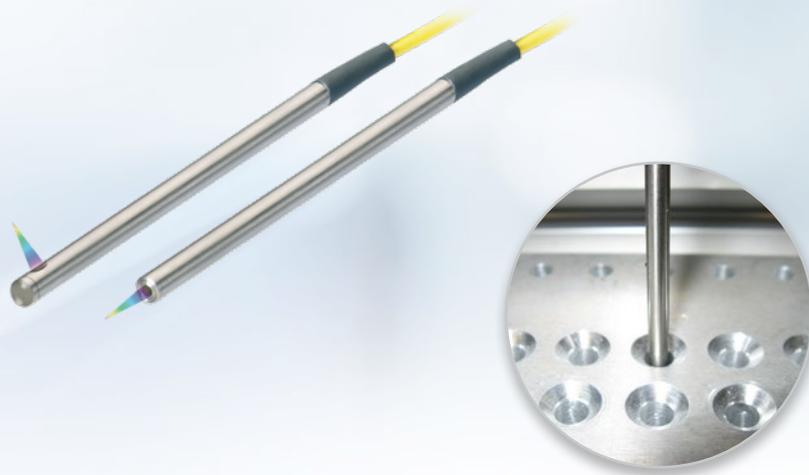# More Precision

confocalDT // Confocal chromatic sensor system

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
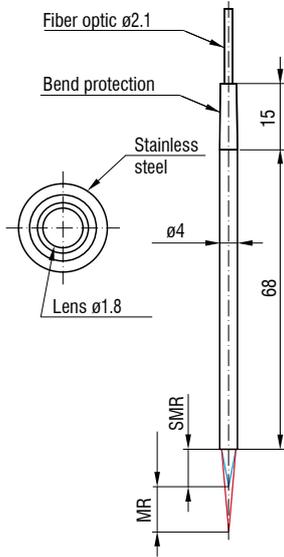[3] RMS noise relates to mid of measuring range (1 kHz)
[4] All data at constant ambient temperature (25±1 °C). Measurement on plane-parallel test glass. Acceptance report is enclosed with delivery
[5] Maximum sensor measuring angle up to which a usable signal can be achieved on reflective surfaces, with accuracy decreasing toward the limit values
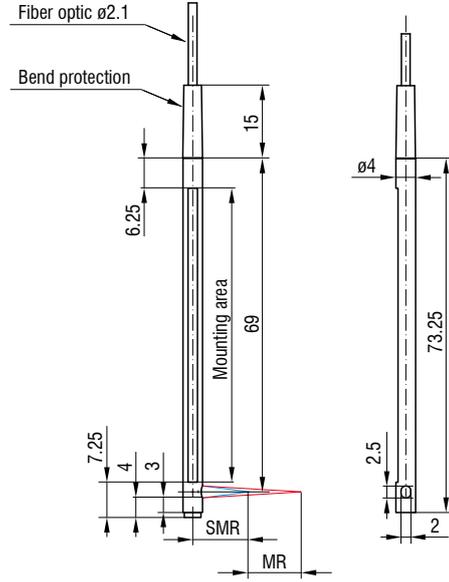[6] No thickness measurement possible. Distance measurement only possible if thickness of glass > measuring range. Measurements on metal only possible to a limited extent.

Dimensions

(in mm, not to scale)

IFS2402-x

Fiber optic ø2.1

Bend protection

Stainless steel

ø4

Lens ø1.8

15

68

SMR

MR

IFS2402/90-x

Fiber optic ø2.1

Bend protection

6.25

Mounting area

15

69

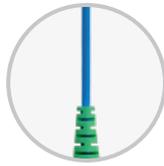7.25

4

3

SMR

MR

ø4

2.5

73.25

2

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 Other versions: C2401/PT3-x C2401-x(01) C2401-x(10) C2401-x(20)	with FC/APC and E2000/APC connectors (3 m, 5 m, 10 m, customer-specific length up to 50 m) Optical fiber with protective hose for mechanical stress (3 m, 5 m, 10 m, customer-specific length up to 50 m) Optical fiber core diameter 26 μm (3 m, 5 m, 15 m) Drag-chain suitable optical fiber (3 m, 5 m, 10 m) Robot-suitable optical fiber (3 m, 5 m, 10 m)	⊘	✔	✔	✔	✔	⊘
C2400-x Other versions: C2400/PT-x C2400/PT-x-Vac	2x FC/APC connectors (3 m, 5 m, 10 m, customer-specific length up to 50 m) [5] Optical fiber with protective hose for mechanical stress (3 m, 5 m, 10 m, customer-specific length up to 50 m) [5] 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

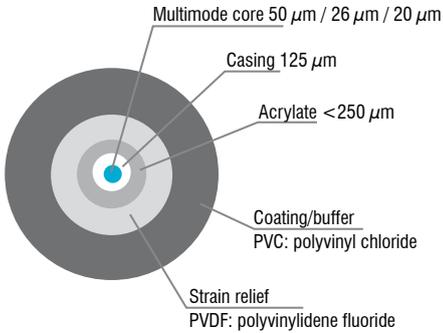|	
CE2402-x	Extension for optical fiber (3 m, 10 m,13 m, 30 m, 50 m)
CE2402/PT3-x	Optical fiber extension with protective hose for mechanical stress (3 m, 10 m, customer-specific length up to 50 m)

Light source accessories

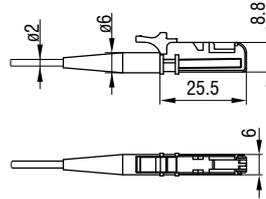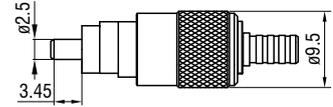|	
IFL2422/LED	Lamp module for IFC2422 and IFC2466
IFL24x1/LED	Lamp module for IFC2421 and IFC2465

Structure of standard optical fiber

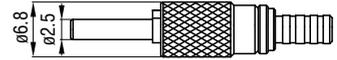Temperature range : -50 °C to 90 °C

Bending radius: 30/40 mm

- Multimode core 50 µm / 26 µm / 20 µm
- Casing 125 µm
- Acrylate < 250 µm
- Coating/buffer
  PVC: polyvinyl chloride
- Strain relief
  PVDF: polyvinylidene fluoride

E2000/APC Standard connector

ø2 ø6 8.8 25.5 6

FC/APC Standard connector

ø2.5 3.45 ø9.5

DIN connector

ø6.8 ø2.5

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

IFS24xx/Vac

C2400/PT-x-Vac

C2401-x

Controller IFC24xx

Vacuum feedthrough
C2405.../Vac (KF or CF flange)
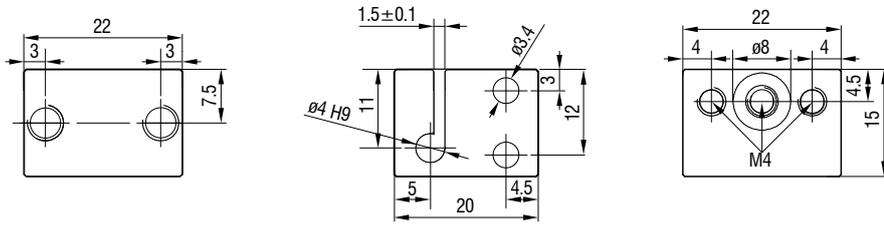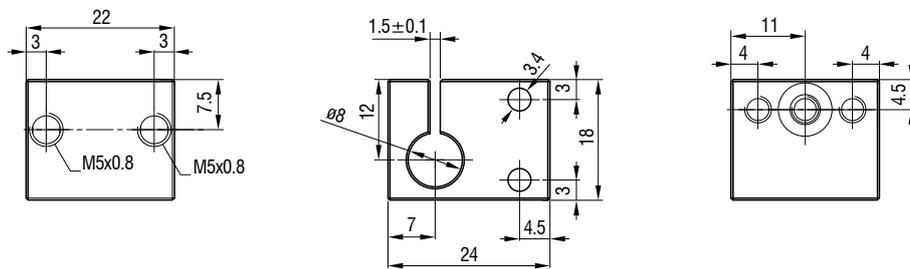C2402.../Vac (KF flange)
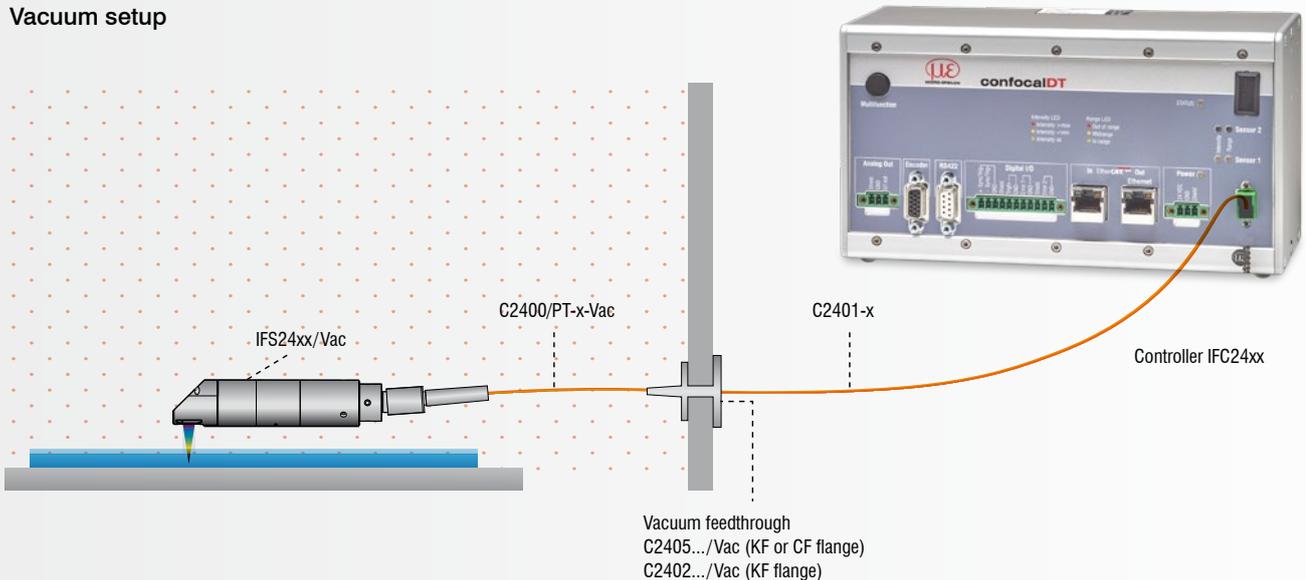
Accessories
Mounting adapter

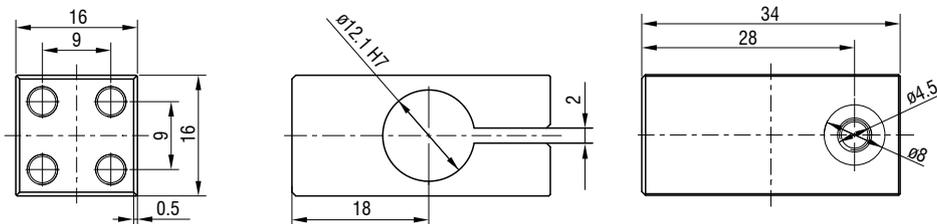**Sensor mounting adapter**

MA2402 for 2402 sensors

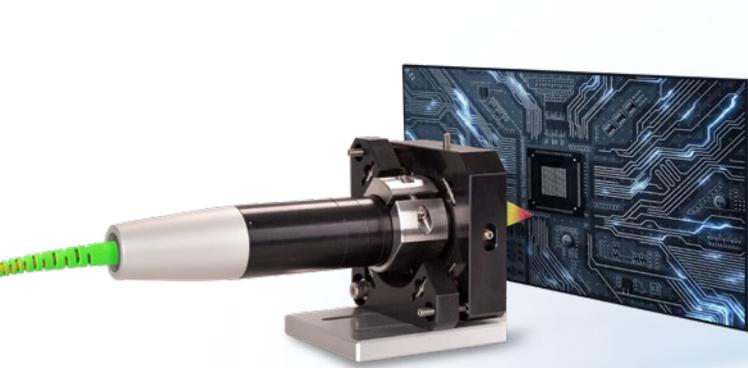**Sensor mounting adapter**

MA2403 for IFS2403 sensors

Sensor mounting adapter

MA2404-12 for IFS2404-2 / IFS2404/90-2 / IFS2404-4 / IFS2407-0,1 / IFS2407-0,8 sensors
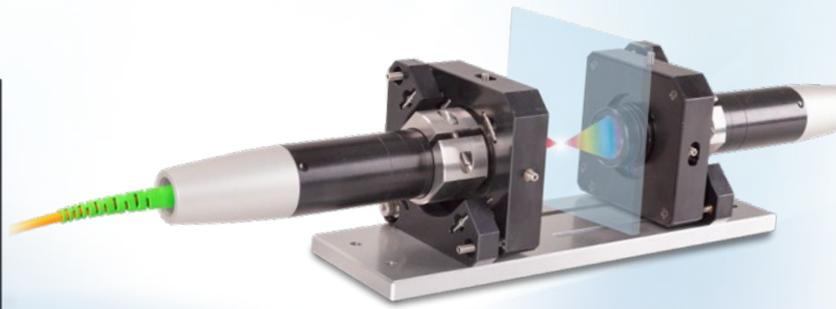
Accessories
Adjustable mounting adapters

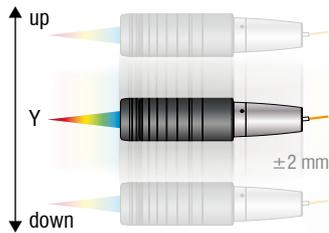JMA-xx mounting adapter for distance measurements

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.
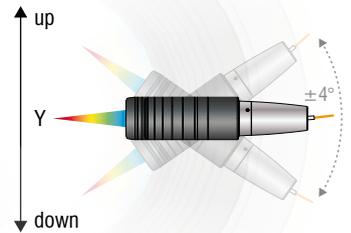
❶ Max. shift in X ±2 mm

❷ Max. shift in Y ±2 mm

❸ Max. tilt angle in X ±4°

❹ Max. tilt angle in Y ±4°

Dimensions

Adjustable mounting adapter JMA

64

64

38.8

68

68

ø27.4 ±0.05

Screws for tilt adjustment

1:2

1:2

2 x 2 Threaded holes
for M4 mounting screws

25

25

Screws for adjusting the position
in the x, y axis

Dimensions in mm, not to scale.
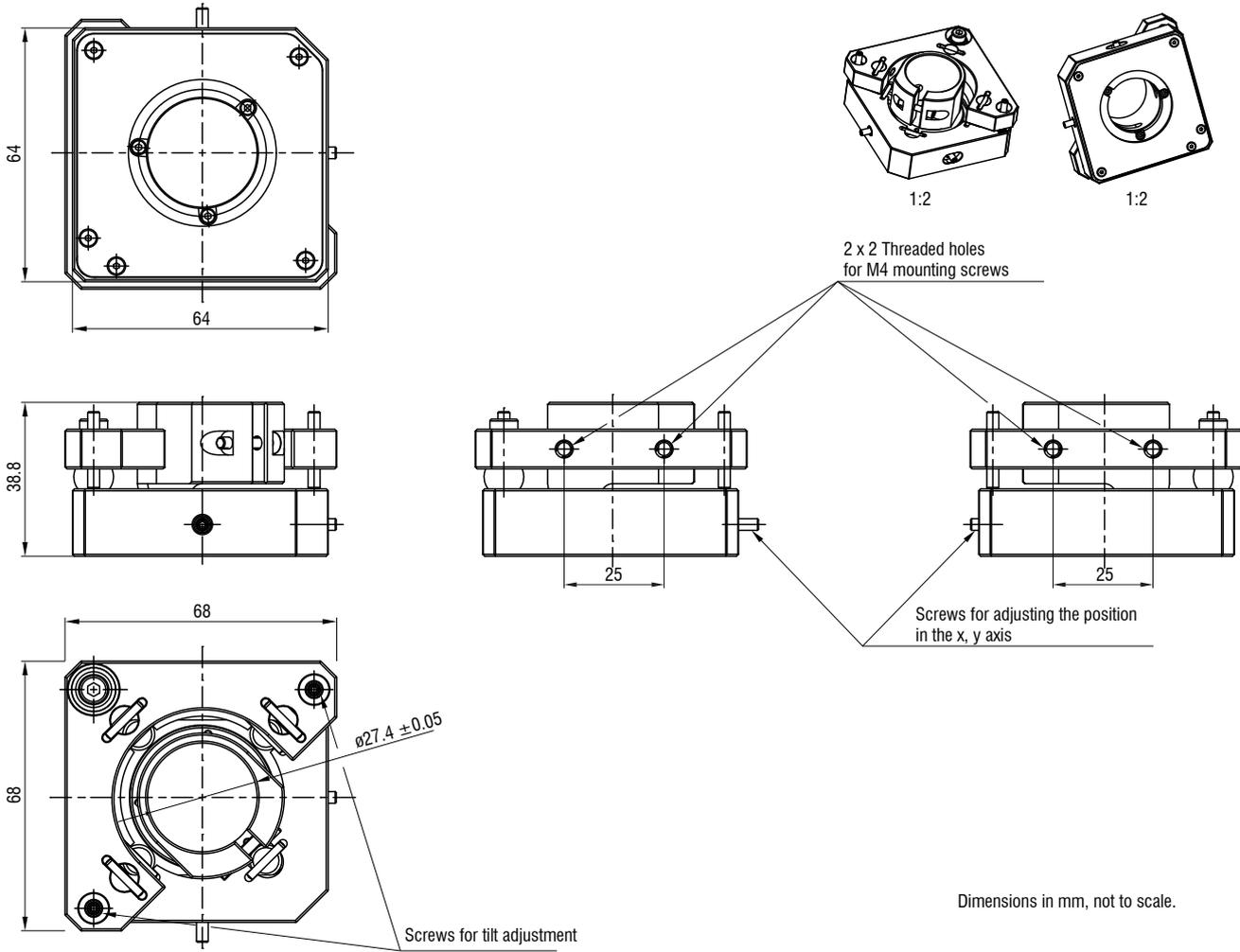
Holder for smaller sensor diameters

Sensor holder
for JMA-08

A

A

A-A

A-A

1

$19.8_{-0.5}^{0}$

$ø8.05_{0}^{+0.05}$

$ø27_{-0.3}^{0}$

M4

for M4x6 grub screw,
0441041

Sensor holder
for JMA-10

A

A

A-A

1

$19.8_{-0.5}^{0}$

$ø10.05_{0}^{+0.05}$

$ø27_{-0.3}^{0}$

M4

for M4x6 grub screw,
0441074

Sensor holder
for JMA-12

A

A

A-A

1

$19.8_{-0.5}^{0}$

$ø12.05_{0}^{+0.05}$

$ø27_{-0.3}^{0}$

M4

for M4x6 grub screw,
0441041

Sensor holder
for JMA-20

A

A

1

$19.8_{-0.5}^{0}$

2

$ø20.05_{0}^{+0.05}$

$ø27_{-0.3}^{0}$

A-A
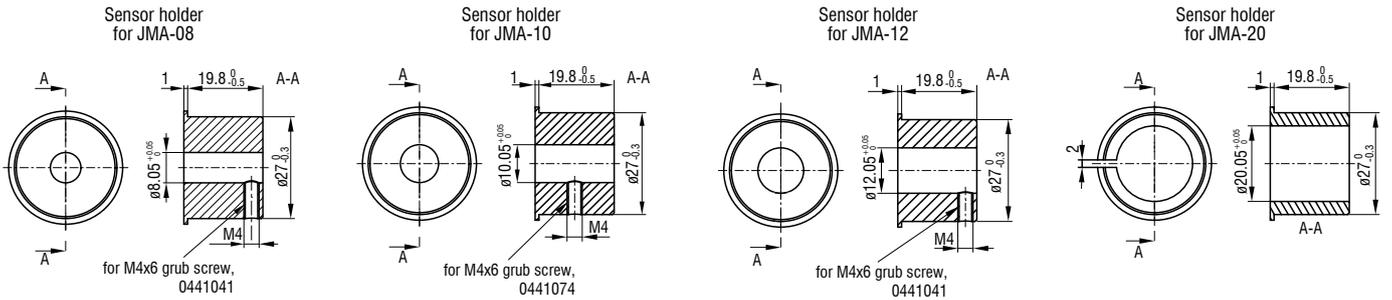
Mounting plate JMP for JMA-Thickness

200

B

80

100

10

30

25
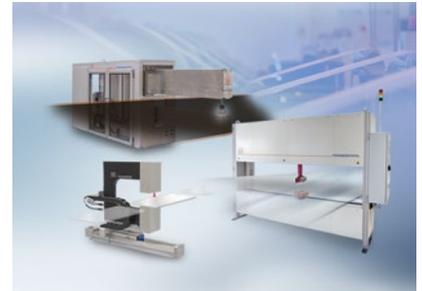
12.5

B

1x45°

5

60

ø4.2

ø8

ø4.2

ø8

5

8

B-B
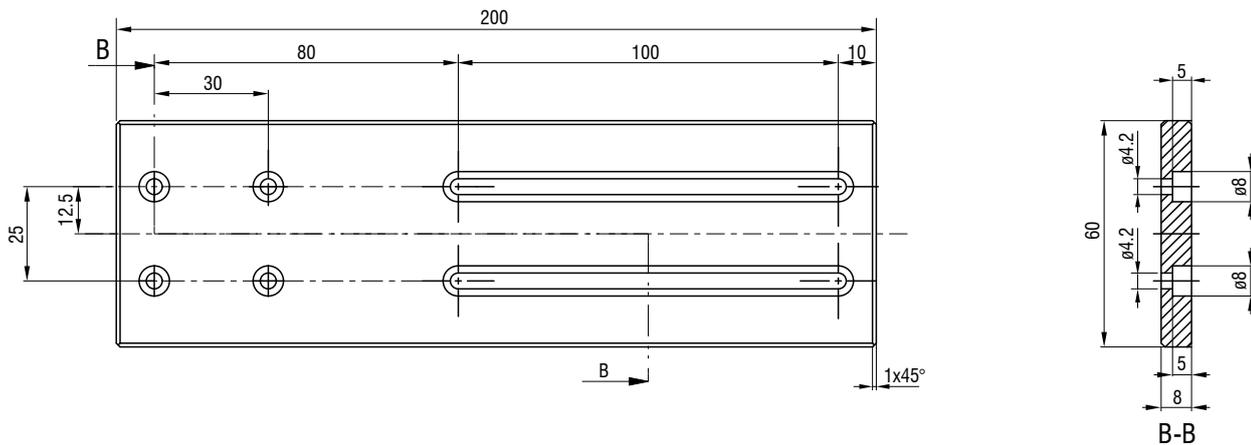
Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

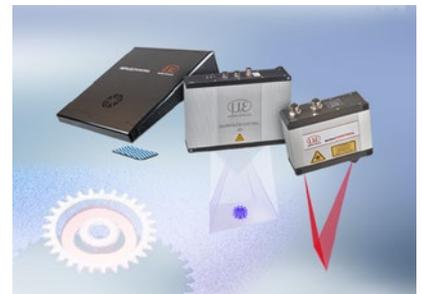Sensors and measurement devices for non-contact temperature measurement

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