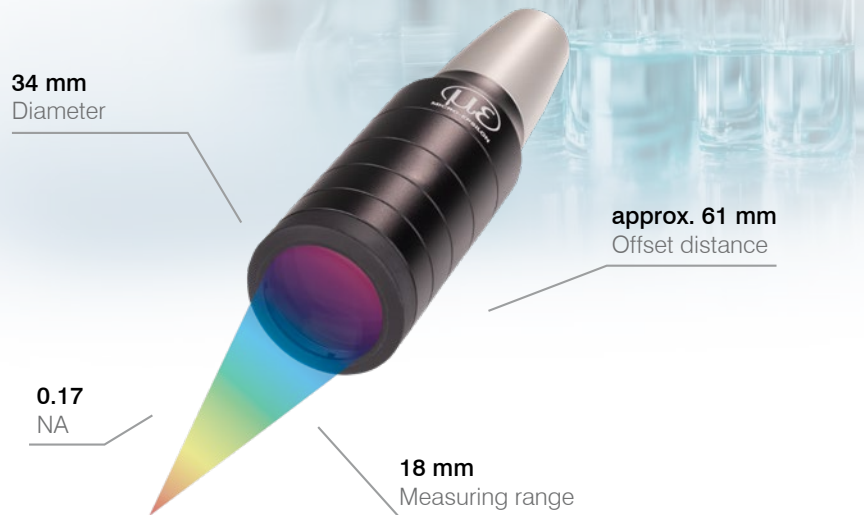
Accurate position detection of wafer tables in vacuum

More details from p. 30.

NEW

Confocal chromatic sensor with narrow measurement cone confocalDT IFS2404-18

-  Large measuring range
-  Large offset distance
-  Narrow light cone
-  Compatible with all confocalDT controllers
-  For precise distance and thickness measurements



Precise distance measurement on a wide range of surfaces

Micro-Epsilon's confocal chromatic sensors offer precise, non-contact distance measurement combined with an excellent price-performance ratio, and reliable results even on reflective, diffuse, and transparent surfaces. This makes them suitable for a wide range of applications, such as in optical metrology, precision manufacturing, the glass industry, and in laboratory and process environments.

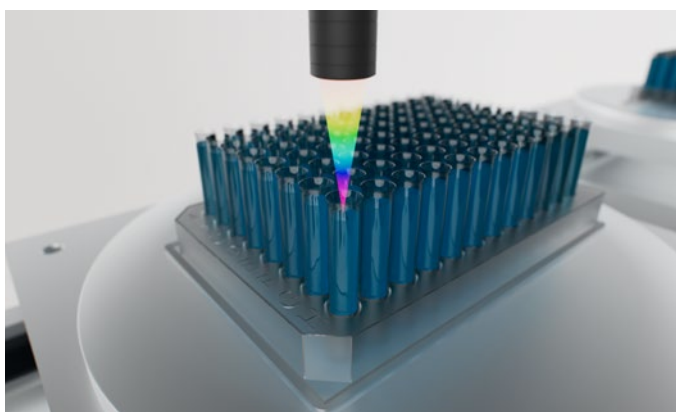
Large measuring range and offset distance

With the new IFS2404-18, we are expanding the IFS2404 series with a measuring range of 18 mm. The sensor combines a large offset distance with a sufficiently large measuring range to handle typical component and process variations. The measuring range starts at approx. 61 mm and covers 18 mm.

This combination is particularly advantageous for applications where space is limited, e.g., for level measurements in microtiter vessels or in narrow containers and openings. One key advantage is the optical design: the numerical aperture NA 0.17 produces a particularly narrow light cone. This means that measurements are also possible in confined spaces. With a maximum measuring angle of $\pm 9^\circ$, the system is less sensitive to tilted components and mounting deviations, which requires less readjustment.

Maximum compatibility

Just like all confocalDT sensors, the IFS2404-18 is also compatible with the IFC series controllers. This enables measuring rates up to 30 kHz, which is ideal for fast and reliable process monitoring.



Measurement in recesses

The narrow beam path enables the confocal sensors to measure inside recesses. With the confocal measuring principle, measurements on liquids are possible, e.g. for precise filling level control in trays.

More details from p. 22.

New products





confocalDT

NEW Compact confocal chromatic controllers for industrial series applications

The new IFC2412 and IFC2417 confocal controllers are now available as 2-channel versions of the ultra-compact IFC2411 and IFC2416 controllers. The IFC2412 has two channels with an adjustable measuring rate of 8 kHz and a submicrometer resolution of up to 1 nm. The IFC2417 with its two channels has a measuring rate of 25 kHz and is also able to perform multi-peak measurements with up to 5





layers. An active exposure regulation of the CCD line enables fast and reliable measurements on varying surfaces. Both controllers feature integrated interfaces such as Ethernet, EtherCAT and two analog outputs.

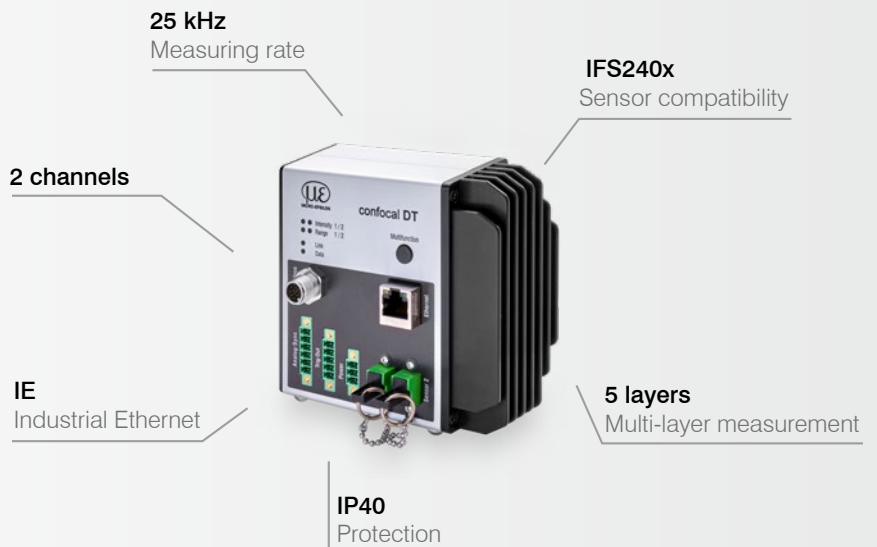
confocalDT IFC2411 / IFC2412

-  Most compact confocal controller on the market
-  Nanometer resolution for precise distance and thickness measurements
- INTERFACE** Flexible integration via Ethernet, RS422 or analog output (U/I)
-  Direct PLC connection due to Industrial Ethernet
- IP40** Robust aluminum housing (IP40)
-  Best price Excellent price-performance ratio



confocalDT IFC2416 / IFC2417

-  Nanometer resolution for highest precision
-  Ideal for extremely fast distance and thickness measurements up to 25 kHz
-  Multi-peak: up to 5 layers with one measurement
-  Best signal quality and stability due to high light intensity
- INTERFACE** Flexible integration via Ethernet, RS422 or analog output
- IP40** Compact design and robust IP40 aluminum housing



More details from p. 36.






NEW

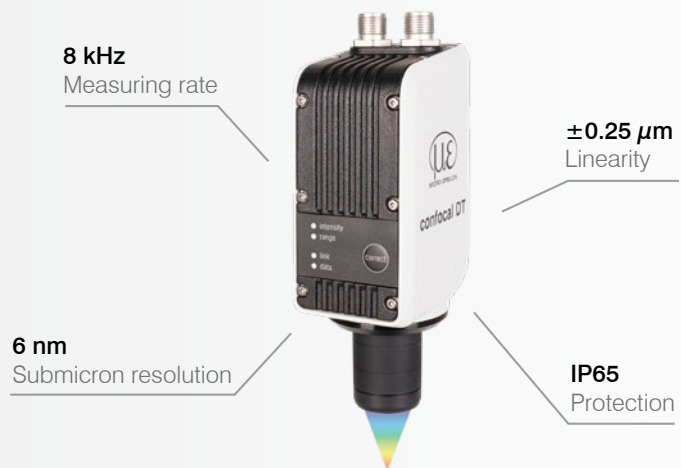
High performance sensor system with integrated controller
Now also with Ethernet

Micro-Epsilon's latest all-in-one sensor systems, the IFD2410 and IFD2415, are the best in their class worldwide. These handy systems are not only easy to operate and integrate, but also extremely powerful. These compact systems are particularly suitable for series-production machines and systems and have been equipped with the most important fieldbus interfaces (Industrial Ethernet) for this







purpose. An Ethernet interface was previously only available for setup and configuration. The IFD2410 and IFD2415 sensor systems are now also available with an integrated Ethernet interface for data output. This allows measurement data to be output with a higher resolution (32 bits) than with the RS422 interface (18 bits).

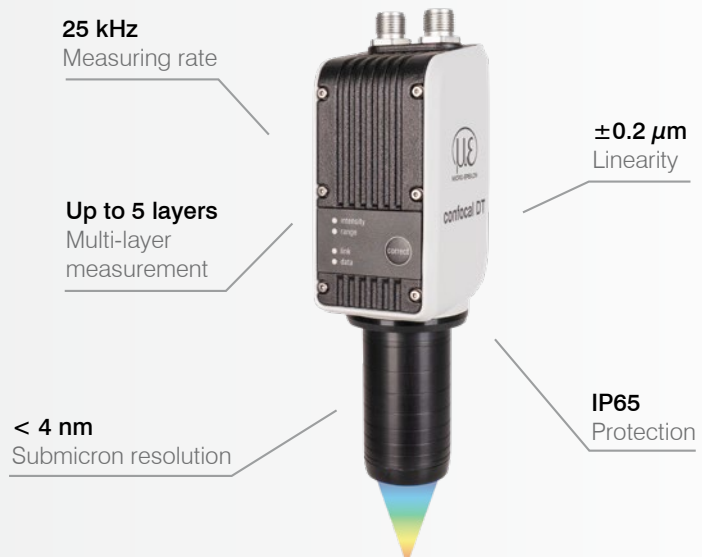
confocalDT IFD2410

-  All-in-One: sensor and controller in one compact housing (IP65)
-  Adjustable measuring rate up to 8 kHz
-  Simple integration without optical fibers
-  **INTERFACE** EtherCAT / PROFINET / EtherNet/IP / Ethernet / RS422 / Analog
-  Micron-precise measurement of distance and thickness



confocalDT IFD2415






-  All-in-One: sensor and controller in one compact housing (IP65)
-  Adjustable measuring rate up to 25 kHz
-  **INTERFACE** EtherCAT / PROFINET / EtherNet/IP / Ethernet / RS422 / Analog
-  Micron-precise measurement of distance and thickness
-  High precision distance and thickness measurements (5 layers)
-  Short exposure time due to high light intensity

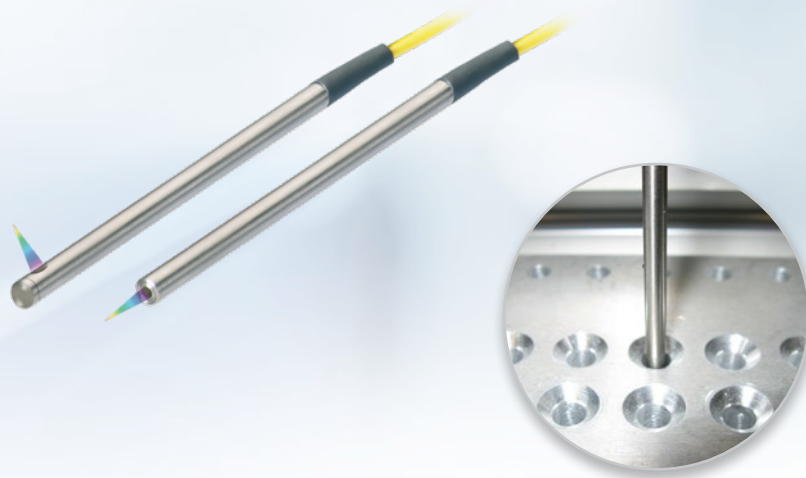


More details from p. 48.

Confocal chromatic miniature sensors

confocalDT IFS2402

-  Miniature sensors Ø4 mm with axial or radial beam path
-  Submicron resolution
-  Suitable for precise distance measurements
-  Small light spot
-  Ideal for confined installation spaces



Model		IFS2402-0.5	IFS2402-1.5	IFS2402/90-1.5	IFS2402-4	IFS2402/90-4
Measuring range		0.5 mm	1.5 mm	1.5 mm	3.5 mm	3.5 mm
Start of measuring range	approx.	1.7 mm	0.9 mm	2.5 mm ^[1]	1.9 mm	2.5 mm ^[1]
Resolution	Static ^[2]	< 8 nm	< 30 nm		< 50 nm	
	Dynamic ^[3]	< 48 nm	< 192 nm		< 480 nm	
Linearity ^[4]	Displacement and distance	< ±0.15 µm	< ±0.60 µm		< ±1.40 µm	
Light spot diameter		10 µm	20 µm		20 µm	
Maximum measuring angle ^[5]		±27°	±5°		±3°	
Numerical aperture (NA)		0.40	0.20		0.10	
Target material		reflective, diffuse as well as transparent surfaces (e.g. glass) ^[6]				
Connection		integrated optical fiber 2 m with E2000/APC connector; extension up to 50 m; bending radius: static 30 mm, dynamic 40 mm				
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)		2g/ 20 ... 500 Hz on XY axis, 10 cycles each				
Protection class (DIN EN 60529)		IP64 (front)	IP64 (front)	IP40	IP64 (front)	IP40
Material		Stainless steel housing, glass lenses				
Weight		approx. 186 g (incl. optical fiber)				

^[1] Start of measuring range measured from sensor axis

^[2] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat

^[3] RMS noise relates to mid of measuring range (1 kHz)

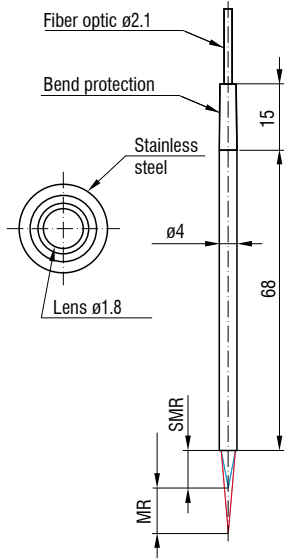
^[4] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery

^[5] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values

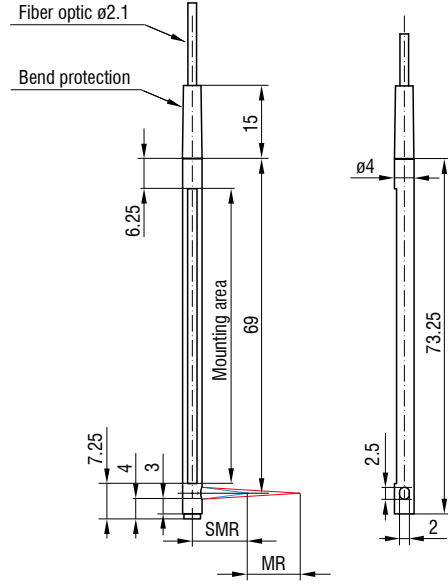
^[6] No thickness measurement possible. Distance measurement only possible if thickness of glass > measuring range. Measurements on metal only possible to a limited extent.

Dimensions
(in mm, not to scale)

IFS2402-x








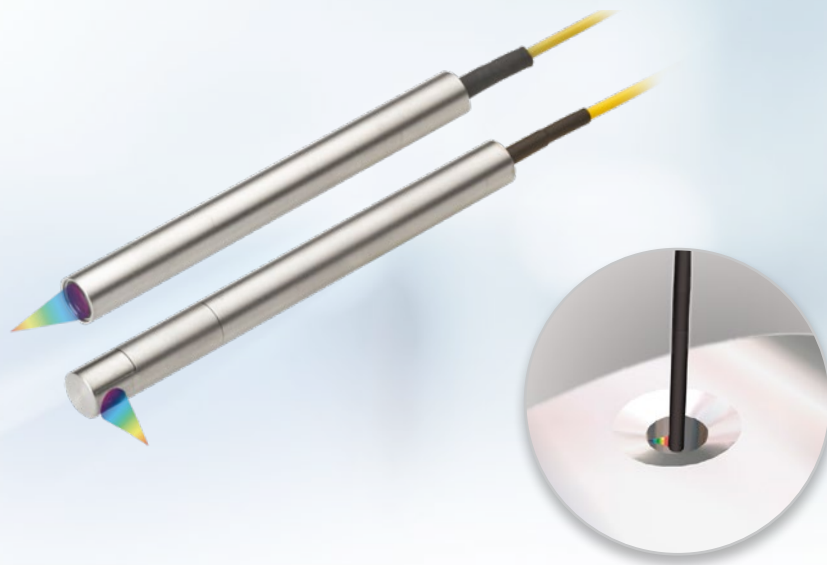
IFS2402/90-x



Confocal chromatic hybrid sensors

confocalDT IFS2403

-  Hybrid sensors $\varnothing 8$ mm with axial or radial beam path
-  Submicron resolution
-  Suitable for precise distance measurements
-  Small light spot
-  Ideal for confined installation spaces



Model		IFS2403-0.4	IFS2403-1.5	IFS2403/90-1.5	IFS2403-4	IFS2403/90-4	IFS2403-10	IFS2403/90-10
Measuring range		0.4 mm	1.5 mm	1.5 mm	4 mm	4 mm	10 mm	10 mm
Start of measuring range	approx.	2.5 mm	8 mm	4.9 mm ^[1]	14.7 mm	12 mm ^[1]	11 mm	8.6 mm ^[1]
Resolution	Static ^[2]	< 8 nm	< 30 nm		< 50 nm		< 125 nm	
	Dynamic ^[3]	< 47 nm	< 186 nm		< 460 nm		< 950 nm	
Linearity ^[4]	Displacement and distance	< $\pm 0.12 \mu\text{m}$	< $\pm 0.45 \mu\text{m}$		< $\pm 1.6 \mu\text{m}$		< $\pm 4 \mu\text{m}$	
Light spot diameter		9 μm	15 μm		28 μm		56 μm	
Maximum measuring angle ^[5]		$\pm 20^\circ$	$\pm 16^\circ$		$\pm 6^\circ$		$\pm 6^\circ$	
Numerical aperture (NA)		0.50	0.30		0.15		0.15	
Min. target thickness ^[6]		0.06 mm	0.23 mm		0.6 mm		1.5 mm	
Target material		reflective, diffuse as well as transparent surfaces (e.g. glass)						
Connection		integrated optical fiber 2 m with E2000/APC connector; extension up to 50 m; bending radius: static 30 mm, dynamic 40 mm						
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)		2g/ 20 ... 500 Hz on XY axis, 10 cycles each						
Protection class (DIN EN 60529)		IP64 (front)						
Material		Stainless steel housing, glass lenses						
Weight		approx. 200 g (incl. optical fiber)						

^[1] Start of measuring range measured from sensor axis

^[2] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat

^[3] RMS noise relates to mid of measuring range (1 kHz)

^[4] All data at constant ambient temperature (25 \pm 1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery

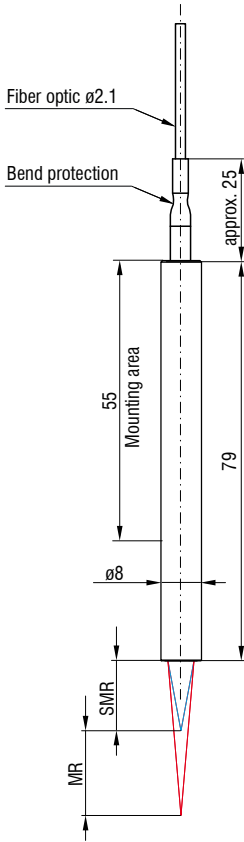
^[5] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values

^[6] Pane of glass with refractive index $n = 1.5$ in mid of measuring range

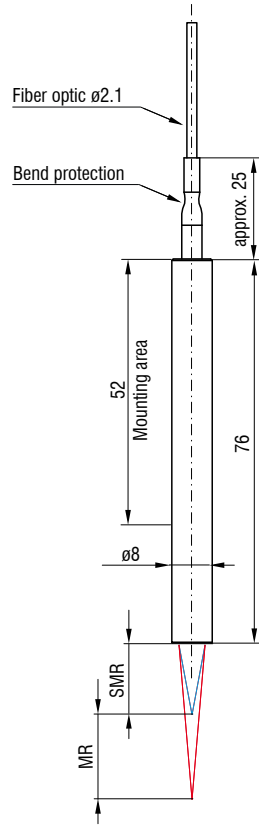
Dimensions

(in mm, not to scale)

IFS2403-0,4 / IFS2403-10



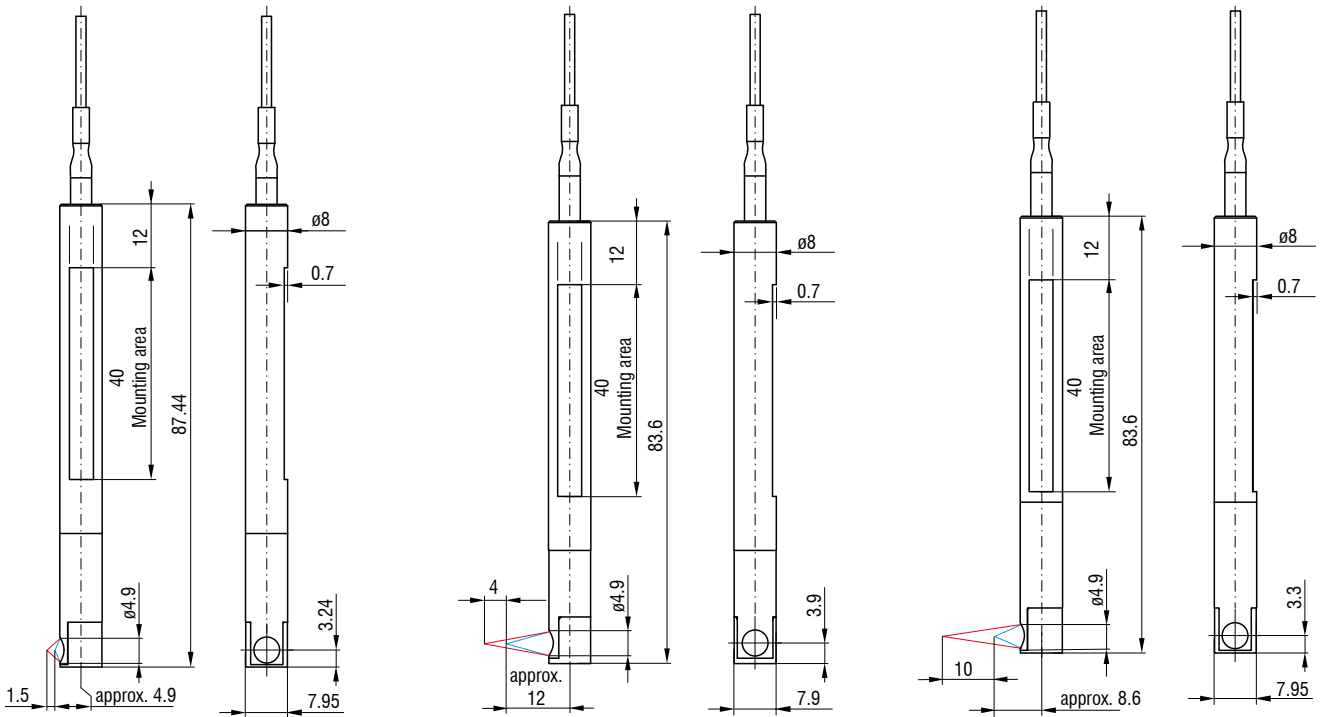
IFS2403-1,5 / IFS2403-4



IFS2403/90-1,5






IFS2403/90-4

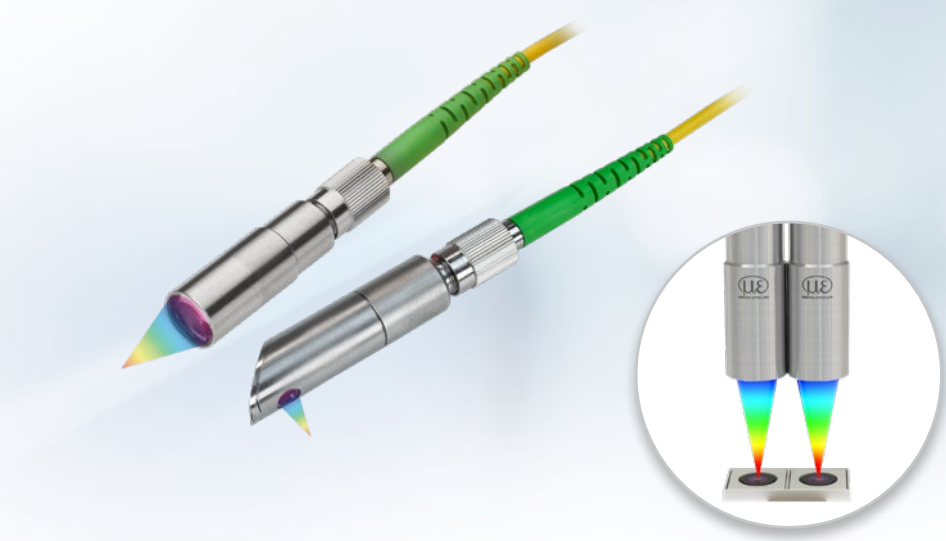
IFS2403/90-10



Confocal chromatic compact sensors

confocalDT IFS2404

-  Compact sensors ø12 mm
-  Submicron resolution
-  For one-sided thickness measurements
-  Suitable for precise distance measurements
-  Small light spot



Model		IFS2404-2	IFS2404/90-2	IFS2404-2(001)	IFS2404/90-2(001)	IFS2404-4
Measuring range		2 mm	2 mm	2 mm	2 mm	4 mm
Start of measuring range	approx.	14 mm	9.6 mm ^[1]	14 mm	9.6 mm ^[1]	14.7 mm
Resolution	Static ^[2]		< 20 nm			< 40 nm
	Dynamic ^[3]		< 125 nm			< 250 nm
Linearity ^[4]	Displacement and distance		< ±0.5 μm			≤ ±1 μm
	Thickness		< ±1 μm			≤ ±2 μm
Light spot diameter			10 μm			10 μm
Maximum measuring angle ^[5]			±12°			±12°
Numerical aperture (NA)			0.25			0.20
Min. target thickness ^[6]			0.1 mm			0.2 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)		2g/ 20 ... 500 Hz on XY axis, 10 cycles each				
Protection class (DIN EN 60529)		IP64 (front)				
Material		Stainless steel housing, glass lenses				
Weight ^[7]		approx. 20 g	approx. 30 g	approx. 40 g	approx. 40 g	approx. 20 g

^[1] Start of measuring range measured from sensor axis

^[2] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat

^[3] RMS noise relates to mid of measuring range (1 kHz)

^[4] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery

^[5] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values

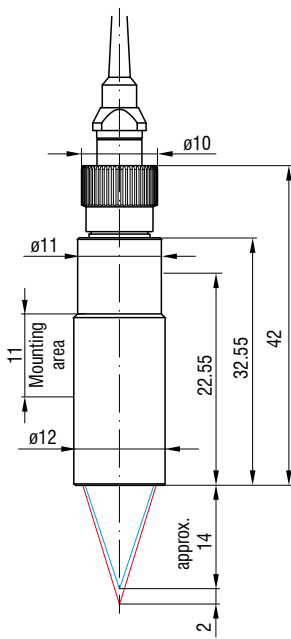
^[6] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.

^[7] Sensor weight without optical fiber

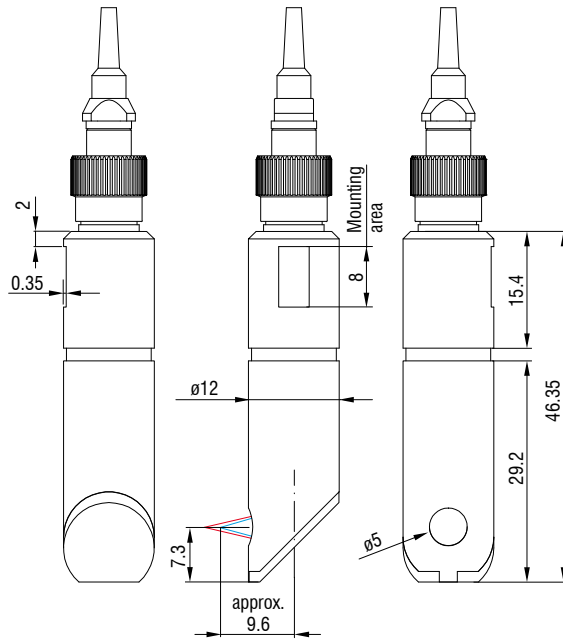
Dimensions

(in mm, not to scale)

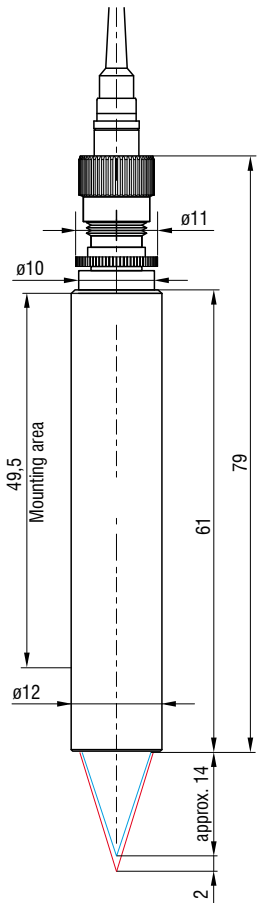
IFS2404-2



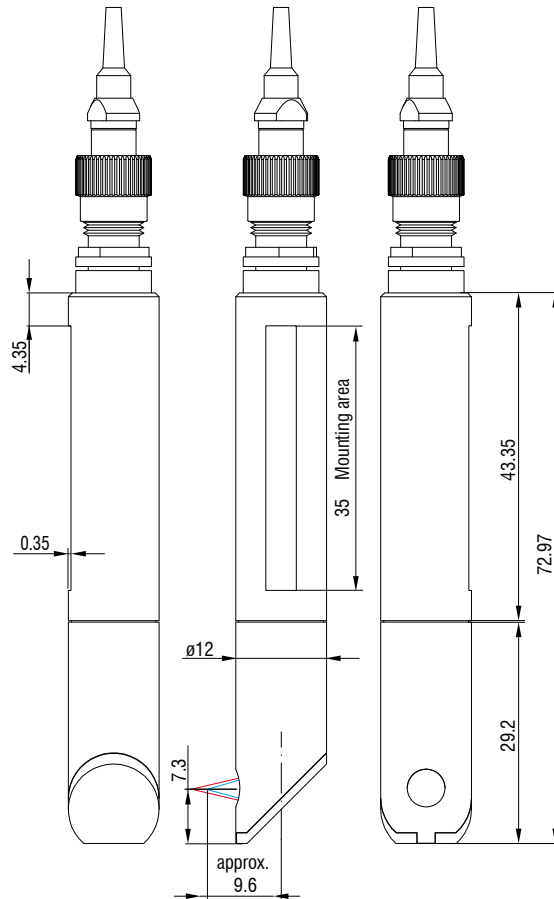
IFS2404/90-2



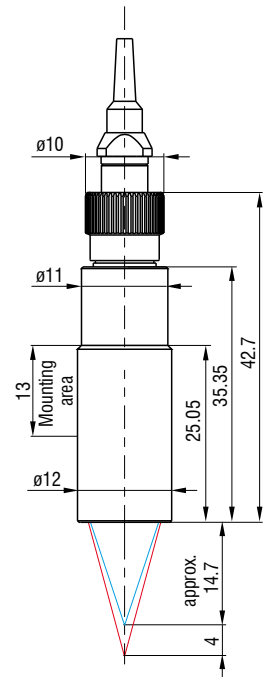
IFS2404-2(001)



IFS2404/90-2(001)








IFS2404-4



Confocal chromatic sensors for series applications

confocalDT IFS2404

-  Submicron resolution
-  For one-sided thickness measurements
-  Suitable for precise distance measurements
-  Small light spot
-  Excellent price-performance ratio



Model		IFS2404-1	IFS2404-3	IFS2404-6	IFS2404-18
Measuring range		1 mm	3 mm	6 mm	18 mm
Start of measuring range	approx.	15 mm	25 mm	35 mm	61 mm
Resolution	Static ^[1]	< 6 nm	< 18 nm	< 40 nm	< 50 nm
	Dynamic ^[2]	< 50 nm	< 125 nm	< 250 nm	< 280 nm
Linearity ^[3]	Displacement and distance	< ±0.25 μm	< ±0.75 μm	< ±1.5 μm	< ±5.4 μm
	Thickness	< ±0.5 μm	< ±1.5 μm	< ±3 μm	< ±10.8 μm
Light spot diameter		12 μm	18 μm	24 μm	50 μm
Maximum measuring angle ^[4]		±25°	±19°	±10°	±9°
Numerical aperture (NA)		0.45	0.35	0.18	0.17
Min. target thickness ^[5]		0.05 mm	0.15 mm	0.3 mm	0.9 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 ... +70 °C			
	Operation	5 ... 70 °C			
Shock (DIN EN 60068-2-27)		15 g/ 6 ms in XY axis, 1000 shocks each			
Vibration (DIN EN 60068-2-6)		2g/ 20 ... 500 Hz on XY axis, 10 cycles each			
Protection class (DIN EN 60529)		IP64 (front)			
Material		Aluminum housing, glass lenses			
Weight ^[6]		approx. 100 g	approx. 100 g	approx. 100 g	approx. 150 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

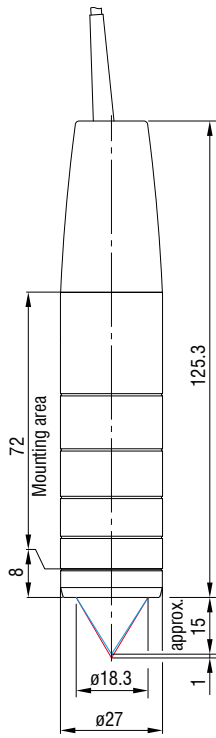
^[5] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.

^[6] Sensor weight without optical fiber

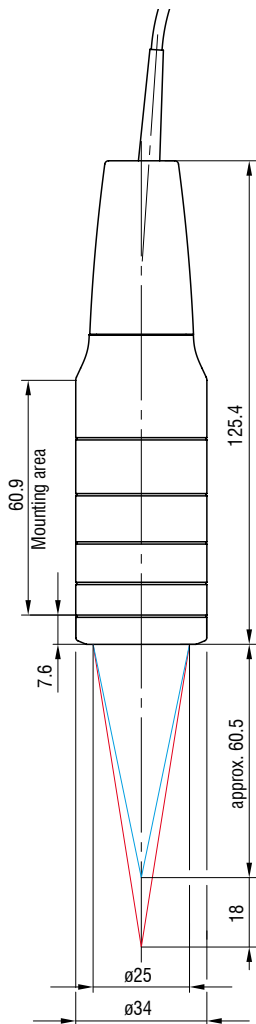
Dimensions

(in mm, not to scale)

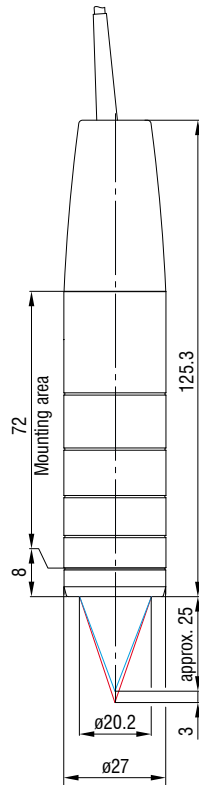
IFS2404-1



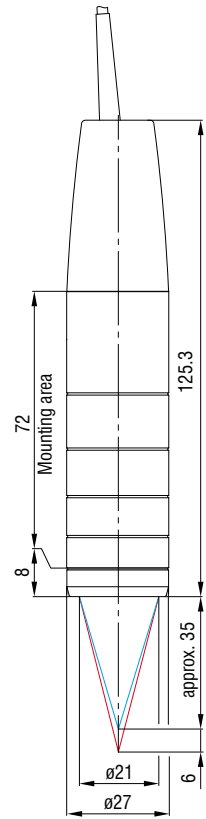
IFS2404-18









IFS2404-3

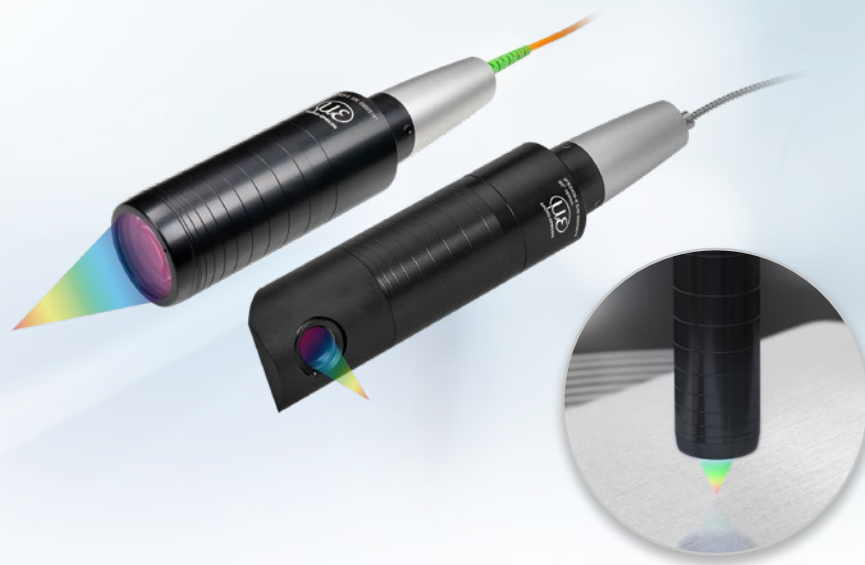


IFS2404-6



Precise universal sensors confocalDT IFS2405

-  Robust universal sensors for versatile applications
-  Submicron resolution
-  For one-sided thickness measurements
-  Suitable for precise distance measurements
-  Very small light spot
-  Large tilt angle



Model		IFS2405-0.3	IFS2405-1	IFS2405-3	IFS2405-6	IFS2405/90-6
Measuring range		0.3 mm	1 mm	3 mm	6 mm	6 mm
Start of measuring range	approx.	6 mm	10 mm	20 mm	63 mm	41 mm ^[1]
Resolution	Static ^[2]	< 2 nm	< 4 nm	< 8 nm	< 17 nm	
	Dynamic ^[3]	< 18 nm	< 38 nm	< 80 nm	< 190 nm	
Linearity ^[4]	Displacement and distance	< ±0.09 μm	< ±0.2 μm	< ±0.6 μm	< ±1.2 μm	
	Thickness	< ±0.18 μm	< ±0.4 μm	< ±1.2 μm	< ±2.4 μm	
Light spot diameter		6 μm	8 μm	9 μm	31 μm	
Maximum measuring angle ^[5]		±34°	±30°	±24°	±10°	
Numerical aperture (NA)		0.60	0.55	0.45	0.22	
Min. target thickness ^[6]		0.015 mm	0.05 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		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)		2g/ 20 ... 500 Hz on XY axis, 10 cycles each				
Protection class (DIN EN 60529)		IP64 (front)				
Material		Aluminum housing, glass lenses				
Weight ^[7]		approx. 140 g	approx. 125 g	approx. 225 g	approx. 260 g	approx. 315 g

^[1] Start of measuring range measured from sensor axis

^[2] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat

^[3] RMS noise relates to mid of measuring range (1 kHz)

^[4] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery

^[5] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values

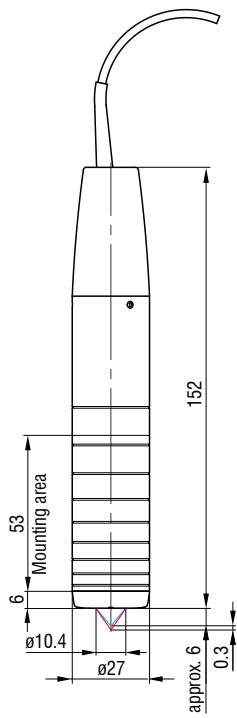
^[6] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.

^[7] Sensor weight without optical fiber

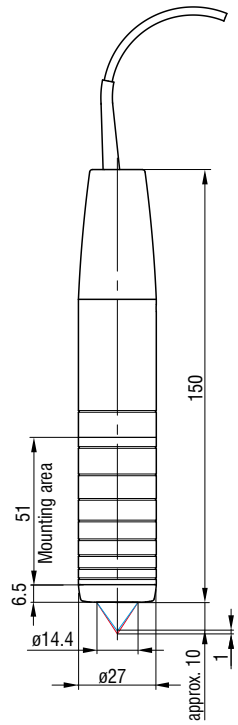
Dimensions

(in mm, not to scale)

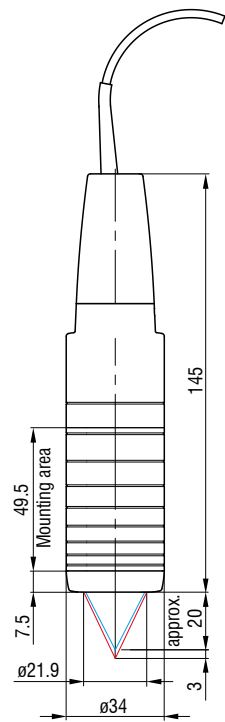
IFS2405-0.3



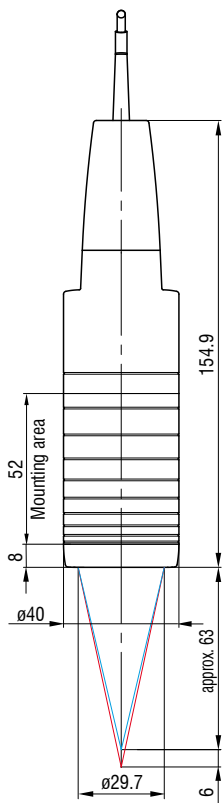
IFS2405-1



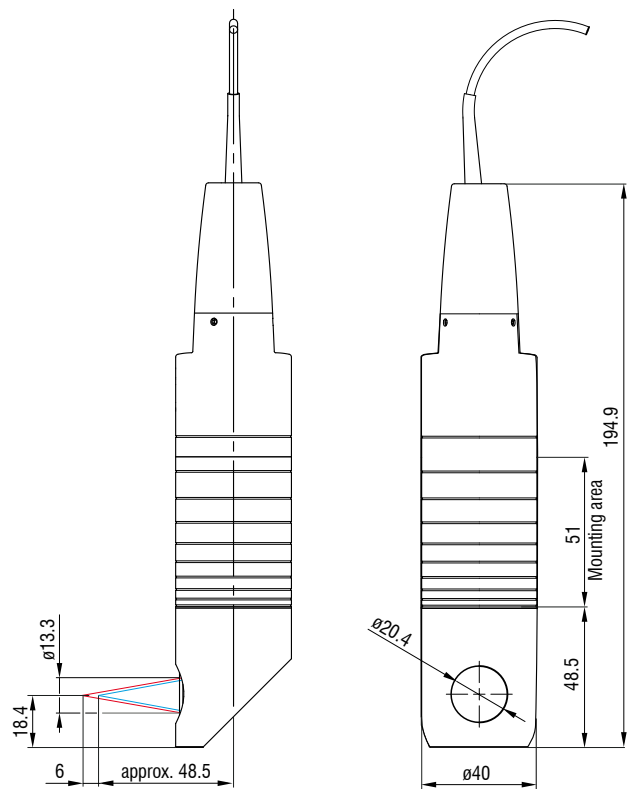
IFS2405-3









IFS2405-6

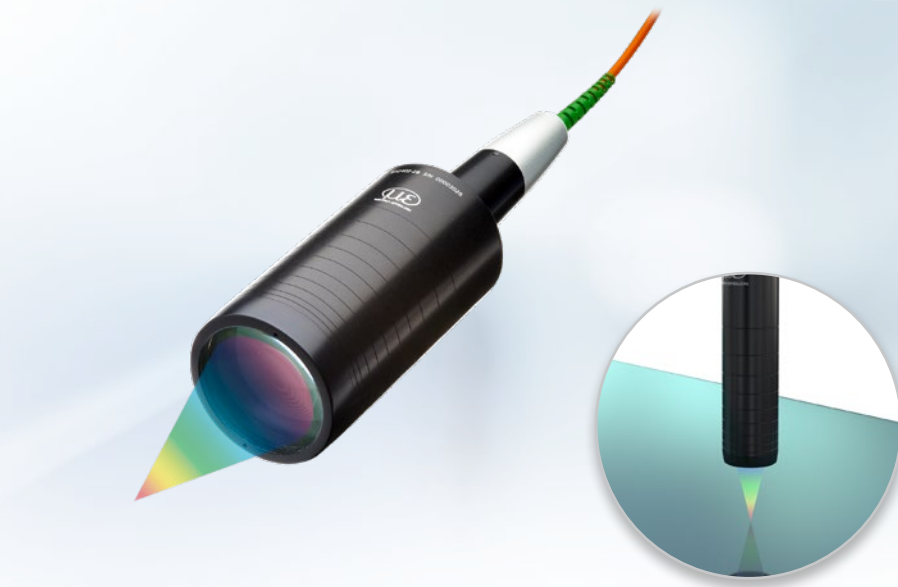


IFS2405/90-6



Precise universal sensors confocalDT IFS2405

-  Robust universal sensors for versatile applications
-  Submicron resolution
-  For one-sided thickness measurements
-  Suitable for precise distance measurements
-  Very small light spot
-  Large tilt angle



Model		IFS2405-10	IFS2405-28	IFS2405-28/VAC(001)	IFS2405-30
Measuring range		10 mm		28 mm	30 mm
Start of measuring range	approx.	50 mm		220 mm	100 mm
Resolution	Static ^[1]	< 18 nm		< 65 nm	< 47 nm
	Dynamic ^[2]	< 204 nm		< 747 nm	< 530 nm
Linearity ^[3]	Displacement and distance	< ±1.5 μm		< ±5.6 μm	< ±4.5 μm
	Thickness	< ±3 μm		< ±11.2 μm	< ±9 μm
Light spot diameter		16 μm		60 μm	50 μm
Maximum measuring angle ^[4]		±17°		±5°	±9°
Numerical aperture (NA)		0.30		0.10	0.20
Min. target thickness ^[5]		0.5 mm		2.2 mm	1.5 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)		15g / 6 ms in XY axis, 1000 shocks each			
Vibration (DIN EN 60068-2-6)		2g / 20 ... 500 Hz on XY axis, 10 cycles each			
Protection class (DIN EN 60529)		IP64 (front)	IP64 (front)	IP40 (vacuum compatible)	IP64 (front)
Material		Aluminum housing, glass lenses	Aluminum housing, glass lenses	Burnished stainless steel housing	Aluminum housing, glass lenses
Weight ^[6]		approx. 500 g	approx. 750 g	approx. 1.2 kg	approx. 730 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

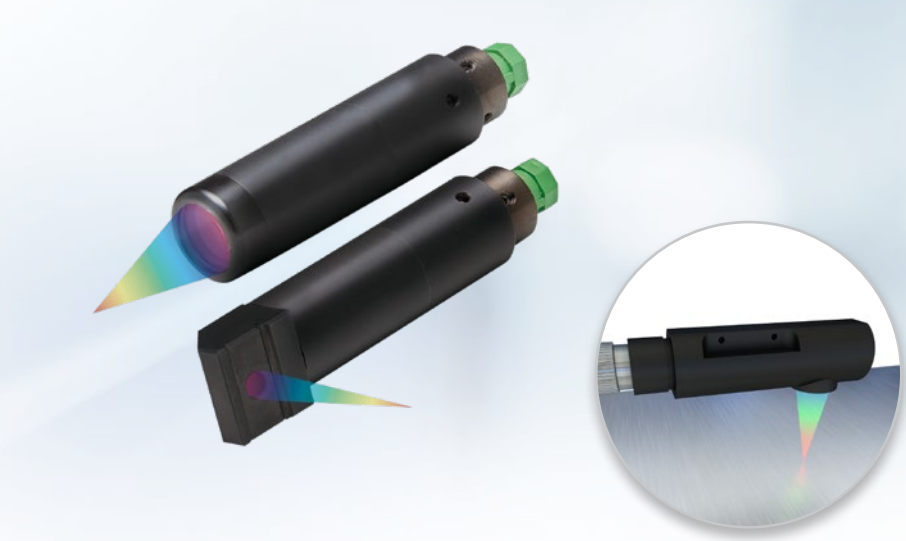
^[5] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.

^[6] Sensor weight without optical fiber

Confocal chromatic sensors for special requirements

confocalDT IFS2406

-  Sensors with axial or radial beam path
-  Submicron resolution
-  For one-sided thickness measurements
-  Suitable for precise distance measurements
-  Very small light spot
-  **VAC** Suitable for vacuum environments



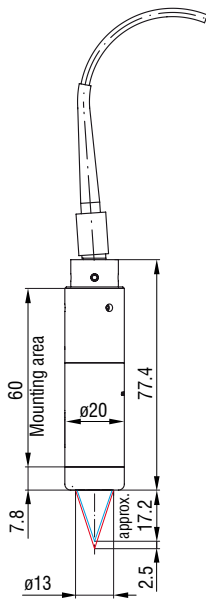
Model		IFS2406-2,5/ VAC(003)	IFS2406/90-2,5/ VAC(001)	IFS2406-3	IFS2406-3/VAC(001)	IFS2406-10	IFS2406-10/ VAC(001)
Measuring range		2.5 mm		3 mm		10 mm	
Start of measuring range	approx.	17.2 mm	12.6 mm ^[1]	75 mm		27 mm	
Resolution	Static ^[2]	< 9 nm		< 16 nm		< 19 nm	
	Dynamic ^[3]	< 97 nm		< 168 nm		< 207 nm	
Linearity ^[4]	Displacement and distance	< ±0.6 μm		< ±1.5 μm		< ±2 μm	
	Thickness	< ±1.2 μm		< ±3 μm		< ±4 μm	
Light spot diameter		10 μm		35 μm		15 μm	
Maximum measuring angle ^[5]		±16°		±6.5°		±13.5°	
Numerical aperture (NA)		0.30		0.14		0.25	
Min. target thickness ^[6]		0.125 mm		0.15 mm		0.5 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)		2g/ 20 ... 500 Hz on XY axis, 10 cycles each					
Protection class (DIN EN 60529)		IP40 (vacuum compatible)		IP65 (front)	IP40 (vacuum compatible)	IP65 (front)	IP40 (vacuum compatible)
Material		Stainless steel housing, glass lenses		Aluminum housing, glass lenses	Stainless steel housing (1.4305), glass lenses	Aluminum housing, glass lenses	Stainless steel housing, anodized aluminum housing
Weight ^[7]		approx. 105 g	approx. 130 g	approx. 99 g	approx. 250 g	approx. 128 g	

^[1] Start of measuring range measured from sensor axis
^[2] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat
^[3] RMS noise relates to mid of measuring range (1 kHz)
^[4] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery
^[5] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective 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

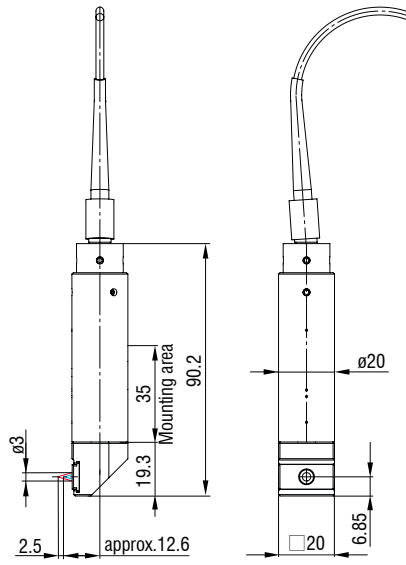
Dimensions

(in mm, not to scale)

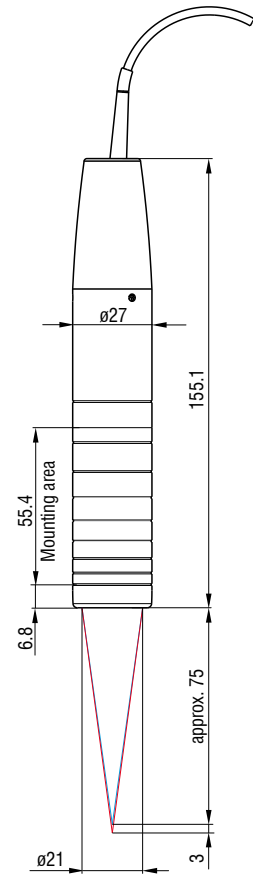
IFS2406-2,5/VAC(003)



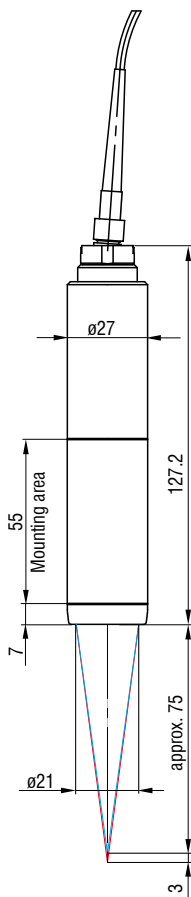
IFS2406/90-2,5/VAC(001)



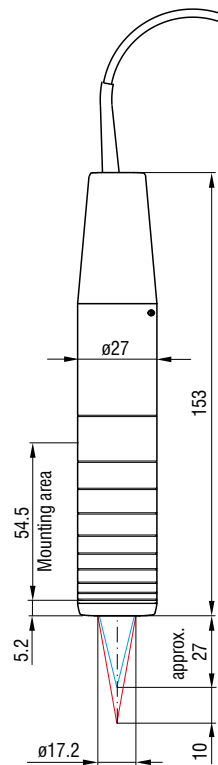
IFS2406-3



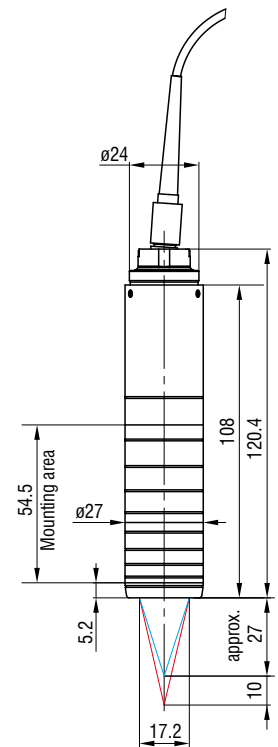
IFS2406-3/VAC(001)



IFS2406-10








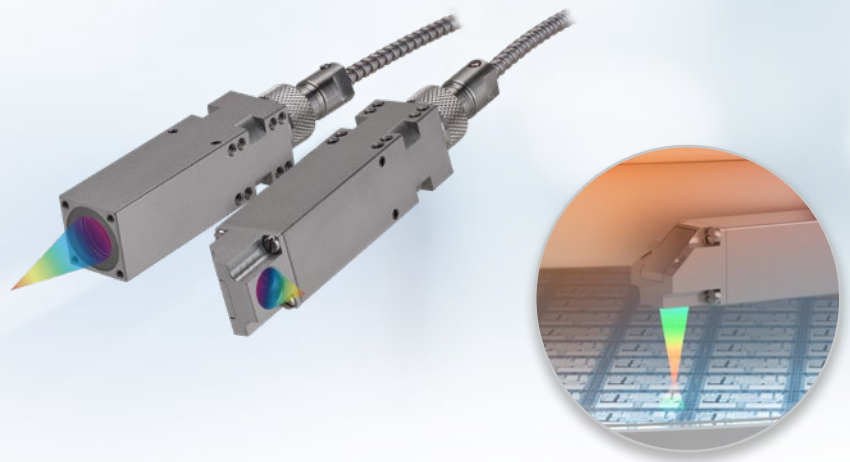
IFS2406-10/VAC(001)



Confocal high temperature sensors for environments up to 200 °C

confocalDT IFS2407-xHT/VAC

-  Robust and compact sensor design
-  Submicron resolution
-  High temperature up to 200 °C
-  Suitable for vacuum applications up to UHV
-  For precise distance and thickness measurements



Model		IFS2407-0,8HT/VAC	IFS2407-2HT/VAC	IFS2407/90-2HT/VAC	IFS2407-4HT/VAC	IFS2407/90-4HT/VAC
Measuring range		0.8 mm	2 mm		4 mm	
Start of measuring range	approx.	5.85 mm	14.5 mm	8 mm ^[1]	14.5 mm	8 mm ^[1]
Resolution	Static ^[2]	< 6 nm	< 10 nm		< 24 nm	
	Dynamic ^[3]	< 45 nm	< 90 nm		< 180 nm	
Linearity ^[4]	Displacement and distance	< ±0.16 μm	< ±0.4 μm		< ±0.8 μm	
	Thickness	< ±0.35 μm	< ±0.88 μm		< ±1.76 μm	
Temperature stability ^[5]		<0.015 % FSO / K	<0.005 % FSO / K		<0.01 % FSO / K	
Light spot diameter		11 μm	19 μm		29 μm	
Maximum measuring angle ^[6]		±30°	±12°		±8°	
Numerical aperture (NA)		0.50	0.28		0.19	
Min. target thickness ^[7]		0.04 mm	0.1 mm		0.2 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		Clamping / screw connection via four mounting holes M2x0.4				
Temperature range	Storage	-20 ... +200 °C				
	Operation	+5 ... +200 °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 (vacuum compatible)				
Material		Stainless steel housing, glass lenses				
Weight ^[8]		approx. 40 g	approx. 40 g	approx. 50 g	approx. 40 g	approx. 50 g

^[1] Start of measuring range measured from sensor axis

^[2] Average from 2,048 values at 1 kHz, in the mid of the measuring range onto optical flat

^[3] RMS noise relates to mid of measuring range (1 kHz)

^[4] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery

^[5] Depending on the clamping position of the sensor

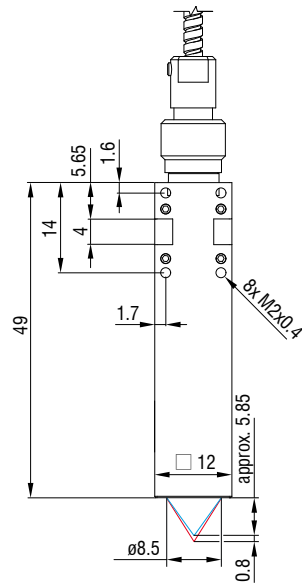
^[6] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values

^[7] 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.

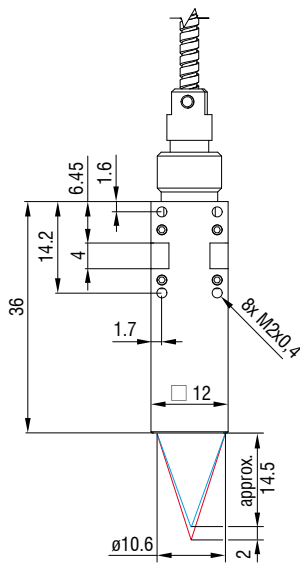
^[8] Sensor weight without optical fiber

Dimensions
(in mm, not to scale)

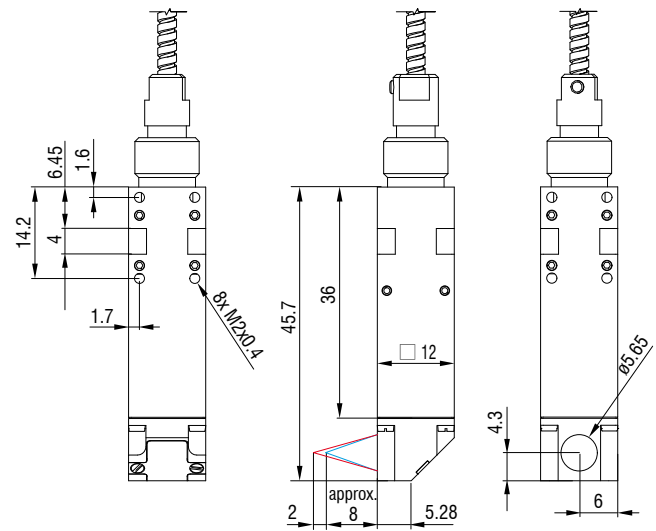
IFS2407-0,8HT/VAC



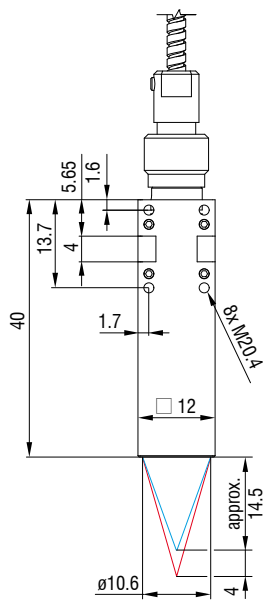
IFS2407-2HT/VAC



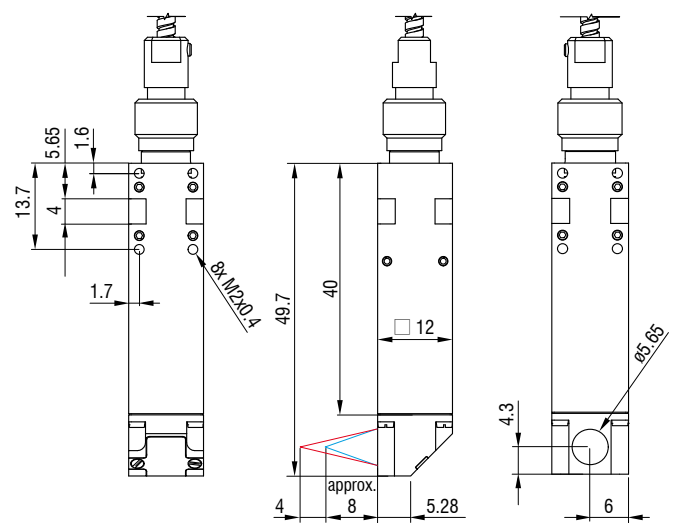
IFS2407/90-2HT/VAC









IFS2407-4HT/VAC

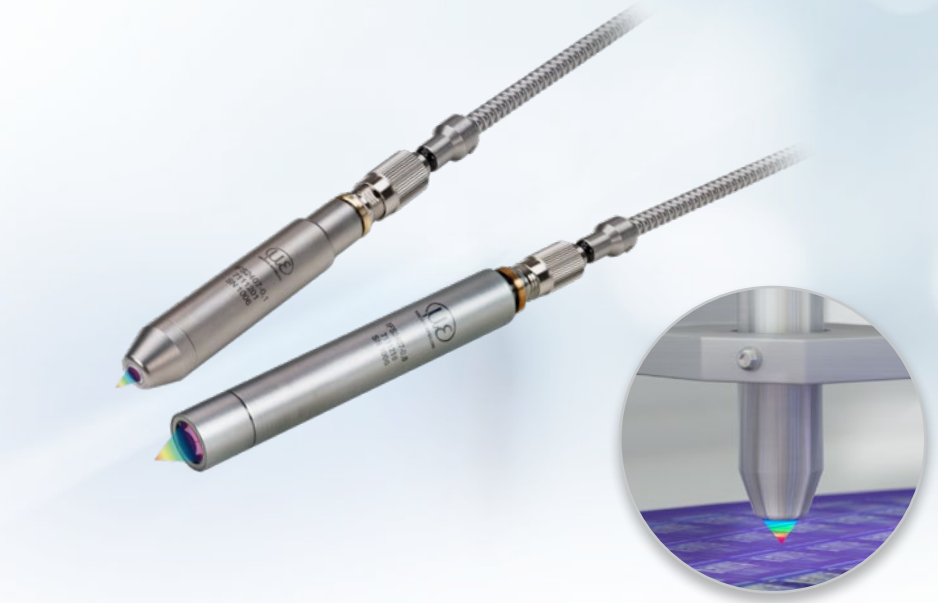


IFS2407/90-4HT/VAC



High precision sensors for displacement and thickness measurements confocalDT IFS2407

-  Compact sensors from $\varnothing 12$ 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	< $\pm 0.04 \mu\text{m}$	< $\pm 0.04 \mu\text{m}$	< $\pm 0.2 \mu\text{m}$
	Thickness	-	-	< $\pm 0.4 \mu\text{m}$
Light spot diameter		3 μm	4 μm	6 μm
Maximum measuring angle ^[4]		$\pm 48^\circ$	$\pm 48^\circ$	$\pm 30^\circ$
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 \pm 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

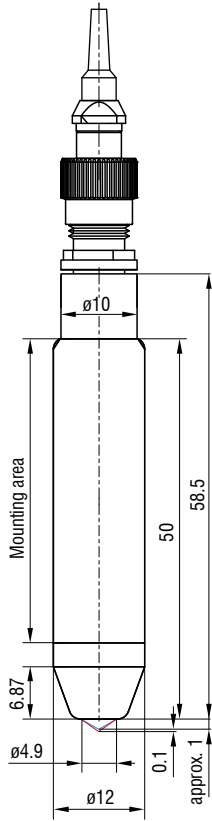
^[5] Glass sheet with refractive index n = 1.5 throughout the entire measuring range. In the mid of the measuring range, also thinner layers can be measured.

^[6] Sensor weight without optical fiber

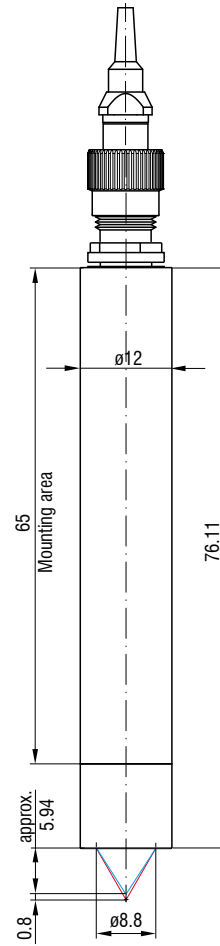
Dimensions

(in mm, not to scale)

IFS2407-0.1
IFS2407-0.1(001)









IFS2407-0.8



High precision sensors for displacement and thickness measurements

confocalDT IFS2407

-  Compact sensors from $\varnothing 12$ 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	< $\pm 0.10 \mu\text{m}$	< $\pm 0.16 \mu\text{m}$	< $\pm 0.45 \mu\text{m}$	$\leq \pm 0.9 \mu\text{m}$
	Thickness	< $\pm 0.20 \mu\text{m}$	< $\pm 0.4 \mu\text{m}$	< $\pm 0.9 \mu\text{m}$	$\leq \pm 1.8 \mu\text{m}$
Light spot diameter		6 μm	5.5 μm	9 μm	14 μm
Maximum measuring angle ^[4]		$\pm 27^\circ$	$\pm 43^\circ (\pm 70^\circ)$ ^[5]	$\pm 30^\circ$	$\pm 23^\circ$
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

Compact confocal chromatic controllers for industrial series applications

confocalDT IFC2411 / IFC2412

-  Most compact confocal controller on the market
-  Nanometer resolution for precise distance and thickness measurements
- INTERFACE** Flexible integration via Ethernet, RS422 or analog output (U/I)
-  Direct PLC connection due to Industrial Ethernet
- IP40** Robust aluminum housing (IP40)
- Best price** Excellent price-performance ratio



Powerful confocal chromatic controllers

The IFC2411 and IFC2412 controllers set new standards in non-contact distance and thickness measurements. The most compact confocal chromatic controllers currently available deliver impressive results with high-precision measurements at high speeds. Their unique design makes these controllers ideal for easy integration into existing plants and systems. They can be quickly mounted on a DIN rail and fit into even the smallest control cabinets.

One controller – two channels with full performance

With the dual-channel version confocalDT IFC2412, integrated calculation functions enable the data combination of both channels, for example for thickness measurements of battery film. The measured values are recorded synchronously and at full measuring rate for both channels.

Maximum sensor variety, numerous application options

The flexible connection of various sensors enables measurements on almost all surfaces as well as one-sided thickness measurements on transparent objects. Micro-Epsilon's extensive sensor portfolio covers measuring ranges from 0.1 mm to 30 mm. In addition, the sensors are available for use in high-temperature environments and in a vacuum.

Developed for industrial production, OEMs and automation

Diverse interfaces enable flexible integration into machines and systems. The robust IP40 aluminum housing provides reliable protection in industrial environments for maximum precision and signal stability. These systems impress in series and OEM applications with their outstanding performance and excellent price-performance ratio.

Video signal display

Measurement chart

Presets for fast setting

Simple operation via web interface

Setup and configuration of the controller and sensors are handled in a user-friendly web interface via Ethernet connection. No additional software is required. For thickness measurements, materials are stored in an editable materials database.

Model		IFC2411	IFC2411/IE
Resolution	Ethernet	1 nm	-
	Industrial Ethernet	-	1 nm
	RS422	18 bit	
	Analog	16 bits (teachable)	
Measuring rate	Continuously adjustable from 100 Hz to 8 kHz		
Linearity ^[1]	typ. < ±0.02 % FSO (depends on sensor)		
Multi-peak measurement	1 layer		
Light source	Internal white LED		
No. of characteristic curves	up to 10 characteristic curves for different sensors per channel, selection via table in the menu		
Permissible extraneous light ^[2]	30.000 lx		
Synchronization	yes		
Supply voltage	24 VDC ± 10 %		
Power consumption	< 7 W (24V)		
Signal input	sync-in / trig-in; 1x encoder (A+, A-, B+, B-, index)		
Digital interface ^[3]	Ethernet / RS422		EtherCAT / PROFINET / Ethernet/IP / RS422
Analog output	Current: 4 ... 20 mA; voltage: 0 ... 5V & 0 ... 10 V (16 bit D/A converter)		
Digital output	Sync-out		
Connection	Optical	pluggable optical fiber via E2000 socket, length 2 m ... 50 m, min. bending radius 30 mm	
	Electrical	3-pin supply terminal block; 6-pin I/O terminal block (max. cable length 30 m); 17-pin M12 connector for RS422, analog and encoder; RJ45 connector for Ethernet (max. cable length 100 m)	3-pin supply terminal block; 5-pin I/O terminal block (max. cable length 30 m); 17-pin M12 connector for RS422, analog and encoder; RJ45 connector for Industrial Ethernet (max. cable length 100 m)
Mounting	free-standing, DIN rail mounting		
Temperature range	Storage	-20 ... +70 °C	
	Operation	+5 ... +50 °C	
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		
Protection class (DIN EN 60529)	IP40		
Material	Aluminum		
Weight	approx. 335 g		
Compatibility	compatible with all confocalDT sensors		
No. of measurement channels	1		
Control and indicator elements	Web interface for setup and settings; Multifunction button: interface selection, adjustable functions and reset to factory settings after 10 s; 4x color LEDs for intensity, range, link and data		Web interface for setup and settings; Multifunction button: interface selection, adjustable functions and reset to factory settings after 10 s; 4x color LEDs for Intensity, Range, RUN and ERR

^[1] FSO = Full Scale Output

^[2] Illuminant: light bulb

^[3] The controller can also be parameterized via Ethernet

Compact confocal chromatic controllers for industrial series applications

confocalDT IFC2411 / IFC2412

Model		IFC2412	IFC2412/IE
Resolution	Ethernet	1 nm	-
	Industrial Ethernet	-	1 nm
	RS422	18 bit	18 bit
	Analog	16 bits (teachable)	16 bits (teachable)
Measuring rate	Continuously adjustable from 100 Hz to 8 kHz		
Linearity ^[1]	typ. < ±0.02 % FSO (depends on sensor)		
Multi-peak measurement	1 layer		
Light source	Internal white LED		
No. of characteristic curves	Storage of up to 10 characteristic curves for different sensors per channel, selection via table in the menu		
Permissible ambient light ^[2]	30.000 lx		
Synchronization	yes		
Supply voltage	24 VDC ± 10 %		
Power consumption	< 9 W (24V)		
Signal input	Sync-In / trig-In; 2 encoders (A+, A-, B+, B-, Index) 3 encoders (A+, A-, B+, B-)		
Digital interface	Ethernet / RS422		EtherCAT / RS422
Analog output	2x freely selectable (16 bit D/A converter) Current: 4 ... 20 mA; voltage: 0 ... 5 V & 0 ... 10 V		
Digital output	Sync-out		
Connection	Optical	pluggable optical fiber via E2000 socket, length 2 m ... 50 m, min. bending radius 30 mm	
	Electrical	3-pin supply terminal block; 5-pin terminal for Out/Trig; 6-pin I/O terminal block (max. cable length 30 m); 17-pin M12 connector for RS422, analog and encoder; RJ45 connector for Ethernet) (max. cable length 100 m)	
Mounting	free-standing, DIN rail mounting		
Temperature range	Storage	-20 ... +70 °C	
	Operation	+5 ... +50 °C	
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		
Protection class (DIN EN 60529)	IP40		
Material	Aluminum		
Weight	670 g		670 g
Compatibility	compatible with all confocalDT sensors		
No. of measurement channels	2		2
Control and indicator elements	Web interface for setup and settings; Multifunction button: interface selection, adjustable functions and reset to factory settings after 10 s; 4x color LEDs for intensity, range, link and data		Web interface for setup and settings; Multifunction button: interface selection, adjustable functions and reset to factory settings after 10 s; 4x color LEDs for Intensity, Range, RUN and ERR

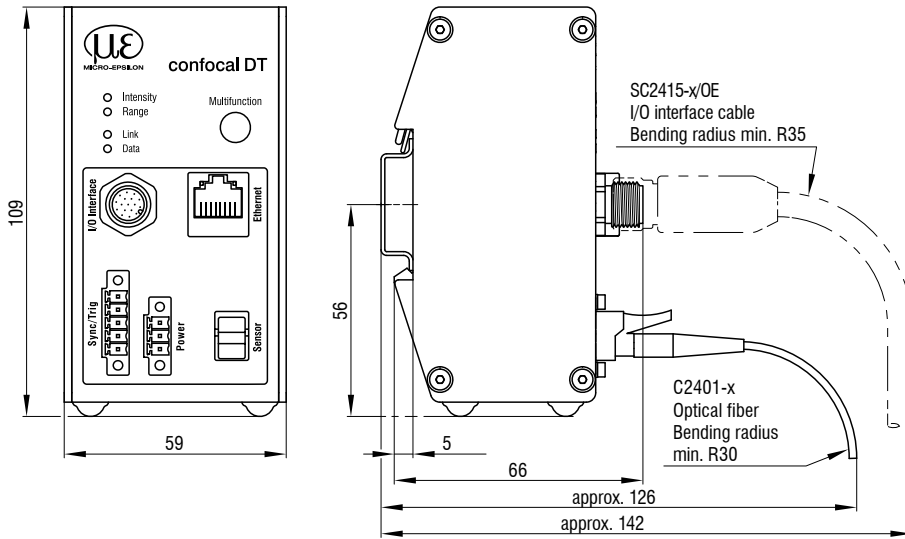
^[1] FSO = Full Scale Output

^[2] Illuminant: light bulb

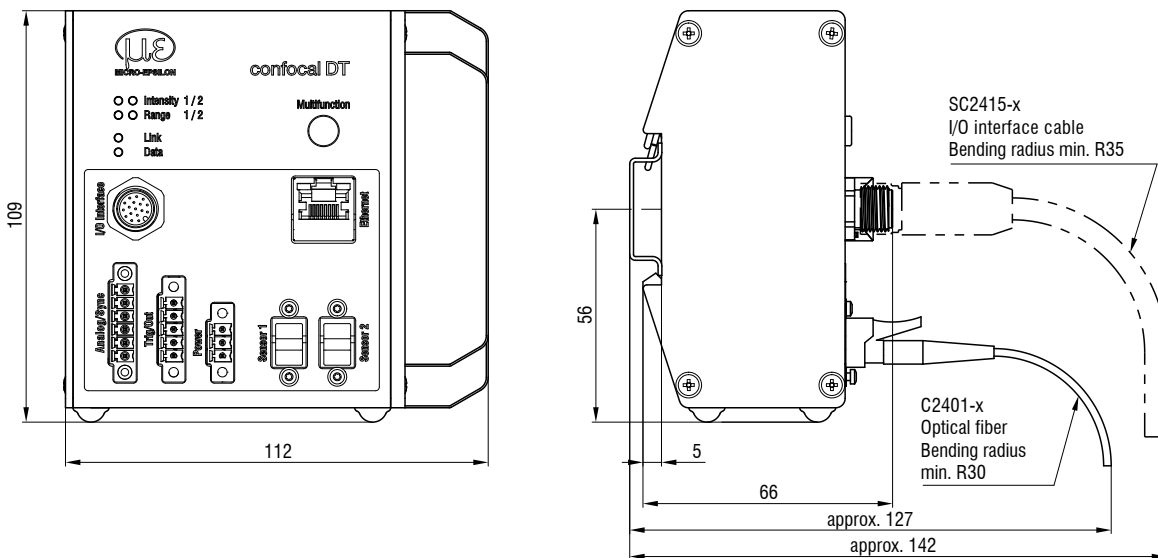
Dimensions

(in mm, not to scale)

confocalDT IFC2411









confocalDT IFC2412



Compact confocal controllers for precise and fast inline processes

confocalDT IFC2416 / IFC2417

-  Nanometer resolution for highest precision
-  Ideal for extremely fast distance and thickness measurements up to 25 kHz
-  Multi-peak: up to 5 layers with one measurement
-  Best signal quality and stability due to high light intensity
-  Flexible integration via Ethernet, RS422 or analog output
-  Compact design and robust IP40 aluminum housing

25 kHz
Measuring rate

IFS240x
Sensor compatibility

IP40
Protection

5 layers
Multi-layer measurement



Compact housing – maximum speed & precision

The confocal chromatic controllers IFC2416 and IFC2417 feature a high measuring rate of 25 kHz and enormous light intensity. This enables stable and precise measurements at high speed on various materials and surfaces.

These compact controllers are used for high-resolution distance and thickness measurements in all areas of industry. Thanks to the multi-peak option, multi-layer measurements of transparent objects with up to 5 layers are possible.

One controller – two channels with full performance


With the dual-channel version confocalDT IFC2417, integrated calculation functions enable the data combination of both channels, for example for thickness measurements of battery film. The measured values are recorded synchronously and at full measuring rate for both channels.

Flexible choice of sensor for a wide range of applications

The flexible connection of various sensors enables measurements on almost all surfaces as well as one-sided thickness measurements on transparent objects. Micro-Epsilon's extensive sensor portfolio covers measuring ranges from 0.1 mm to 30 mm. In addition, sensors are available for use in high-temperature environments and in a vacuum.

Robustness and ease of integration


The powerful controllers are optimally protected in a compact IP40 aluminum housing for easy integration into machines and production lines. Several interfaces are available for integration purposes. In addition to Ethernet and RS422, analog signals can be output as current or voltage values. In addition, encoder inputs as well as a synchronization and switching output support optimal process control.




Extremely high light intensity
Stable and fast measurements on all materials and surfaces

Largest sensor portfolio
Flexible selection of


- Measuring range & offset distance
- Field of application: vacuum, industry, temperature
- Light spot & measuring angle
- Design & beam path (straight/lateral)



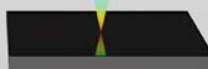
One-sided thickness measurements,
e.g. of flat glass




Structured surfaces,
e.g. metals




Dark surfaces,
e.g. rubber



Shiny surfaces,
e.g. mirrors



Detection of fine structures,
e.g. PCB traces



Optical glasses,
e.g. lenses

Model		IFC2416
Resolution	Ethernet	1 nm
	RS422	18 bit
	Analog	16 bits (teachable)
Measuring rate	Continuously adjustable from 100 Hz to 25 kHz	
Linearity ^[1]	typ. < ±0.02 % FSO (depends on sensor)	
Multi-peak measurement	5 layers	
Light source	Internal white LED	
No. of characteristic curves	up to 10 characteristic curves for different sensors per channel, selection via table in the menu	
Permissible ambient light ^[2]	30.000 lx	
Synchronization	yes	
Supply voltage	24 VDC ±10 %	
Power consumption	< 9 W (24V)	
Signal input	Sync-In / trig-In; 2 encoders (A+, A-, B+, B-, Index) 3 encoders (A+, A-, B+, B-)	
Digital interface	Ethernet / RS422	
Analog output	Current: 4 ... 20 mA; voltage: 0 ... 5V & 0 ... 10 V (16 bit D/A converter)	
Digital output	Sync-out; error-out	
Connection	Optical	pluggable optical fiber via E2000 socket, length 2 m ... 50 m, min. bending radius 30 mm
	Electrical	3-pin supply terminal block; 6-pin I/O terminal block (max. cable length 30 m); 17-pin M12 connector for RS422, analog and encoder; RJ45 connector for Ethernet) (max. cable length 100 m)
Mounting	free-standing, DIN rail mounting	
Temperature range	Storage	-20 ... +70 °C
	Operation	+5 ... +50 °C
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	
Protection class (DIN EN 60529)	IP40	
Material	Aluminum	
Weight	approx. 460 g	
Compatibility	compatible with all confocalDT sensors	
No. of measurement channels	1	
Control and indicator elements	Web interface for setup and settings; Multifunction button: interface selection, adjustable functions and reset to factory settings after 10 s; 4x color LEDs for intensity, range, link and data	

^[1] FSO = Full Scale Output

^[2] Illuminant: light bulb

Compact confocal controllers for precise and fast inline processes

confocalDT IFC2416 / IFC2417

Model		IFC2417	IFC2417/IE
Resolution	Ethernet	1 nm	-
	Industrial Ethernet	-	1 nm
	RS422	18 bit	18 bit
	Analog	16 bits (teachable)	16 bits (teachable)
Measuring rate	Continuously adjustable from 100 Hz to 25 kHz		
Linearity ^[1]	typ. < ±0.02 % FSO (depends on sensor)		
Multi-peak measurement	5 layers		
Light source	Internal white LED		
No. of characteristic curves	Storage of up to 10 characteristic curves for different sensors per channel, selection via table in the menu		
Permissible ambient light ^[2]	30.000 lx		
Synchronization	yes		
Supply voltage	24 VDC ±10 %		
Power consumption	< 12 W (24V)		
Signal input	Sync-In / trig-In; 2 encoders (A+, A-, B+, B-, Index) 3 encoders (A+, A-, B+, B-)		
Digital interface	Ethernet / RS422		EtherCAT / RS422
Analog output	2x freely selectable (16 bit D/A converter) Current: 4 ... 20 mA; voltage: 0 ... 5 V & 0 ... 10 V		
Digital output	Sync-out; error-out		
Connection	Optical	pluggable optical fiber via E2000 socket, length 2 m ... 50 m, min. bending radius 30 mm	
	Electrical	3-pin supply terminal block; 5-pin terminal for Out/Trig; 6-pin I/O terminal block (max. cable length 30 m); 17-pin M12 connector for RS422, analog and encoder; RJ45 connector for Ethernet) (max. cable length 100 m)	
Mounting	free-standing, DIN rail mounting		
Temperature range	Storage	-20 ... +70 °C	
	Operation	+5 ... +50 °C	
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		
Protection class (DIN EN 60529)	IP40		
Material	Aluminum		
Weight	670 g	670 g	
Compatibility	compatible with all confocalDT sensors		
No. of measurement channels	2	2	
Control and indicator elements	Web interface for setup and settings; Multifunction button: interface selection, adjustable functions and reset to factory settings after 10 s; 4x color LEDs for intensity, range, link and data		

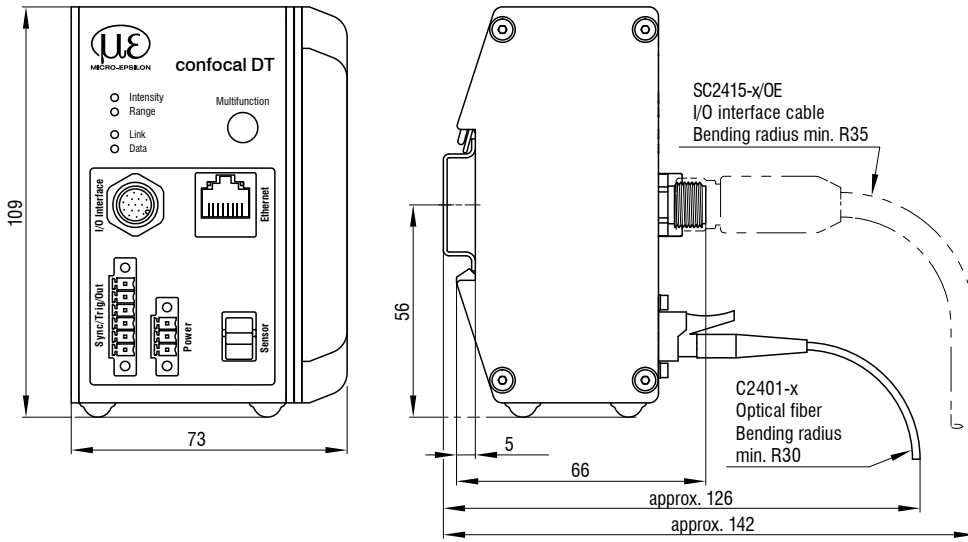
^[1] FSO = Full Scale Output

^[2] Illuminant: light bulb

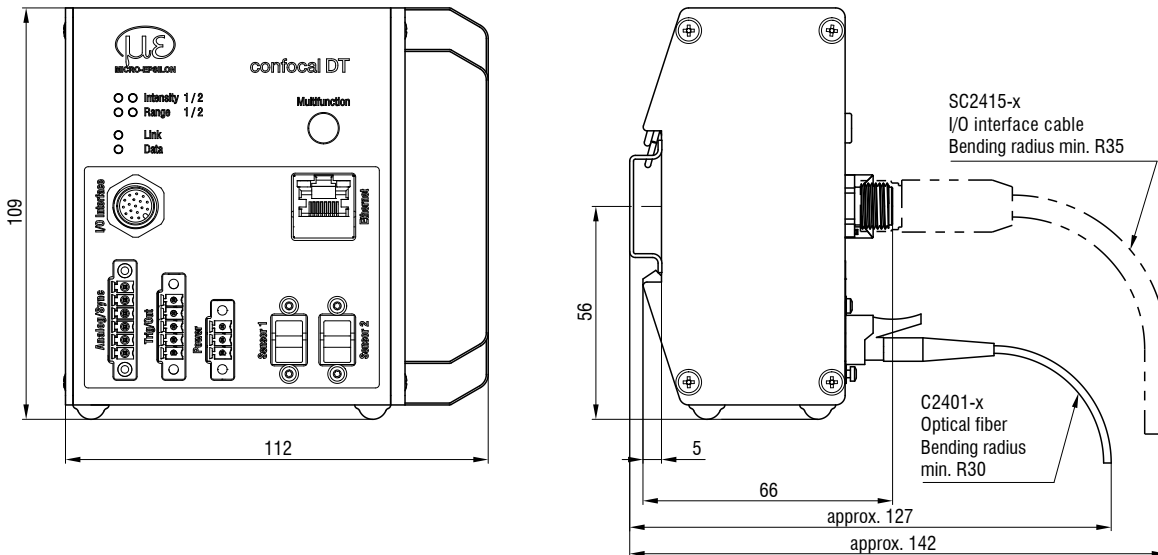
Dimensions

(in mm, not to scale)

confocalDT IFC2416











confocalDT IFC2417



Confocal universal controllers for industrial applications

confocalDT IFC242x

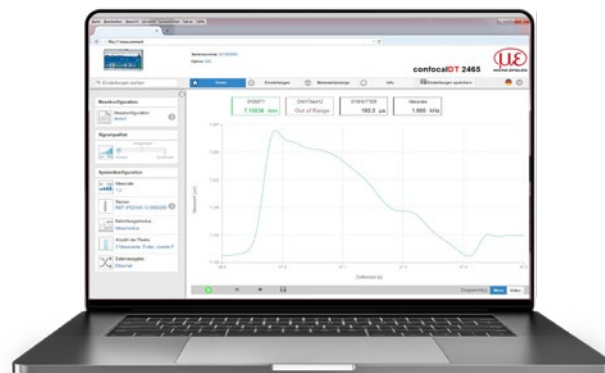
-  Measuring rate of up to 10 kHz
-  Ethernet / EtherCAT / RS422 / PROFINET / EtherNet/IP / Analog
-  Fast surface compensation
-  Configuration via web interface
-  Submicron resolution
-  Thickness measurement of multi-layer materials
-  Synchronous two-sided thickness measurement
-  Robust design with passive cooling



The confocalDT 2421/22 controllers set the industrial standard in precise, confocal measurement technology. Available as either a single- or a dual-channel version, these measuring systems are a low cost solution, especially for series applications. The active exposure regulation of the CCD line enables fast and accurate compensation of varying surfaces.

The controller can be operated with any IFS sensor and is available as a standard version for distance and thickness measurements or as a multi-peak version for multi-layer measurements. Using a special calculation function, the confocalDT 2422 dual-channel version evaluates both channels. Measurement acquisition is synchronous and can be carried out while exploiting the full measuring rate for both channels.

Due to a user-friendly web interface, no additional software is necessary to configure the controller and the sensors. Data output is via Ethernet, EtherCAT, RS422 or analog output.



Settings are made via the web interface. For thickness measurements, materials are stored in an expandable materials database.



Two sensors can be directly connected to a confocal IFC2422 controller.

Model	IFC2421	IFC2421MP	IFC2422	IFC2422MP
Resolution	Ethernet/EtherCAT		1 nm	
	RS422		18 bit	
	Analog		16 bits (teachable)	
Measuring rate	Continuously adjustable from 100 Hz to 10 kHz ^[1]			
Linearity	typ. $\pm 0.020\%$ FSO (depends on sensor)			
Multi-peak measurement	1 layer	5 layers	1 layer	5 layers
Light source	Internal white LED			
No. of characteristic curves	up to 20 characteristic curves for different sensors per channel, selection via table in the menu			
Permissible ambient light ^[2]	30.000 lx			
Synchronization	yes			
Supply voltage	24 VDC $\pm 15\%$			
Power consumption	approx. 10 W			
Signal input	Sync-in / trig-in; 2x encoders (A+, A-, B+, B-, index) or 3x encoders (A+, A-, B+, B-)			
Digital interface	Ethernet / EtherCAT / RS422 / PROFINET ^[3] EtherNet/IP ^[3]			
Analog output	Current: 4 ... 20 mA; voltage: 0 ... 10 V (16 bit D/A converter)			
Switching output	Error1-Out, Error2-Out			
Digital output	Sync-out			
Connection	Optical	pluggable optical fiber via E2000 socket, length 2 m ... 50 m, min. bending radius 30 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	+5 ... +50 °C		
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			
Protection class (DIN EN 60529)	IP40			
Material	Aluminum			
Weight	approx. 1.8 kg		approx. 2.25 kg	
Compatibility	compatible with all confocalDT sensors			
No. of measurement channels ^[4]	1		2	
Control and indicator elements	Multifunction button (adjustable functions and reset to factory setting after 10 s); 5x LEDs for intensity, range, status and supply voltage			

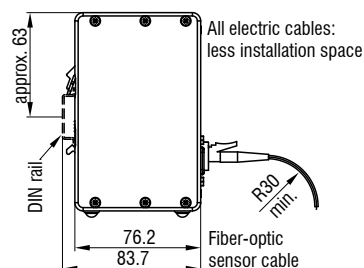
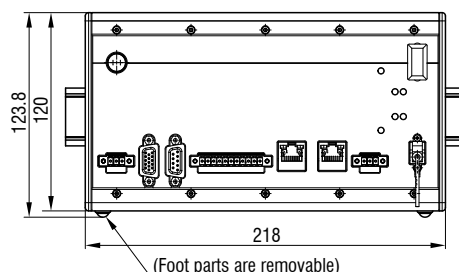
^[1] Full measuring range up to 8 kHz. Sensor-dependent up to 80% FSO between 9 and 10 kHz

^[2] Illuminant: light bulb

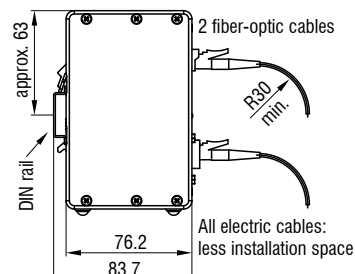
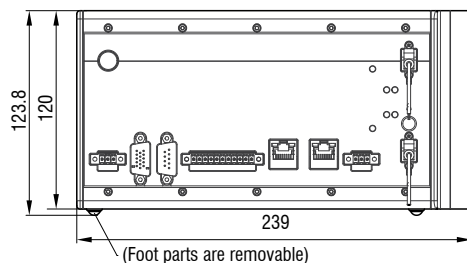
^[3] Connection via interface module (see accessories)

^[4] No loss of intensity and linearity due to two synchronous measurement channels

IFC2421 Controller











IFC2422 Controller



Light-intensive controller for high speed measurements

confocalDT IFC246x

-  Measuring rate of up to 30 kHz
-  Ethernet / EtherCAT / RS422 / PROFINET / EtherNet/IP / Analog
-  Fast surface compensation and high light intensity
-  Configuration via web interface
-  Submicron resolution
-  Thickness measurement of multi-layer materials
-  Synchronous two-sided thickness measurement
-  Robust design with passive cooling



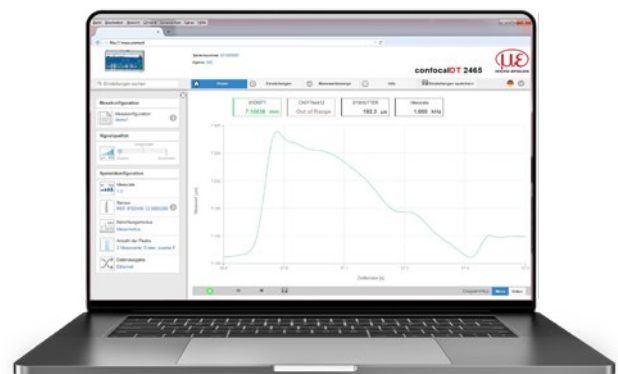
The confocalDT 2465 and 2466 controllers enable fast, high-precision distance and thickness measurements up to 30 kHz. The controllers are available as a single- or dual-channel variant. Using a special calculation function, the confocalDT 2466 dual-channel version evaluates both channels. Measurement acquisition is synchronous and can be carried out while exploiting the full measuring rate for both channels.

Available as a standard version for distance and thickness measurements as well as a multi-peak version, the controllers are compatible with all sensor types of the IFS series. The multi-peak models are used for the thickness measurement of up to 5 transparent layers.

Due to a user-friendly web interface, no additional software is necessary to configure the controller and the sensors. Data output is via Ethernet, EtherCAT, RS422 or analog output. Optionally available interface modules enable the data to be output also via PROFINET or EtherNet/IP.

High luminous intensity for challenging measuring objects

A controller version with high light intensity is available for measuring low-reflecting objects. Especially with tilted or dark surfaces, the enhanced light intensity increases the proportion of reflected light and enables stable measurements.



Settings are made via the web interface. For thickness measurements, materials are stored in an expandable materials database.

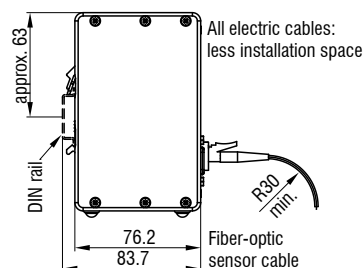
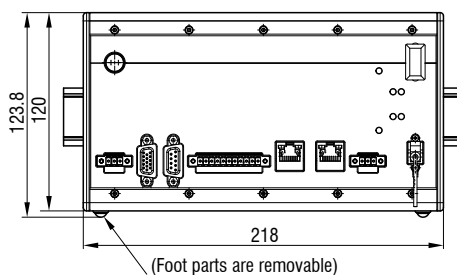
Model	IFC2465	IFC2465MP	IFC2466	IFC2466MP
Resolution	Ethernet/EtherCAT	1 nm		
	RS422	18 bit		
	Analog	16 bits (teachable)		
Measuring rate	Continuously adjustable from 100 Hz to 30 kHz			
Linearity	typ. $\pm 0.020\%$ FSO (depends on sensor)			
Multi-peak measurement	1 layer	5 layers	1 layer	5 layers
Light source	Internal white LED; high-power LED for variant with double light intensity			
No. of characteristic curves	up to 20 characteristic curves for different sensors per channel, selection via table in the menu			
Permissible ambient light ^[1]	30.000 lx			
Synchronization	yes			
Supply voltage	24 VDC $\pm 15\%$			
	approx. 10 W; approx. 20 W with double light intensity option			
Signal input	Sync-in / trig-in; 2x encoders (A+, A-, B+, B-, index) or 3x encoders (A+, A-, B+, B-)			
Digital interface	Ethernet / EtherCAT / RS422 / PROFINET ^[2] EtherNet/IP ^[2]			
Analog output	Current: 4 ... 20 mA; voltage: 0 ... 10 V (16 bit D/A converter)			
Switching output	Error1-Out, Error2-Out			
Digital output	Sync-out			
Connection	Optical	pluggable optical fiber via E2000 socket, length 2 m ... 50 m, min. bending radius 30 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	+5 ... +50 °C		
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			
Protection class (DIN EN 60529)	IP40			
Material	Aluminum			
Weight	approx. 1.8 kg		approx. 2.25 kg	
Compatibility	compatible with all confocalDT sensors			
No. of measurement channels ^[3]	1		2	
Control and indicator elements	Multifunction button (adjustable functions and reset to factory setting after 10 s); 5x LEDs for intensity, range, status and supply voltage			

^[1] Illuminant: light bulb

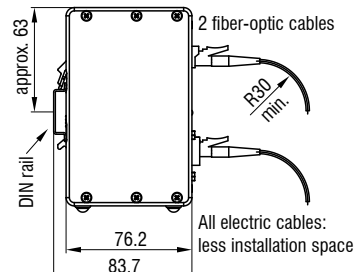
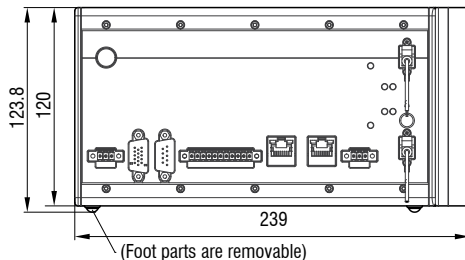
^[2] Connection via interface module (see accessories)

^[3] No loss of intensity and linearity due to two synchronous measurement channels

IFC2465 Controller








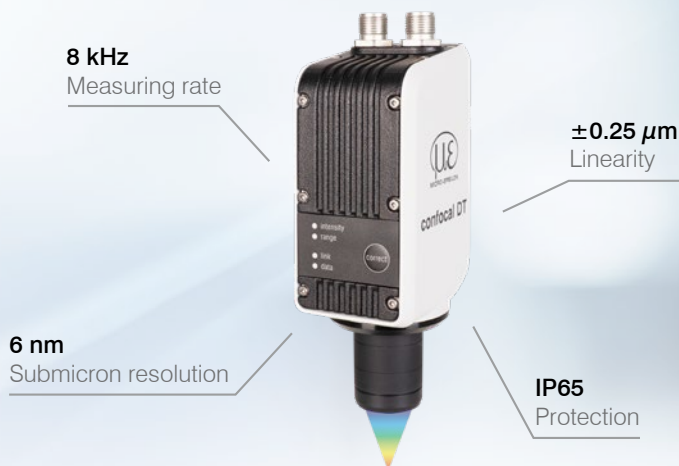
IFC2466 Controller



Confocal chromatic sensor system with integrated controller

confocalDT IFD2410

-  All-in-One: sensor and controller in one compact housing (IP65)
-  Adjustable measuring rate up to 8 kHz
-  Simple integration without optical fibers
-  **INTERFACE** EtherCAT / PROFINET / EtherNet/IP / Ethernet / RS422 / Analog
-  Micron-precise measurement of distance and thickness



Compact confocal sensor with optimal price-performance ratio

The confocalDT IFD2410 is an innovative confocal sensor with integrated controller. The space-saving IP65 housing enables fast integration into systems and machines as no optical fiber is required. This makes the IFD2410 ideally suited to high precision distance and thickness measurements in industrial series applications.

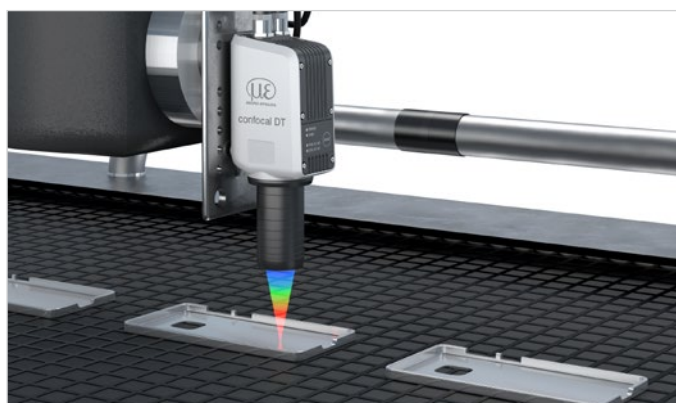
The active exposure regulation of the CCD line enables fast and accurate compensation of varying surfaces even in dynamic measurement processes up to 8 kHz. Based on its excellent price-performance ratio, the confocalDT IFD2410 sets a new benchmark in precise confocal measurement technology.

Intelligent technology with high performance and ease of use

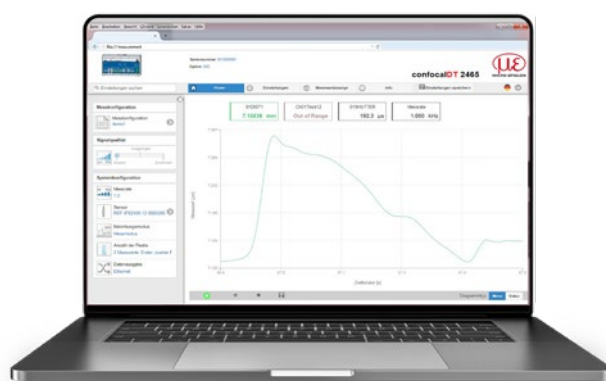
In Ethernet mode, the confocalDT IFD2410 can be set via the intuitive web interface. Industrial Ethernet ensures that the settings are automatically transferred to the PLC environment. This eliminates time-consuming setting efforts in the programming environment.

Fast, precise and compact

Its high performance and compact housing make this sensor ideally suitable for series applications in production lines and machines. These include inline inspection and coordinate measuring machines, inline thickness monitoring of flat glass and container glass as well as testing electronic components.



Inline measurement of smartphone housings



Easy setup and configuration via integrated web interface

Model		IFD2410-1/IE	IFD2410-3/IE	IFD2410-6/IE
Measuring range		1 mm	3 mm	6 mm
Start of measuring range		approx. 15 mm	approx. 25 mm	approx. 35 mm
Resolution	Static ^[1]	< 6 nm	< 18 nm	< 40 nm
	Dynamic ^[2]	< 50 nm	< 125 nm	< 250 nm
Measuring rate		Continuously adjustable from 100 Hz to 8 kHz		
Linearity ^[3]	Displacement and distance	< ±0.25 μm	< ±0.75 μm	< ±1.5 μm
	Thickness	< ±0.5 μm	< ±1.5 μm	< ±3.0 μm
Multi-peak measurement		1 layer		
Light source		Internal white LED		
Permissible ambient light		30.000 lx		
Light spot diameter ^[4]		12 μm	18 μm	24 μm
Measuring angle ^[5]		±25°	±19°	±10°
Numerical aperture (NA)		0.45	0.35	0.18
Min. target thickness		0.05 mm	0.15 mm	0.3 mm
Target material		Reflective, diffuse as well as transparent surfaces (e.g. glass)		
Supply voltage		24 VDC ± 10 %		
Power consumption		< 5.3 W (24V)		
Signal input		2x encoders (A+, A-, B+, B-, index); 3x encoders (A+, A-, B+, B-) 2x HTL/TTL multi-function inputs: trigger in, slave in, zero setting, mastering, teach-in; 1x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating		
Digital interface ^[6]		EtherCAT / PROFINET / EtherNet/IP / RS422		
Analog output		4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit D/A converter)		
Switching output		Error1-Out, Error2-Out		
Digital output		Sync out		
Connection		12-pin M12 connector for supply, encoder, EtherCAT, PROFINET, EtherNet/IP, RS422 and Sync 17-pin M12 connector for I/O analog and encoder optional extension to 3 m / 6 m / 9 m / 15 m possible (see accessories for suitable connection cables)		
Mounting		Radial clamping (see accessories for mounting adapter), threaded holes		
Temperature range	Storage	-20 ... +70 °C		
	Operation	+5 ... +50 °C		
Shock (DIN EN 60068-2-27)		15 g / 6 ms on 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)	Sensor	IP64 (front)		
	Controller	IP65		
Material		Aluminum housing, passive cooling		
Weight		approx. 490 g	approx. 490 g	approx. 490 g
Control and indicator elements		Correct button: interface selection, two adjustable functions and reset to factory setting after 10 s; 4x color LEDs for Intensity, Range, Data connections (2x)		

^[1] All data at constant ambient temperature (24 ± 2 °C). 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] Maximum deviation from reference system over the entire measuring range, measured on front surface of ND filter

^[4] In the mid of the measuring range

^[5] 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.

^[6] The controller can also be parameterized via Ethernet

Confocal chromatic sensor system with integrated controller

confocalDT IFD2410

Model		IFD2410-1 Ethernet	IFD2410-3 Ethernet	IFD2410-6 Ethernet
Measuring range		1 mm	3 mm	6 mm
Start of measuring range		approx. 15 mm	approx. 25 mm	approx. 35 mm
Resolution	Static ^[1]	< 6 nm	< 18 nm	< 40 nm
	Dynamic ^[2]	< 50 nm	< 125 nm	< 250 nm
Measuring rate		Continuously adjustable from 100 Hz to 8 kHz		
Linearity ^[3]	Displacement and distance	< ±0.25 μm	< ±0.75 μm	< ±1.5 μm
	Thickness	< ±0.5 μm	< ±1.5 μm	< ±3.0 μm
Multi-peak measurement		1 layer		
Light source		Internal white LED		
Permissible ambient light		30.000 lx		
Light spot diameter ^[4]		12 μm	18 μm	24 μm
Measuring angle ^[5]		±25°	±19°	±10°
Numerical aperture (NA)		0.45	0.35	0.18
Min. target thickness		0.05 mm	0.15 mm	0.3 mm
Target material		Reflective, diffuse as well as transparent surfaces (e.g. glass)		
Supply voltage		24 VDC ±10 %		
Power consumption		< 5.3 W (24V)		
Signal input		3 x encoders (A+, A-, B+, B-) 2 x HTL/TTL multifunction input: trigger in, slave in, zeroing, master, teach; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating		
Digital interface		Ethernet / RS422		
Analog output		4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit D/A converter)		
Switching output		Error1-Out, Error2-Out		
Digital output		Sync out		
Connection		12-pin M12 connector for supply, Ethernet, RS422 and Sync 17-pin M12 connector for I/O analog and encoder optional extension to 3 m / 6 m / 9 m / 15 m possible (see accessories for suitable connection cables)		
Mounting		Radial clamping (see accessories for mounting adapter), threaded holes		
Temperature range	Storage	-20 ... +70 °C		
	Operation	+5 ... +50 °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)	Sensor	IP64 (front)		
	Controller	IP65		
Material		Aluminum housing, passive cooling		
Weight		approx. 490 g	approx. 490 g	approx. 490 g
Control and indicator elements		Correct button, LEDs for Intensity, Range, Link and Data		

^[1] All data at constant ambient temperature (24 ±2 °C). 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)

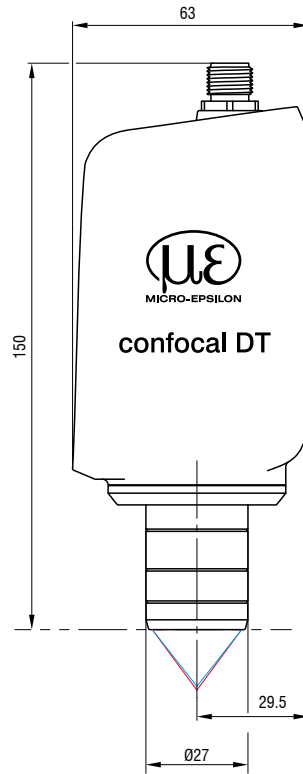
^[3] Maximum deviation from reference system over the entire measuring range, measured on front surface of ND filter

^[4] In the mid of the measuring range

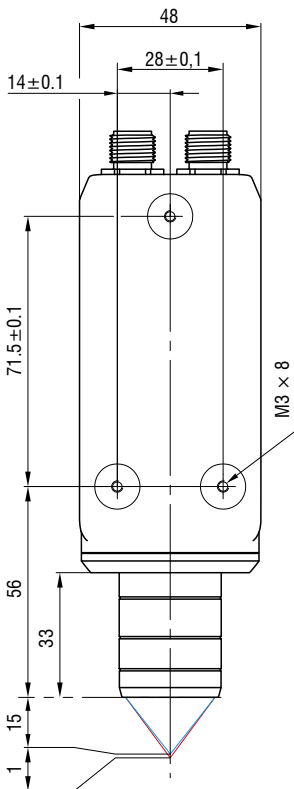
^[5] Maximum sensor tilt angle that produces a usable signal on polished glass (n = 1.5) in the mid of the measuring range. The accuracy decreases when approaching the limit values.

Dimensions

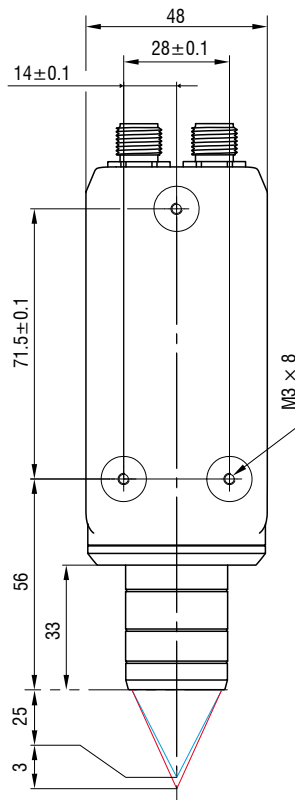
(in mm, not to scale)



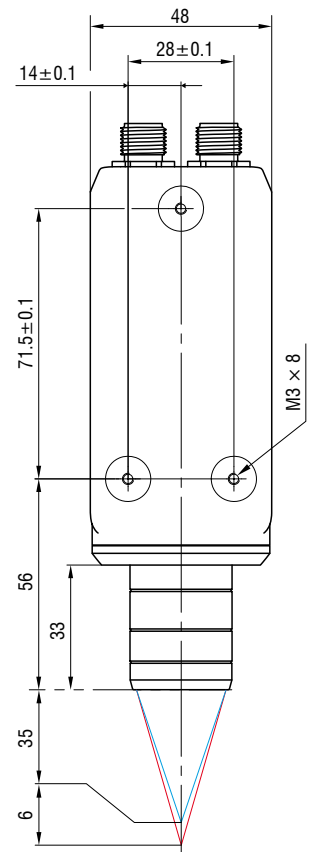
IFD2410-1/IE
IFD2410-1 Ethernet



IFD2410-3/IE
IFD2410-3 Ethernet









IFD2410-6/IE
IFD2410-6 Ethernet



High performance sensor system with integrated controller

confocalDT IFD2415

-  All-in-One: sensor and controller in one compact housing (IP65)
-  Adjustable measuring rate up to 25 kHz
-  **INTER FACE** EtherCAT / PROFINET / EtherNet/IP / Ethernet / RS422 / Analog
-  Micron-precise measurement of distance and thickness
-  High precision distance and thickness measurements (5 layers)
-  Short exposure time due to high light intensity



All-in-One: compact confocal sensor with highest performance

The confocalDT IFD2415 is a powerful confocal sensor with integrated controller. The space-saving IP65 housing enables fast integration into systems and machines as no optical fiber is required. Furthermore, the IFD2415 is ideally suited to high precision distance and thickness measurements in industrial series applications. In addition, the sensor can be used with transparent materials for multi-layer thickness measurements of up to 5 layers.

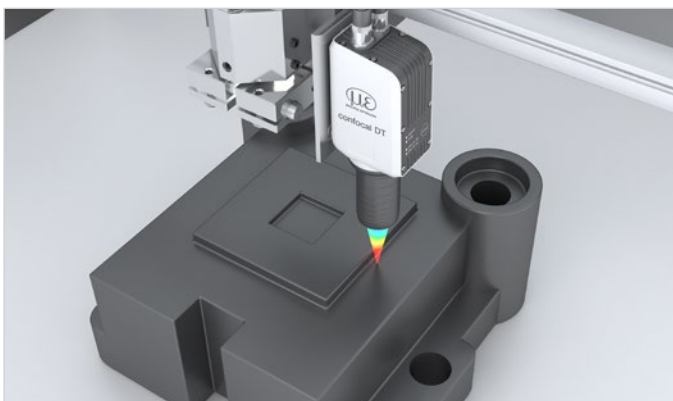
The active exposure time regulation of the CCD line enables fast and stable measurements of varying surfaces even in dynamic measurement processes up to 25 kHz. The measuring system is also characterized by high luminous intensity which enables fast and reliable measurements even on darker surfaces.

Intelligent technology with high performance and ease of use

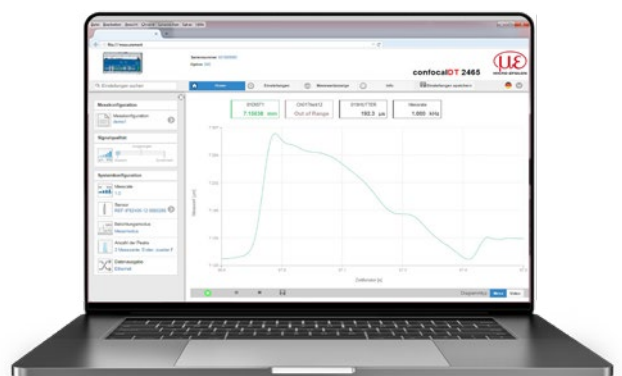
In Ethernet mode, the confocalDT IFD2415 can be set via the intuitive web interface. Industrial Ethernet ensures that the settings are automatically transferred to the PLC environment. This eliminates time-consuming setting efforts in the programming environment.

Fast, precise and compact

The unique combination of sensor and controller, together with excellent performance and high measuring rate make the confocalDT IFD2415 the best in its class. This compact sensor can be used in series applications such as, e.g., in inline inspection machines, robots, 3D printers and coordinate measuring machines.



Displacement and distance measurement in 3D printing



Easy setup and configuration via integrated web interface

Model		IFD2415-1/IE	IFD2415-3/IE	IFD2415-10/IE
Measuring range		1 mm	3 mm	10 mm
Start of measuring range		approx. 10 mm	approx. 20 mm	approx. 50 mm
Resolution	Static ^[1]	< 4 nm	< 8 nm	< 18 nm
	Dynamic ^[2]	< 38 nm	< 80 nm	< 204 nm
Measuring rate		Continuously adjustable from 100 Hz to 25 kHz		
Linearity ^[3]	Displacement and distance	< ±0.2 μm	< ±0.6 μm	< ±2 μm
	Thickness	< ±0.4 μm	< ±1.2 μm	< ±4 μm
Multi-peak measurement		5 layers		
Light source		Internal white LED		
Permissible ambient light		30.000 lx		
Light spot diameter ^[4]		8 μm	9 μm	16 μm
Measuring angle ^[5]		±30°	±24°	±17°
Numerical aperture (NA)		0.55	0.45	0.30
Min. target thickness		0.05 mm	0.15 mm	0.5 mm
Target material		Reflective, diffuse as well as transparent surfaces (e.g. glass)		
Supply voltage		24 VDC ± 10 %		
Power consumption		< 7 W (24V)		
Signal input		2x encoders (A+, A-, B+, B-, index); 3x encoders (A+, A-, B+, B-) 2x HTL/TTL multi-function inputs: trigger in, slave in, zero setting, mastering, teach-in; 1x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating		
Digital interface ^[6]		EtherCAT / PROFINET / EtherNet/IP / RS422		
Analog output		4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit D/A converter)		
Switching output		Error1-Out, Error2-Out		
Digital output		Sync out		
Connection		12-pin M12 connector for supply, encoder, EtherCAT, PROFINET, EtherNet/IP, RS422 and Sync 17-pin M12 connector for I/O analog and encoder optional extension to 3 m / 6 m / 9 m / 15 m possible (see accessories for suitable connection cables)		
Mounting		Radial clamping (see accessories for mounting adapter), threaded holes		
Temperature range	Storage	-20 ... +70 °C		
	Operation	+5 ... +50 °C		
Shock (DIN EN 60068-2-27)		15 g / 6 ms on 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)	Sensor	IP64 (front)		
	Controller	IP65		
Material		Aluminum housing, passive cooling		
Weight		approx. 500 g	approx. 600 g	approx. 800 g
Control and indicator elements		Correct button: interface selection, two adjustable functions and reset to factory setting after 10 s; 4x color LEDs for Intensity, Range, Data connections (2x)		

^[1] All data at constant ambient temperature (24 ± 2 °C). 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] Maximum deviation from reference system over the entire measuring range, measured on front surface of ND filter

^[4] In the mid of the measuring range

^[5] 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.

^[6] The controller can also be parameterized via Ethernet

High performance sensor system with integrated controller

confocalDT IFD2415

Model		IFD2415-1 Ethernet	IFD2415-3 Ethernet	IFD2415-10 Ethernet
Measuring range		1 mm	3 mm	10 mm
Start of measuring range		approx. 10 mm	approx. 20 mm	approx. 50 mm
Resolution	Static ^[1]	< 4 nm	< 8 nm	< 18 nm
	Dynamic ^[2]	< 38 nm	< 80 nm	< 204 nm
Measuring rate		Continuously adjustable from 100 Hz to 25 kHz		
Linearity ^[3]	Displacement and distance	< ±0.2 μm	< ±0.6 μm	< ±2 μm
	Thickness	< ±0.4 μm	< ±1.2 μm	< ±4 μm
Multi-peak measurement		5 layers		
Light source		Internal white LED		
Permissible ambient light		30.000 lx		
Light spot diameter ^[4]		8 μm	9 μm	16 μm
Measuring angle ^[5]		±30°	±24°	±17°
Numerical aperture (NA)		0.55	0.45	0.30
Min. target thickness		0.05 mm	0.15 mm	0.5 mm
Target material		Reflective, diffuse as well as transparent surfaces (e.g. glass)		
Supply voltage		24 VDC ±10 %		
Power consumption		< 7 W (24V)		
Signal input		3 x encoders (A+, A-, B+, B-) 2 x HTL/TTL multifunction input: trigger in, slave in, zeroing, master, teach; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating		
Digital interface		Ethernet / RS422		
Analog output		4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit D/A converter)		
Switching output		Error1-Out, Error2-Out		
Digital output		Sync out		
Connection		12-pin M12 connector for supply, Ethernet, RS422 and Sync 17-pin M12 connector for I/O analog and encoder optional extension to 3 m / 6 m / 9 m / 15 m possible (see accessories for suitable connection cables)		
Mounting		Radial clamping (see accessories for mounting adapter), threaded holes		
Temperature range	Storage	-20 ... +70 °C		
	Operation	+5 ... +50 °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)	Sensor	IP64 (front)		
	Controller	IP65		
Material		Aluminum housing, passive cooling		
Weight		approx. 500 g	approx. 600 g	approx. 800 g
Control and indicator elements		Correct button, LEDs for Intensity, Range, Link and Data		

^[1] All data at constant ambient temperature (24 ±2 °C). 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)

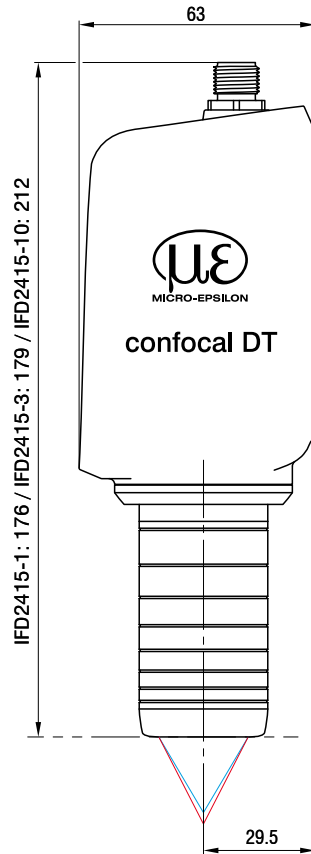
^[3] Maximum deviation from reference system over the entire measuring range, measured on front surface of ND filter

^[4] In the mid of the measuring range

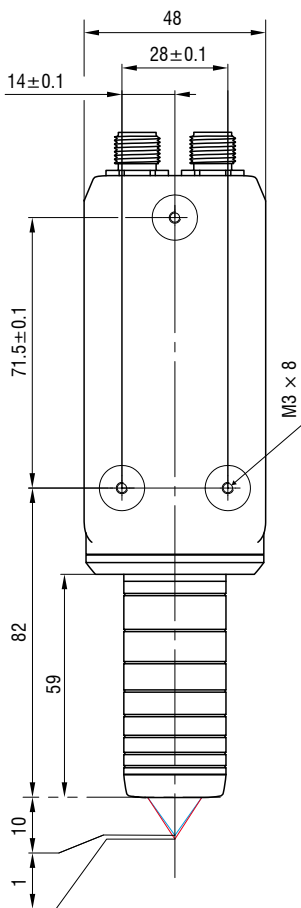
^[5] Maximum sensor tilt angle that produces a usable signal on polished glass (n = 1.5) in the mid of the measuring range. The accuracy decreases when approaching the limit values.

Dimensions

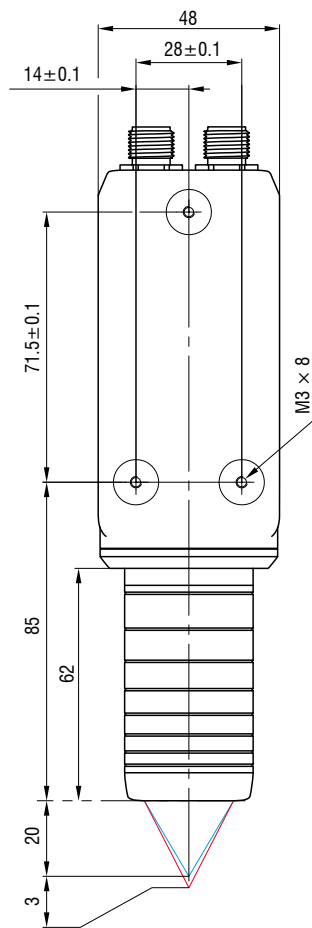
(in mm, not to scale)



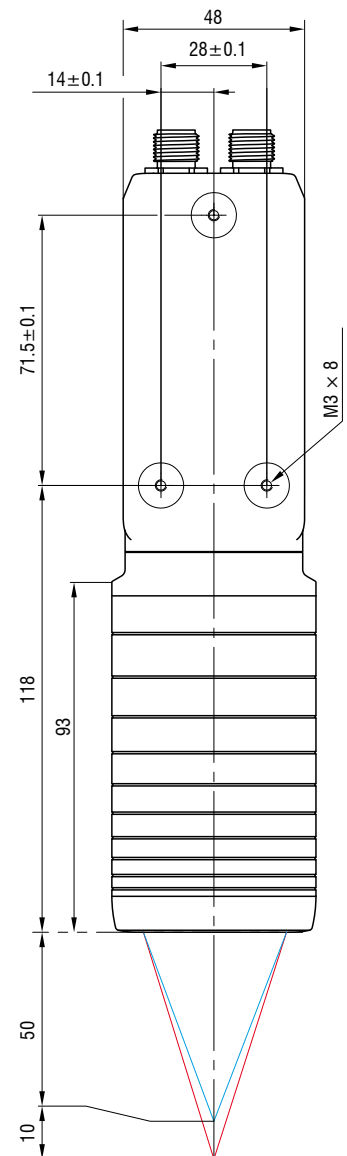
IFD2415-1/IE
IFD2415-1 Ethernet



IFD2415-3/IE
IFD2415-3 Ethernet



IFD2415-6/IE
IFD2415-6 Ethernet

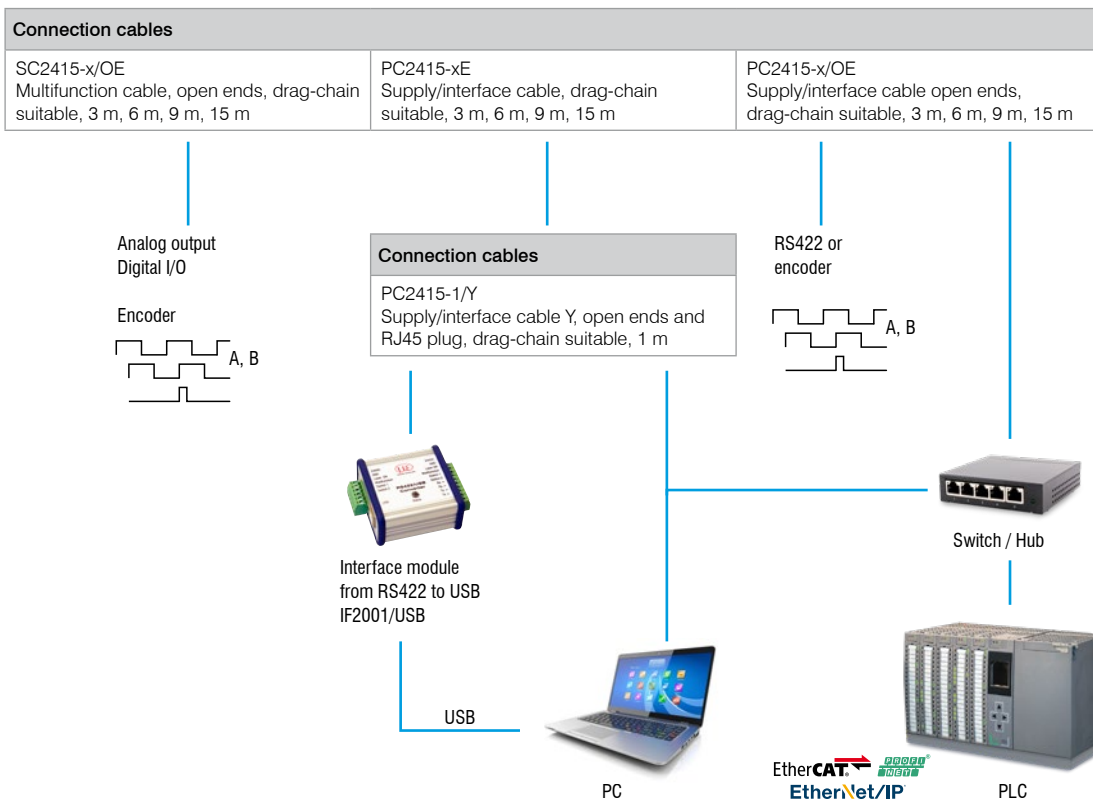


Connection possibilities confocalDT

IFD2410 / IFD2415



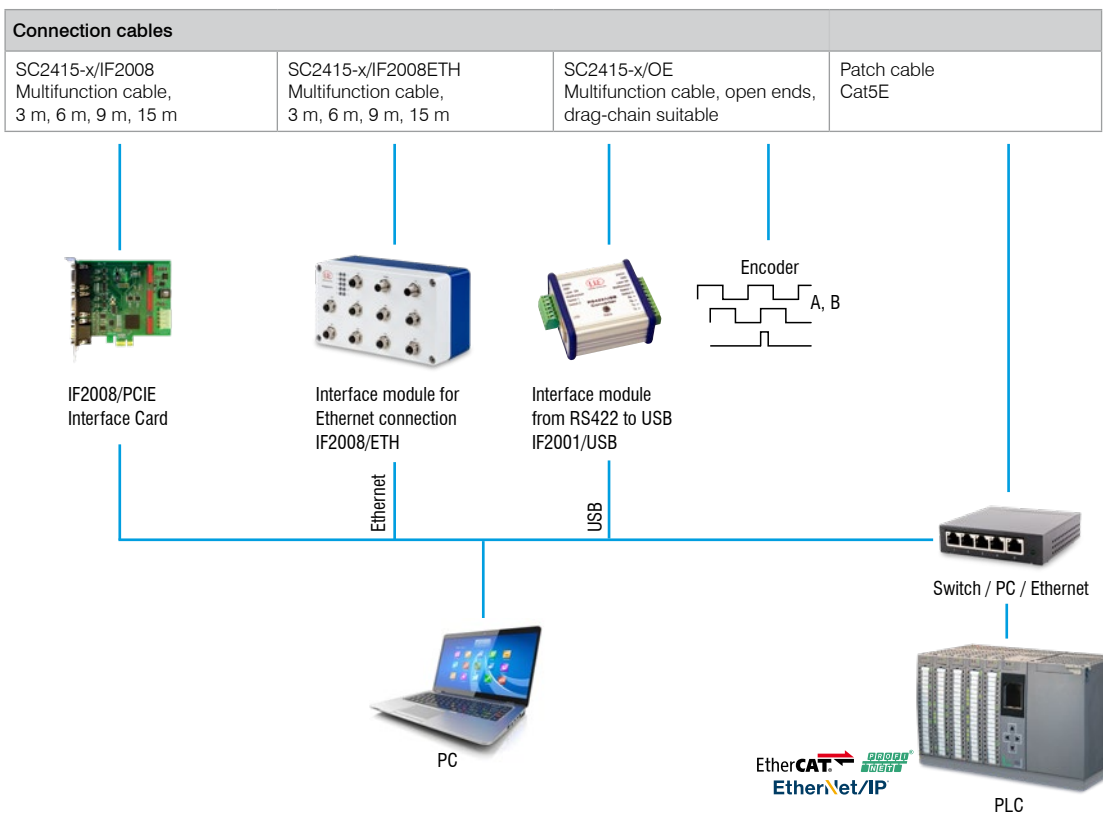
* Can be connected via the PS2020 power supply unit (24 V / 2.5 A)



IFC2411 / IFC2416 IFC2412 / IFC2417



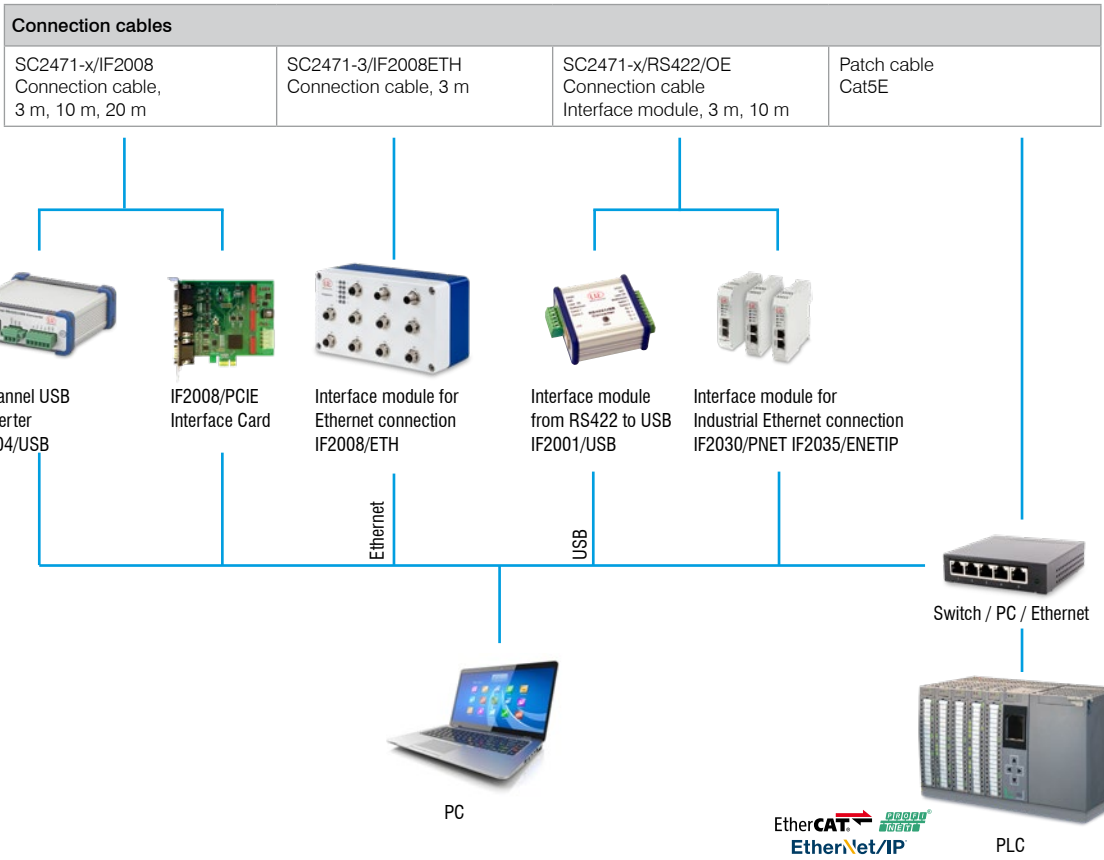
* Can be connected via the PS2020 power supply unit (24 V / 2.5 A)



IFC242x/IFC246x



* Can be connected via the PS2020 power supply unit (24 V / 2.5 A)



Customer-specific modifications

Application examples are often found where the standard versions of the sensors and the controllers are reaching their limits. To facilitate such special tasks, it is possible to customize the sensor design and to adjust the controller accordingly.

Common requests for modifications include changes in design, mounting options, customized cable lengths and modified measuring ranges.

Possible modifications

- Sensors with connector
- Cable length
- Vacuum suitability up to UHV
- Specific lengths
- Customer-specific mounting options
- Optical filter for ambient light compensation
- Housing material
- Measuring range / Offset distance



Accessories

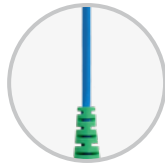
Optical fiber and vacuum feedthrough

All Micro-Epsilon confocal controllers are compatible with any IFS240x sensor.

The IFS2402 and IFS2403 sensors already have integrated optical fibers



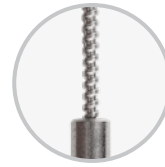
Standard fiber optics



Fiber optics suitable for drag chains



Protective hose for mechanical stress



Robot-compatible fiber optics



Vacuum / UHV version HT version

Sensor-specific optical fiber 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

Optical fiber extension for sensors

CE2402 cable with 2x E2000/APC connectors

CE2402-x Extension for optical fiber (3 m, 10 m, 13 m, 30 m, 50 m)

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

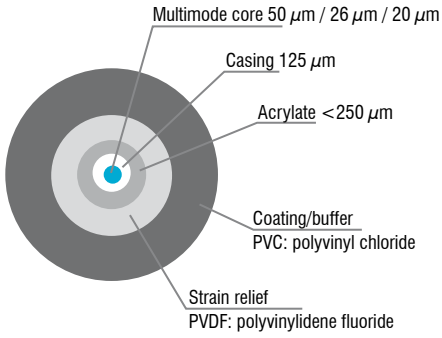
Light source accessories

IFL2422/LED Lamp module for IFC2422 and IFC2466

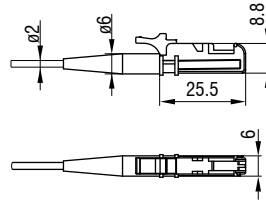
IFL24x1/LED Lamp module for IFC2421 and IFC2465

Structure of standard optical fiber

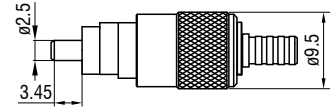
Temperature range : -50 °C to 90 °C
 Bending radius: 30/40 mm



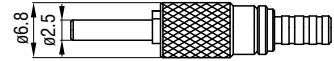
E2000/APC Standard connector



FC/APC Standard connector



DIN connector

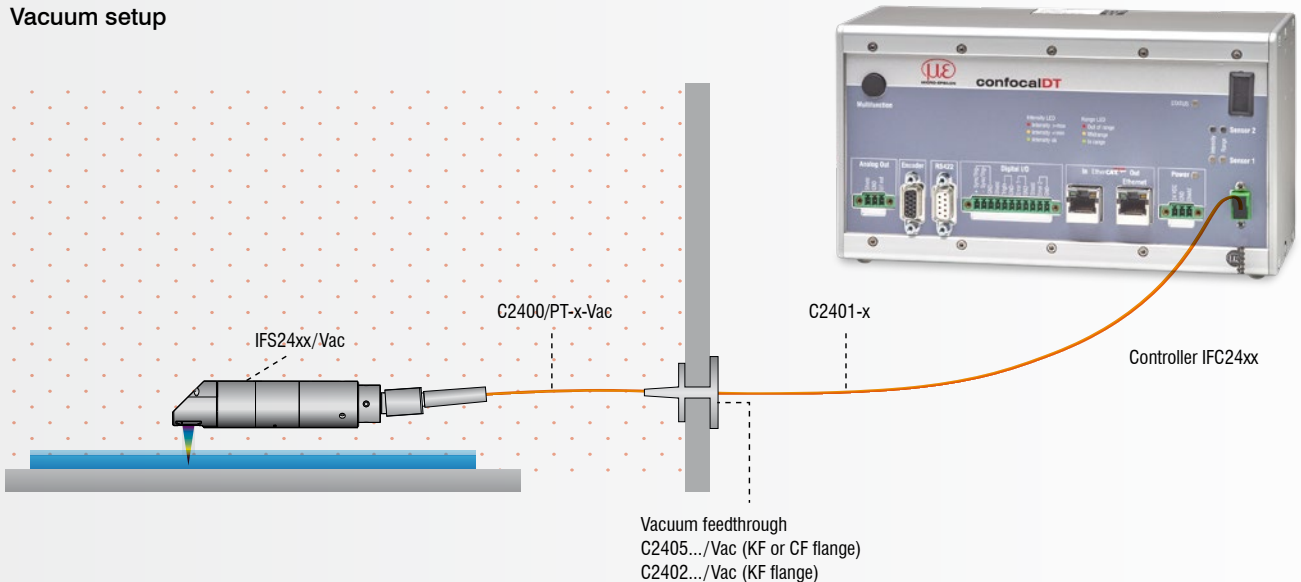


Vacuum feedthrough

- C2402/Vac/KF16 Vacuum feedthrough with optical fiber, 1 channel, vacuum side FC/APC non-vacuum side E2000/APC, clamping flange KF 16
- C2405/Vac/1/KF16 Vacuum feedthrough on both sides FC/APC socket, 1 channel, clamping flange type KF 16
- C2405/Vac/1/CF16 Vacuum feedthrough on both sides FC/APC socket, 1 channel, flange type CF 16
- C2405/Vac/6/CF63 Vacuum feedthrough FC/APC socket, 6 channels, flange type CF 63



Vacuum setup



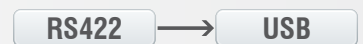
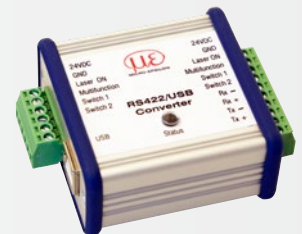
Accessories

Interface modules

Module	IFD2410/IFD2415	IFC2411/12	IFC2416/17	IFC242x	IFC246x
IF2001/USB Single-channel RS422/USB converter cable	✓	✓	✓	✓	✓
IF2004/USB RS422/USB converter to convert up to 4 digital signals to USB	⊘	✓	✓	✓	✓
IF2008/ETH Interface module for Ethernet connection for up to 8 sensors	⊘	✓	✓	✓	✓
IF2008PCIE Interface card for multiple sensor signals; analog and digital interfaces	⊘	✓	✓	✓	✓
IF2035/PNET Interface module for Industrial Ethernet connection (PROFINET)	⊘	⊘	⊘	✓	✓
IF2035/ENETIP Interface module for Industrial Ethernet connection (EtherNet/IP)	⊘	⊘	⊘	✓	✓

IF2001/USB converter RS422 to USB

The RS422/USB converter converts the digital signals of a confocal controller into a USB data packet. The sensor and the converter are connected via the RS422 interface of the converter. Data output is via the USB interface. The converter also passes through additional signals and functions such as laser on/off, switch signals and function output. The connected controllers and the converter can be programmed through software.

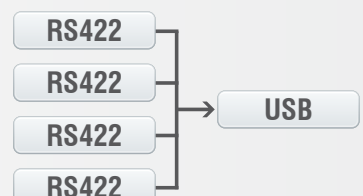


Characteristics

- Robust aluminum housing
- Easy sensor connection via screw terminals (plug and play)
- Conversion from RS422 to USB
- Supports baud rates from 9.6 kBaud to 12 MBaud

IF2004/USB: 4-channel converter from RS422 to USB

The RS422/USB converter is used for transforming digital signals of up to four confocal controllers into USB data signals. The converter has four trigger inputs and a trigger output for connecting additional converters. Data is output via a USB interface. The connected controllers and the converter can be programmed through software. The COM interfaces can be used individually and can be switched.



Characteristics

- 4x digital signals via RS422
- 4x trigger inputs, 1x trigger output
- Synchronous data acquisition
- Data output via USB

IF2008/ETH

Interface module for Ethernet connection with up to 8 sensors

The IF2008/ETH integrates up to eight sensors and/or encoders with an RS422 interface into an Ethernet network. Four programmable switching in-/outputs (TTL and HTL logic) are available.

Ten indicator LEDs directly on the module show both the channel and the device status. In addition, acquisition and output of data via Ethernet is performed at high speeds up to 200 kHz. Parameter setting of the interface module can be easily done via the web interface.



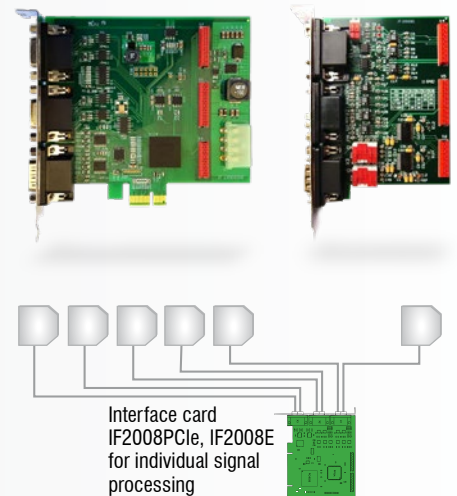
IF2008PCle/IF2008E

Interface card for synchronous data acquisition

Absolute synchronous data acquisition is a decisive factor for the deflection or straightness measurement using several controllers. The IF2008PCle interface card is designed for installation in PCs and enables the synchronous acquisition of four digital sensor signals and two encoders. The data is stored in a FIFO memory in order to enable resource-saving processing in blocks in the PC. The IF2008E expansion board also enables the acquisition of two digital controller signals, two analog controller signals and eight I/O signals.

Characteristics

- IF2008PCle - Basic printed circuit board: 4 digital signals and 2 encoders
- IF2008E - Expansion board: 2x digital signals, 2x analog signals and 8x I/O signals



IF2035

Interface module for Industrial Ethernet connection

The IF2035 interface modules are designed for easy connection of Micro-Epsilon sensors to Ethernet-based fieldbuses. The IF2035 is compatible with sensors that output data via an RS422 or RS485 interface and supports the common Industrial Ethernet protocols EtherCAT, PROFINET and EtherNet/IP.

On the sensor side, these modules operate with up to 4 Mbd and feature two network connections for different network topologies. In addition, the IF2035-EtherCAT offers a 4-fold oversampling function that enables faster measurements than the bus cycle would otherwise allow, if required. Installation in control cabinets is via a DIN rail.

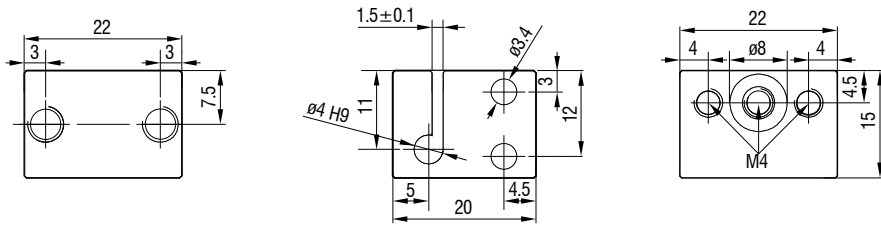


Accessories

Mounting adapter

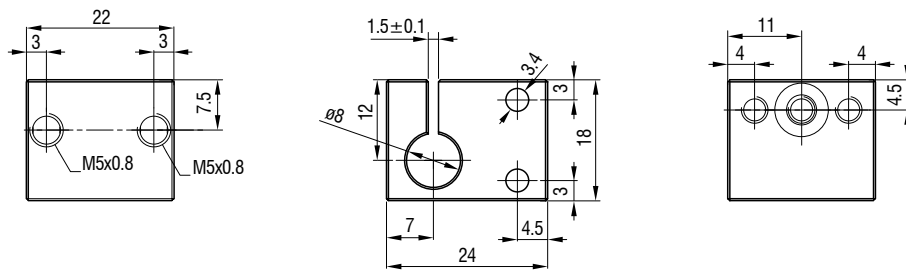
Sensor mounting adapter

MA2402 for 2402 sensors



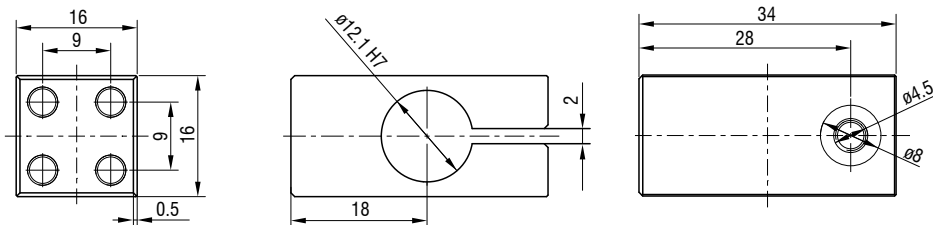
Sensor mounting adapter

MA2403 for IFS2403 sensors



Sensor mounting adapter

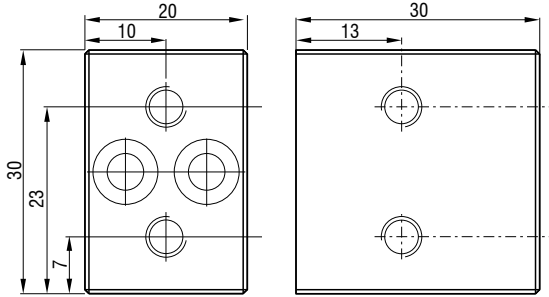
MA2404-12 for IFS2404-2 / IFS2404/90-2 / IFS2404-4 / IFS2407-0,1 / IFS2407-0,8 sensors



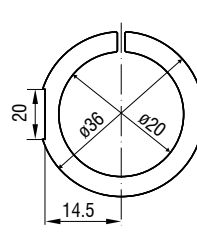
Sensor mounting adapter

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

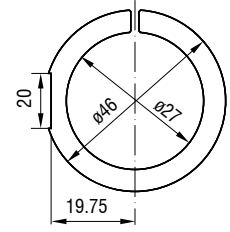
Mounting block



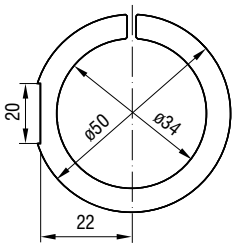
Mounting rings



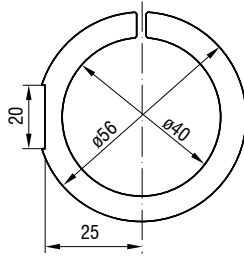
MA 2406-20 for sensors
IFS2406-2,5
IFS2406/90-2.5



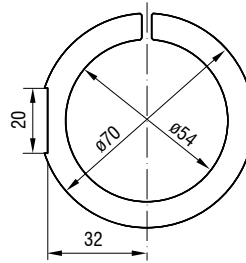
MA 2400-27 for sensors
IFS2404-1 / -3 / -6
IFS2405-0,3 / -1
IFS2406-3 / -10



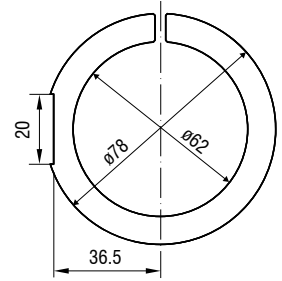
MA 2405-34 for sensors
IFS2405-3
IFS2404-18



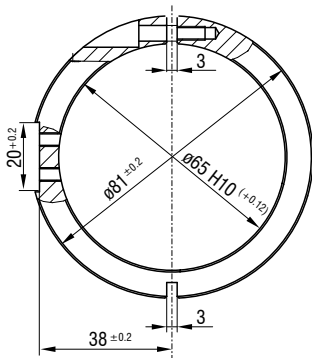
MA 2405-40 for sensor
IFS2405-6



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



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



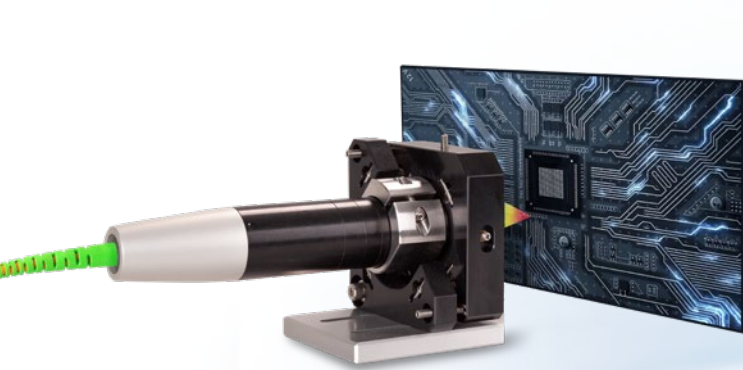
MA 2407-65 for sensor
IFS2407-1,5

Dimensions in mm,
not to scale.

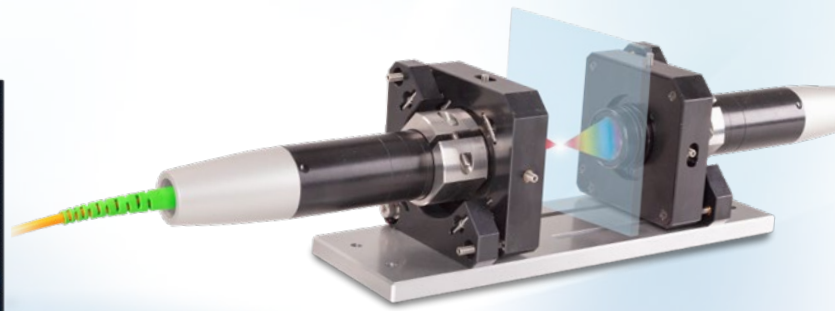


Accessories

Adjustable mounting adapters



JMA-xx mounting adapter for distance measurements



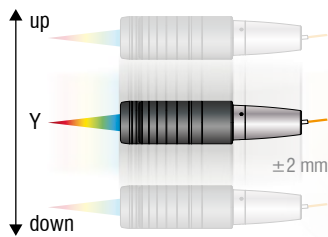
JMA-Thickness mounting adapter for two-sided thickness measurements

The adjustable JMA mounting adapter simplifies the alignment and fine adjustment of confocal sensors. The sensors are integrated and aligned directly in the machine together with the adapter. This corrects, e.g., minor deviations caused by mounting and compensates for tilted measuring objects. With two-sided thickness measurements, the JMA-Thickness mounting adapter supports the fine alignment of the two measuring points.

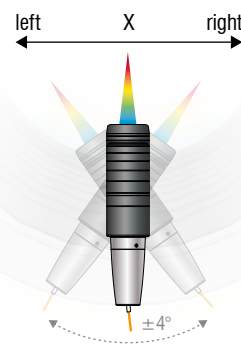
1 Max. shift in X ± 2 mm



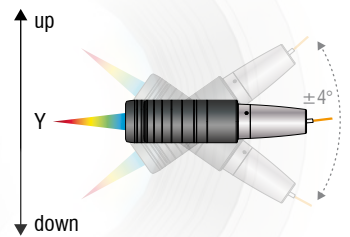
2 Max. shift in Y ± 2 mm



3 Max. tilt angle in X $\pm 4^\circ$

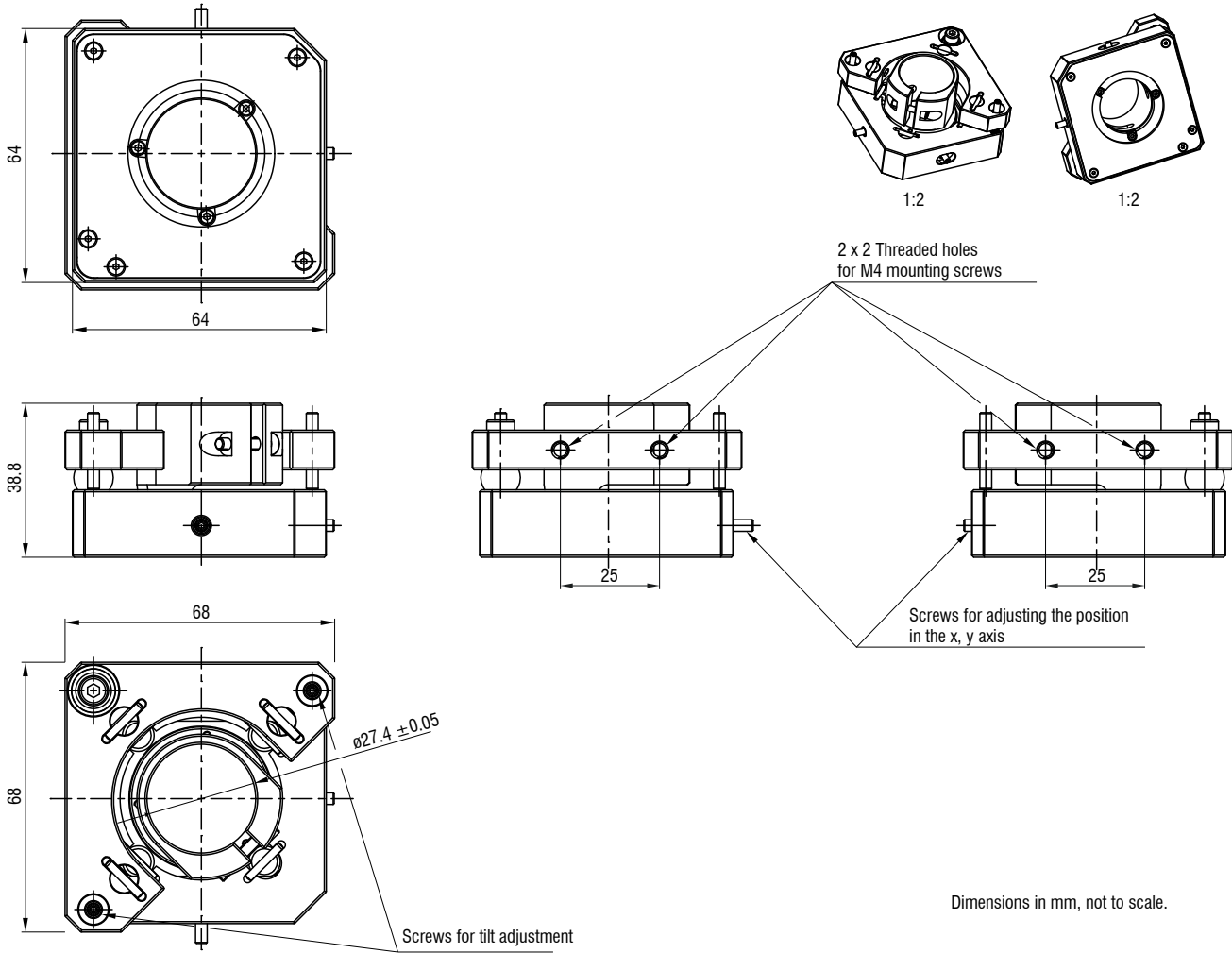


4 Max. tilt angle in Y $\pm 4^\circ$

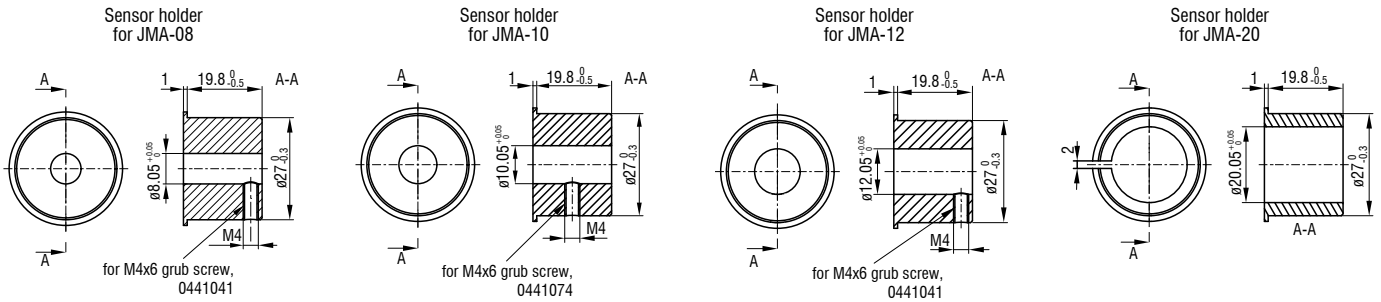


Dimensions

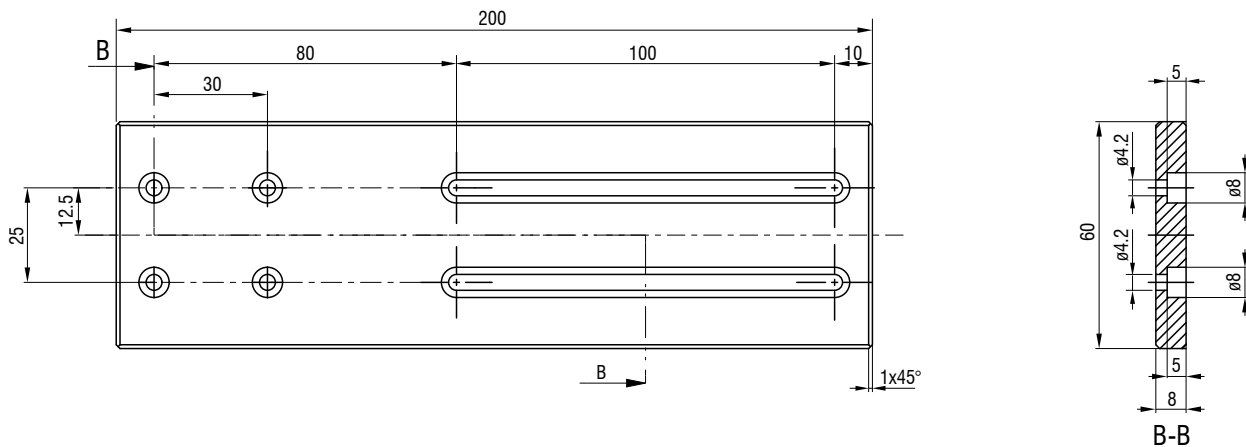
Adjustable mounting adapter JMA



Holder for smaller sensor diameters



Mounting plate JMP for JMA-Thickness



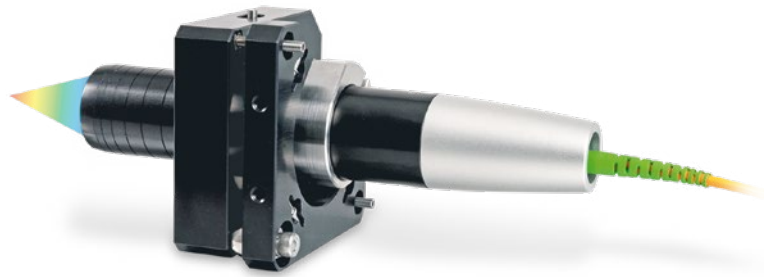
Accessories

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

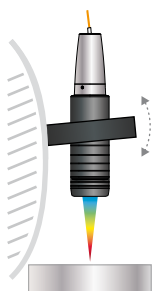
Scope of supply

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

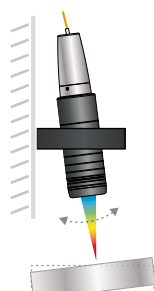
Application examples:

Alignment

Subsequent correction of the mounting position

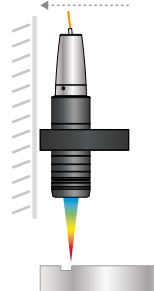


Compensates for incorrect target position



Positioning

Shifting the sensor to target area



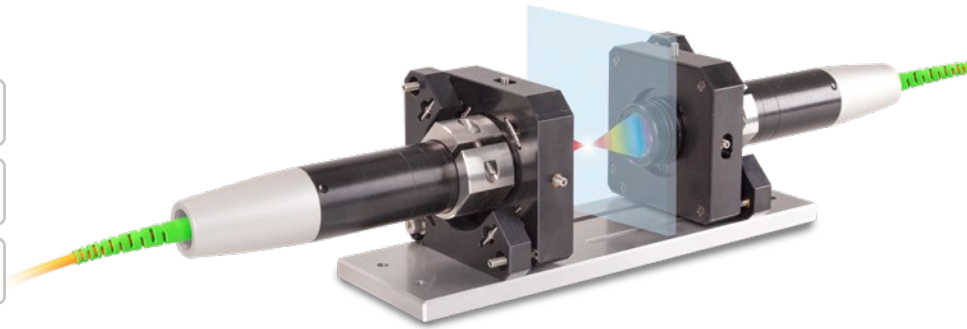
Accessories

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

<p>Without JMA-Thickness: Measurement error with tilted target</p>	<p>Without JMA-Thickness: Incorrect thickness measurement with vibrations</p>	<p>Without JMA-Thickness: Sensors positioned incorrectly – no thickness measurement possible</p>
<p>With JMA-Thickness: Measures exactly at the opposite position</p>	<p>With JMA-Thickness: Sensors are on one optical axis – provides stability even with vibrating objects</p>	<p>With JMA-Thickness: Optimal positioning support – object visible for both sensors</p>

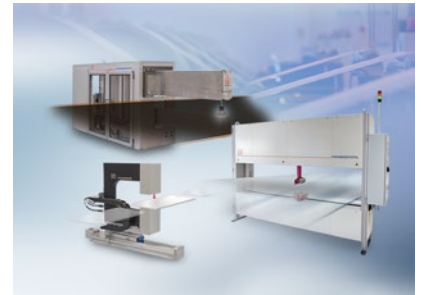
Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



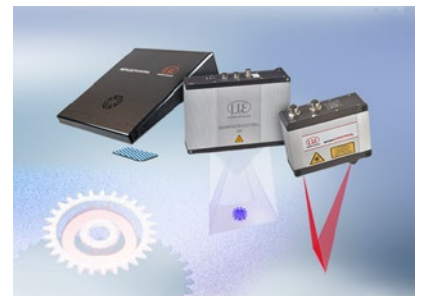
Measuring and inspection systems for metal strips, plastics and rubber



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