MICRO-EPSILON

More Precision.

boreCONTROL

Non-contact internal wall inspection

Sensor system for internal wall inspection

Sensor with integrated rotation drive, plug connectors and exchangeable sensor lance

Exchangeable sensor lance

Confocal chromatic measuring beam

Precise detection of diameters, defects, notches and hollows

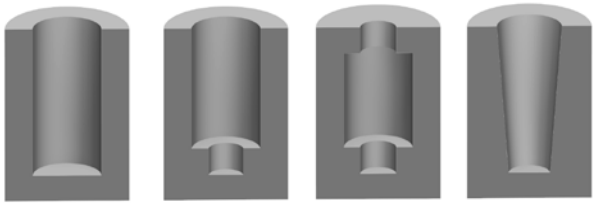
boreCONTROL has been designed for the inspection of small bore holes. The measuring system consists of a sensor with an integrated rotation drive and an exchangeable sensor lance that is loaded on a magnet flange. Due to the rotation of the sensor lance the measurement is effected in a circular way.

The non-contact and wear-free sensor verifies different parameters in bore holes and depressions such as diameter, roundness, concentricity, conicity and straightness. Due to the absolute measurement principle, fluctuating diameters in the measuring range in a measuring process do not pose any problems. A complex precision adaption system with integrated optical coupling and servo motor provides the necessary rotation stability. Measured data conditioning is performed using a compact controller that allows a data acquisition of up to 5kHz. An additional compact controller controls the movements of the servo motor.

Sensor lance BCS24 10/4/10/50
Diameters 4 - 10mm
Immersion depth max. 50mm

Sensor lance BCS24 10/10/16/80
Diameters 10 - 16mm
Immersion depth max. 80mm

Typical applications



Diameter

Steps
Ovality
Roundness

Depressions
Concentricity
Coaxiality

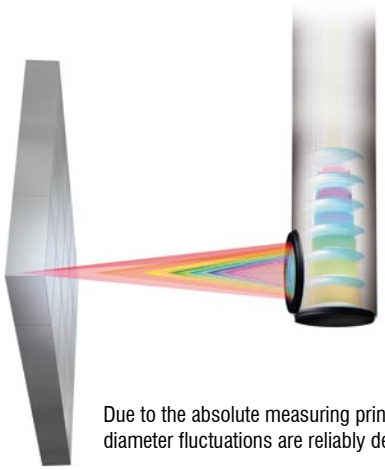
Conicity
Straightness

Special features

- Completely non-contact and wear-free measurement
- High speed sampling rate 5kHz
- Intensity information for surface inspection
- Active temperature compensation
- High repeatability and measurement stability

Confocal chromatic measurement principle

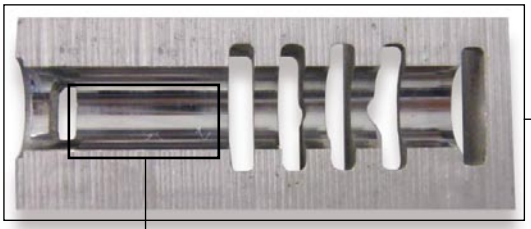
Polychromatic light (white light) is focused onto the target surface by a multi-lens optical system. The discharge of the light is aligned at an angle of 90° to the sensor axis. The lenses are arranged in such a way that the light is broken down by controlled chromatic aberration into monochromatic wavelengths dependent on the displacement. A defined distance point is assigned to each wavelength by a factory calibration. In the sensor system that wavelength of light is used for the measurement that is exactly focused on the target. The light reflected from this point is imaged by an optical arrangement onto a light sensitive sensor element on that the associated spectral colour is detected and evaluated.

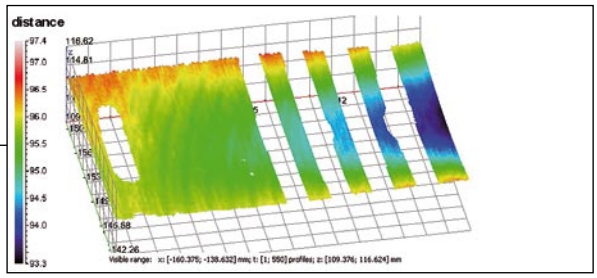


Due to the absolute measuring principle, diameter fluctuations are reliably detected.

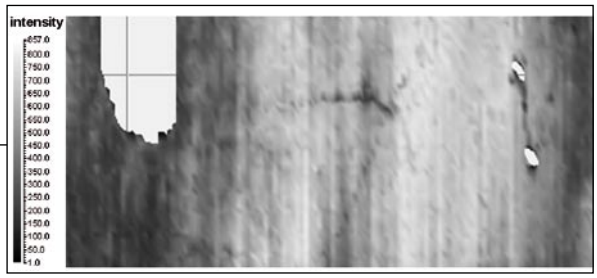
Displacement and intensity measurement

boreCONTROL data packet that includes values regarding displacement, angle and intensity. The displacement values are generated by evaluating the wavelength. The respective angle position is determined by the integral encoder. Signal intensity is used to evaluate the intensity. The intensity data is used for visualisation of defects.





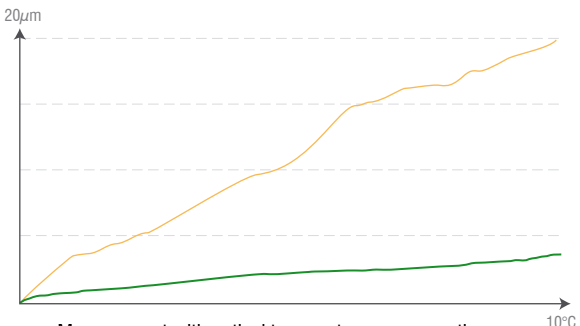
Distance measurement based on wavelength detection



Intensity mode for defect analysis

Optical temperature compensation

Temperature fluctuations that occur in industrial environments can affect the measurement results, particularly if high accuracies are required. To achieve the best possible repeatability, Micro-Epsilon has developed a unique, patented technology for optical temperature compensation. A reference peak, which is used for temperature compensation, is generated via the sensor. Compensation is achieved dynamically in real time, enabling high measurement precision.



■ = Measurement with optical temperature compensation
■ = Measurement without temperature compensation

System design

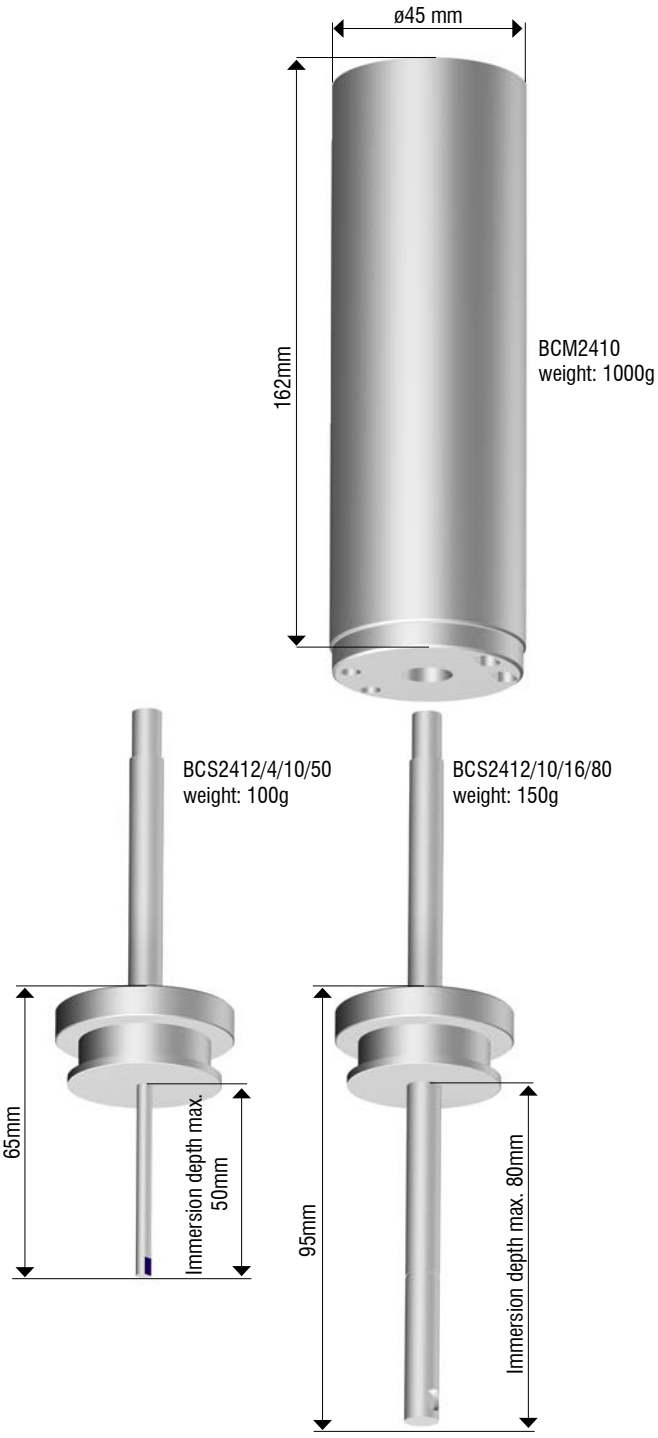
boreCONTROL consists of a sensor with an integrated rotational unit, and an exchangeable sensor probe. The rotational drive is operated by a motor controller, which is connected to the sensor controller. The sensor controller enables set up, configuration and signal processing of the measurement task.

The sensor probe can be easily installed and replaced. Precision mounting greatly simplifies sensor replacement, as the sensor probe is centred automatically. Due to the exchange of both probes, the system can be easily reset for both measuring ranges.

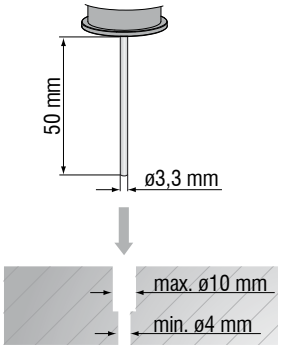
Easy exchange of the sensor lance.

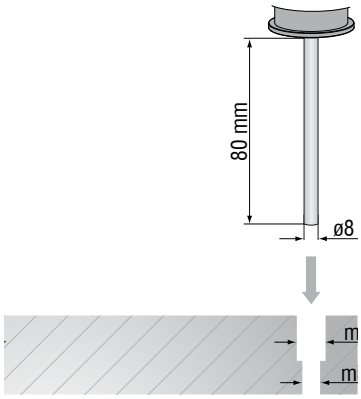
Interfaces

The data packet with the displacement measurement values, angle and intensity is output via the Ethernet interface on the sensor controller and can be used for further processing. For this purpose, the DLL is enclosed, which can be used to integrate boreCONTROL in the customer's own applications.



Sensor lance	BCS2410/4/10/50	BCS2410/10/16/80
Diameter that can be measured approx.	4-10mm	10-16mm
Sampling rate max.	max. 5kHz	max. 5kHz
Diameter measurement spot	20µm	20µm
Dynamic repeatability	0.6µm	0.6µm
Deviation from the measured value	<2µm	<2µm
Angle accuracy	0.04°	
Tilt angle max. (direct reflection)	±3°	±5°





Rotation mechanics	BCR2410
Dimensions	ø45mm, length approx.162mm (without lance)
Rotation speed max.	3000rpm
Total weight (without sensor lance)	1000g
Operating temperature	10 ... 40°C
Power supply	24VDC
Cable length	3 / 5 / 10 m

Specified accuracy to the following general conditions:
100 repetitions; sampling rate 2.5kHz; engine speed 120 rpm; temperature drift: <1K/h; calibration ring DIN 2250 7mm/13mm
As accuracies can vary with different surfaces and characteristics, we kindly ask you to contact us.
We will be pleased to check the technical feasibility of the measurement task.

System components

BCR2410 Rotation drive, comprising
- BCC2410 Motor controller
- BCM2410 Rotation mechanics
- S2410-x Sensor cable (3m/10m)
- SC2410-x Data cable (3m/5m/10m)
- DSC2410-0,25 Synchronisation cable
- Mounting ring

BCS2412/4/10/50
Sensor lance for ø 4-10mm
Immersion depth max. 50mm

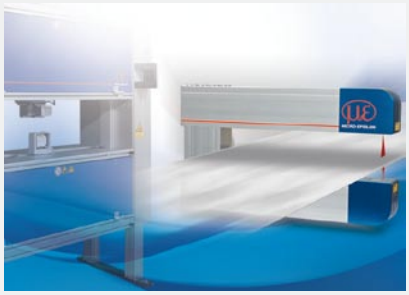
BCS2412/10/16/80
Sensor lance for ø 10-16mm
Immersion depth max. 80mm

IFC2451 Sensor controller

Sensors and systems from Micro-Epsilon

Sensors and systems for displacement, position and dimension

Sensor for non-contact temperature measurement



Measurement and inspection systems

Optical micrometers

Sensors for colour recognition

Technical endoscopes

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