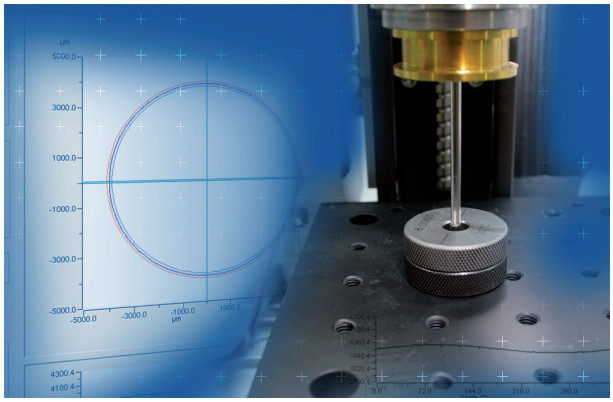
MICRO-EPSILON



Instruction manual

boreCONTROL

Measuring system for
internal wall inspection in bore holes

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Certified according to DIN EN ISO 9001: 2008

Contents

1. Safety

Knowledge of the operating instructions is a prerequisite for equipment operation.

1.1 Symbols Used

The following symbols are used in the instruction manual.

⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a situation which, if not avoided, may lead to property damage.
➪	Indicates a user action.
i	Indicates a user tip.

1.2 Warnings

⚠ CAUTION

Connect or disconnect controller components only, if the controller is off.

> Danger of injury

> Damage to or destruction of the controller

The power supply and the display/output device must be connected in accordance with the safety regulations for electrical equipment.

> Danger of injury

> Damage to or destruction of the controller

The power supply may not exceed the specified limits.

> Danger of injury

> Damage to or destruction of the controller

NOTICE

Avoid shock and vibration to the sensor and controllers.

> Damage to or destruction of the sensor and controllers

Avoid exposure to aggressive materials (washing agent, penetrating liquids or similar) on the sensor lance.

> Damage to or destruction of the sensor

> Failure of the measuring device

1.3 Notes on CE Identification

The following applies to the measuring system boreCONTROL:

- EMC regulation 2004/108/EC
- Machinery Directive 2006/42/EC

Products which carry the CE mark satisfy the requirements of the EMC regulation 2004/108/EC ‘Electromagnetic Compatibility’ and the European standards (EN) listed therein. The EC declaration of conformity is kept available according to EC regulation, article 10 by the authorities responsible at

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The system is a not automatically operable device (component). An EC declaration of conformity or CE identification is therefore not issued by Machinery Directive.

1.4 Proper Use

- The system is designed for industrial use in automated manufacturing and machine monitoring. It is used for internal wall inspection in bore holes, recesses, depressions, notches and hollows
- The system may only be operated within the limits specified in the technical data, see data sheet.
- The system should only be used in such a way that in case of malfunction or failure personnel or machinery are not endangered.
- Additional precautions for safety and damage prevention must be taken for safety-related applications.

1.5 Proper Environment

- Protection class controller: IP 40
- Operating temperature: +10 to +40 °C (+50 to +104 °F)
- Storage temperature: -20 to +70 °C (-4 to +158 °F)
- Humidity: 5 - 95 % (non condensing)
- Ambient pressure: atmospheric pressure
- EMC: According to EN 61000-6-3: 2007
  EN 61000-6-2: 2005

2. Functional Principle, Technical Data

2.1 Short Description

The rotating confocal miniature sensor measures the inner surface of rotational solids e.g. diameter, roundness, concentricity, tapering and straightness. The beam path is applied in the radial direction.

Measured data conditioning is performed using a compact controller which enables data acquisition of up to 30 kHz (standard 2 kHz).

Due to the absolute measuring principle, fluctuating diameters in the measuring range in a measuring process do not pose any problems. A complex attached precision ball bearing system with integrated optical coupling and servo motor provides the necessary rotation stability.

Another compact controller controls the movements of the rotation unit.

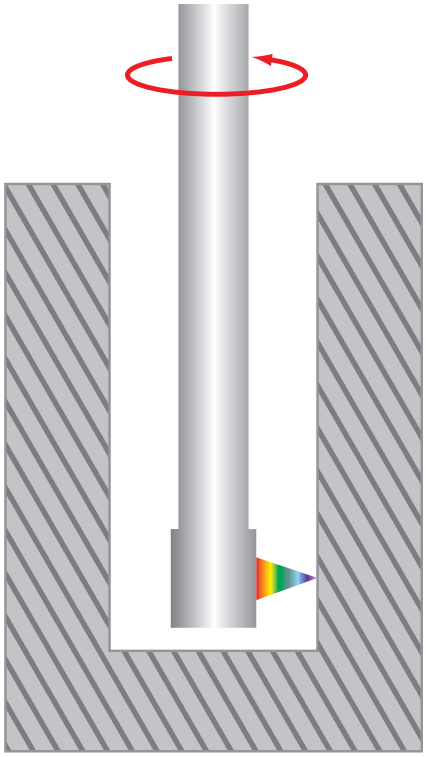
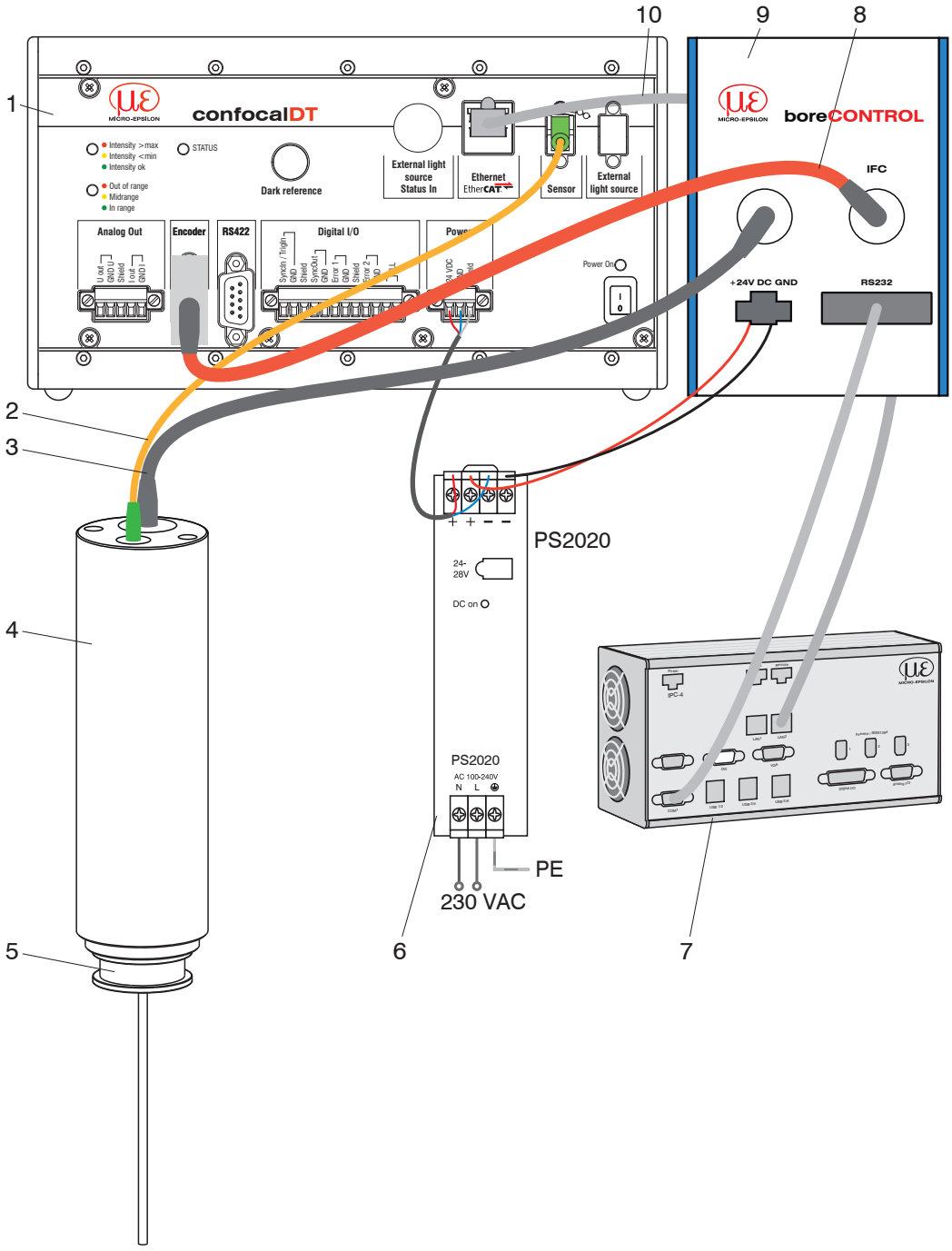


Fig. 1 Measuring principle for internal wall inspection

2.2 Measuring Setup



1	Sensor controller	IFC24x1
2	Optical fiber (Sensor cable)	S2410-x
3	Data cable	SC2410-03
4	Rotation unit	BCM2410
5	Sensor lance with confocal sensor	BCS2412-4,5/10
6	Power supply	PS2020
7	boreSYSTEM with plug and play measurement software	BC-IPC, optional
8	Synchronization cable	SC2410-0.5
9	Controller, boreCONTROL	BCC2410
10	LAN cable	

3. Delivery

3.1 Supplied Items

1 Sensor controller IFC24x1

1 BCR2410 consisting of BCM2410 and controller BCC2410

1 Sensor lance BCS241x-x with fitting calibration ring

1 Optical fiber (sensor cable) S2410-x

1 Data cable SC2410-03

1 LAN cable

1 Synchronization cable SC2410-0.5

1 Serial cable RS232

1 CD with demo software and boreCONTROL-SDK

1 Disassembly aid

Optional Accessories, separate packed:

1 Power supply PS2020 1 boreSYSTEM

➪ Remove the parts of the system carefully from the packaging and transport them in such a way that they are not damaged.

➪ Check for completeness and shipping damages immediately after unpacking. In case of damage or missing parts, please contact the manufacturer or supplier.

3.2 Storage

Storage temperature: 0 °C up to +75 °C

Relative humidity: 0 - 95 % (non-condensing)

4. Mounting

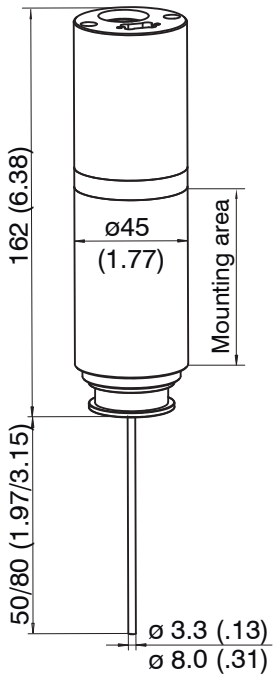
The sensors of the series BCS241x-x are optical sensors, which are used to measure in µm-range.

i Handle optical sensors with care during mounting and operation.

4.1 Rotation Unit BCM2410

⚠ CAUTION

Danger by detecting and winding the hair, the clothes. Wear a hair net and tight clothing with rotary rotation unit.



Legend:
mm
(inches)

➪ Mount the rotation unit with a mounting adapter, see Fig. 3.

This type of sensor mounting offers maximum reliability because the rotation unit is clamped around its cylindrical housing. It is absolutely necessary in difficult installation environments, e.g. on machines, production plants etc.

Fig. 2 Dimensional drawing rotation unit with sensor lance, dimensions in mm (inches)

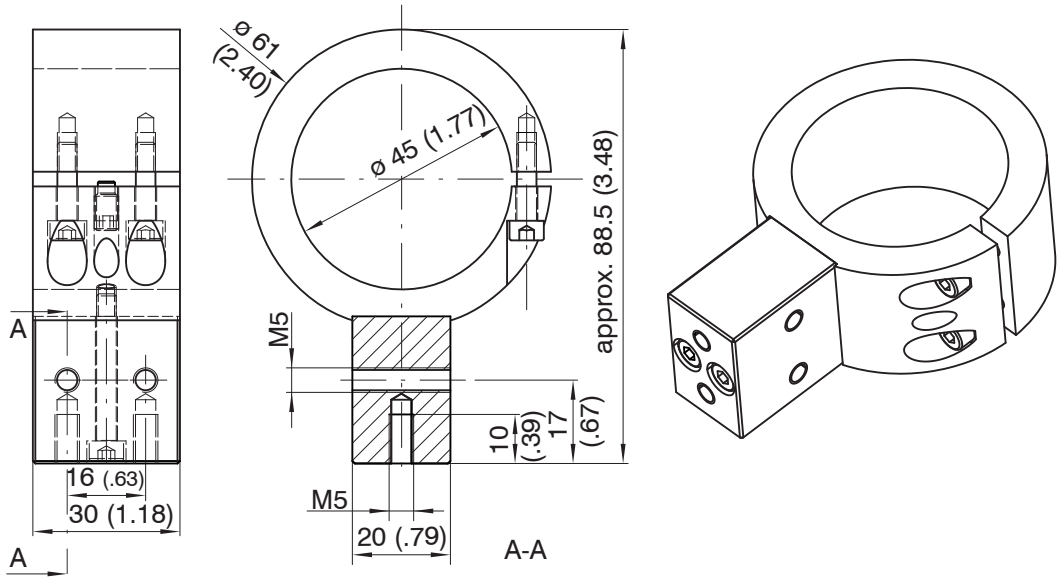


Fig. 3 Dimensional drawing mounting adapter, dimensions in mm (inches), not to scale

4.2 Controller BCC2410

Keep the connectors free in mounted position.

➡ Mount the controller on a DIN rail type TS35.

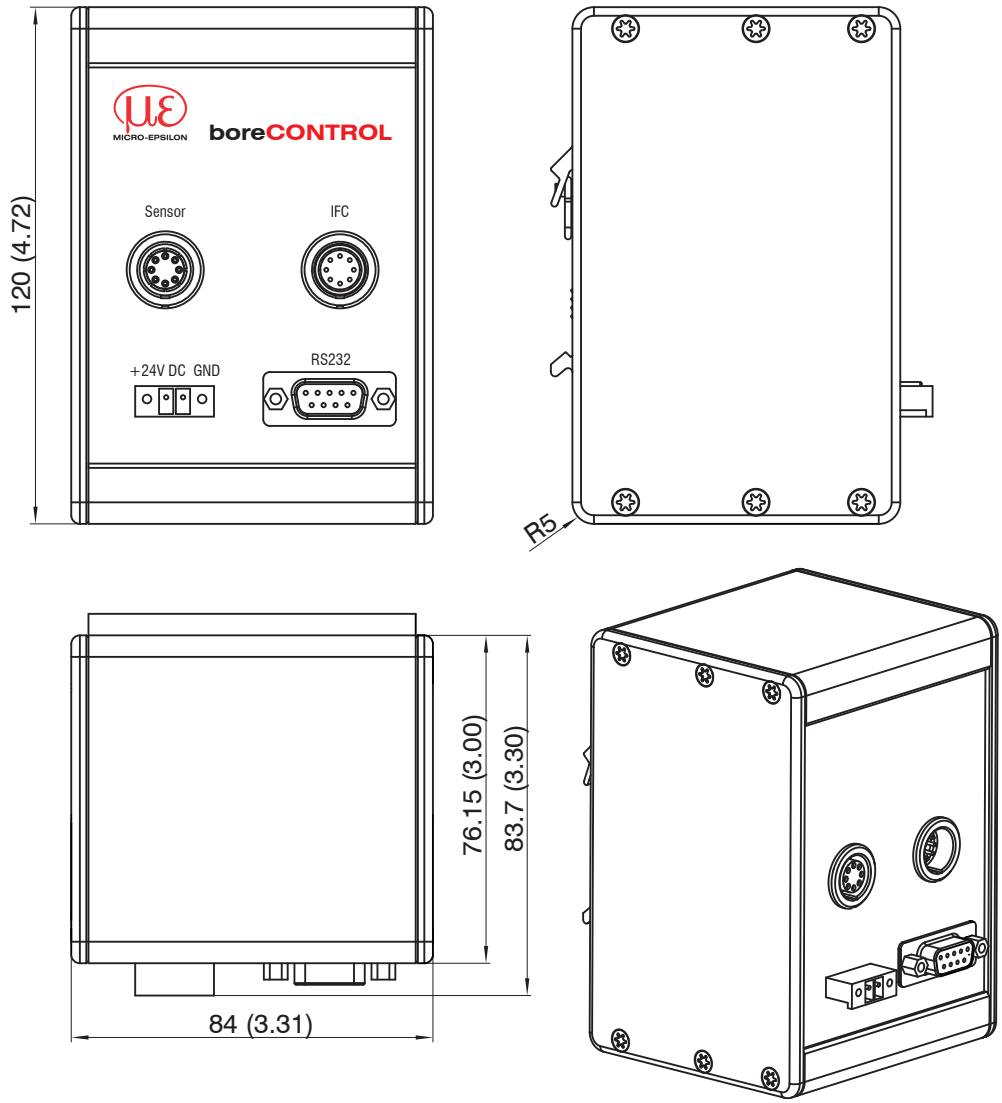
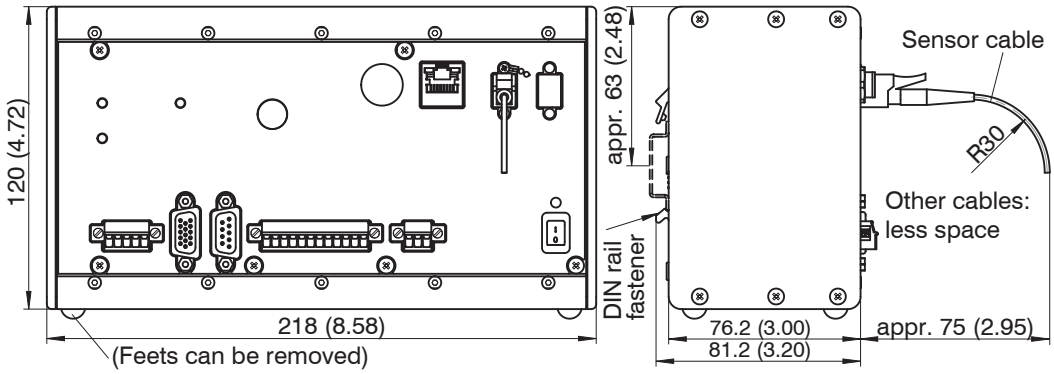


Fig. 4 Dimensional drawing BCC2410, dimensions in mm (inches), not to scale

4.3 IFC24x1

Keep the function keys, connectors and LEDs free in mounted position.

➨ Mount the controller on a DIN rail type TS35.



Legend:
mm
(inches)

Fig. 5 Dimensional drawing IFC24x1

4.4 Electrical Connections BCC2410

4.4.1 Power Supply

The plug-in terminal strip is designed for a conductor cross section of 0.25 mm² to 1.0 mm². The terminal strip is mounted on the controller with two screws and can be removed for wiring or a fast controller change.

➨ Connect the inputs “24 V” and “0 V” to a 24 V power supply.

MICRO-EPSILON recommends to use the optionally available power supply PS2020 for the controller. Features: DIN rail mounting, input 230 VAC, output 24 VDC/2.5 A.

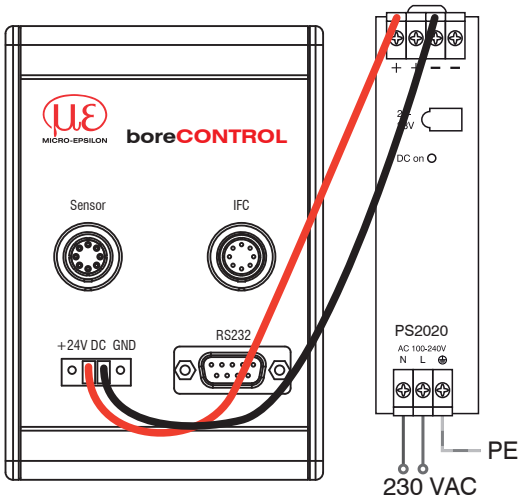


Fig. 6 Power supply of the boreCONTROL with a PS2020

4.4.2 Rotation Unit BCM2410

Connect the controller (connector “Sensor“) with the rotation unit. Please use the SC2410-03 cable.

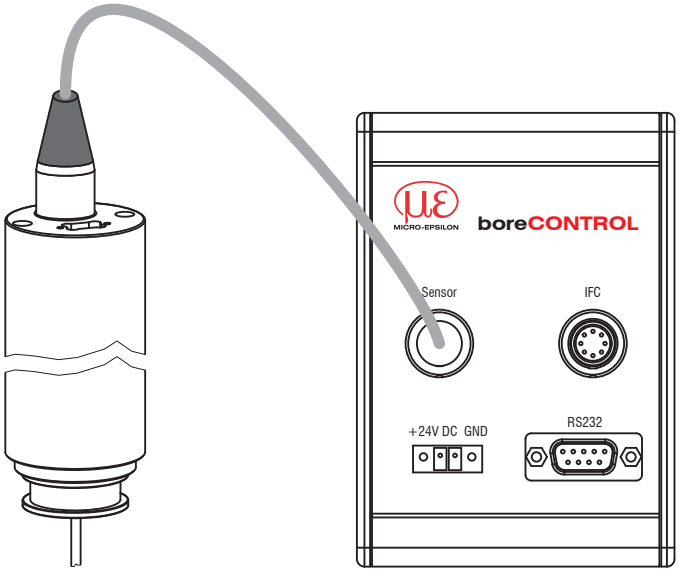


Fig. 7 Rotation unit connect to the boreCONTROL

4.4.3 IFC 24x1

Connect the controller (connector “IFC“) with the IFC24x1. Use the SC2410-0,5 cable.

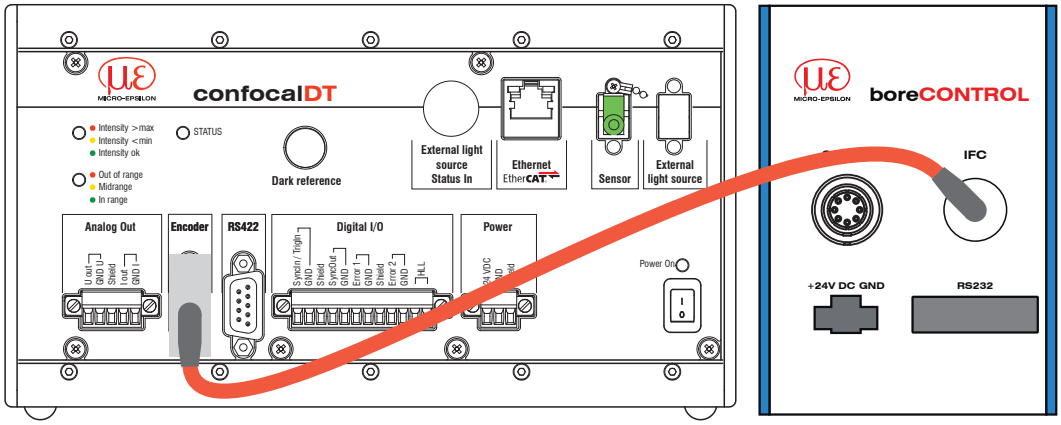
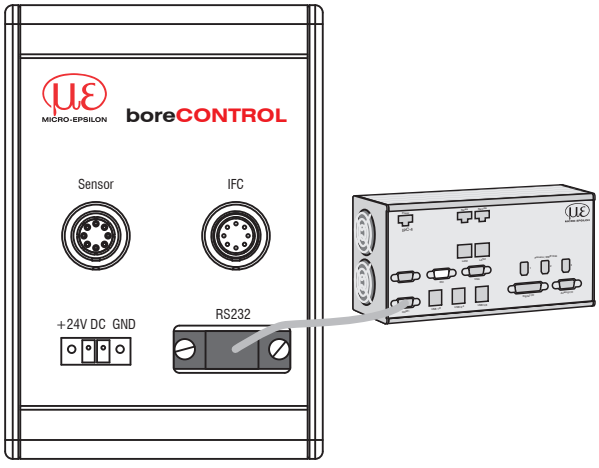


Fig. 8 Sensor controller connected to the boreCONTROL

4.4.4 RS232

Connect the controller (connector “RS232“) with the PC. Use a standard interface cable.

PIN No. 9-pin Sub-D	Assignment
2	TxD
3	RxD
5	GND



Via the RS232 interface, the instructions of the motor control are transferred to the rotation unit.

Baud rate: 9.6 kBaud. Data format: 8 data bits, no parity, one stop bit (8,N,1).

The reference grounds (GND) of controller and receiver (e.g. PC or PLC) must be connected.

4.5 Electrical Connections IFC24x1

4.5.1 Power Supply

Connect the inputs “24 VDC” and “GND” to a 24 V power supply.

MICRO-EPSILON recommends to use the optionally available power supply PS2020 for the controller. Features: DIN rail mounting, input 230 VAC, output 24 VDC/2.5 A.

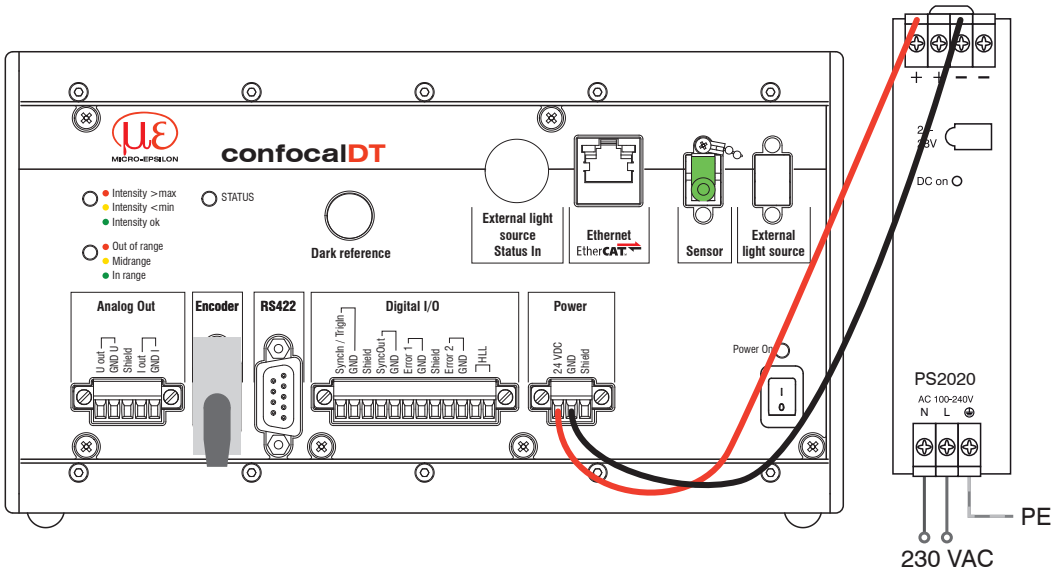


Fig. 9 Power supply of the boreCONTROL with a PS2020

4.5.2 Ethernet

Connect the controller (connector “Ethernet“) with the PC. Use a standard LAN cable.

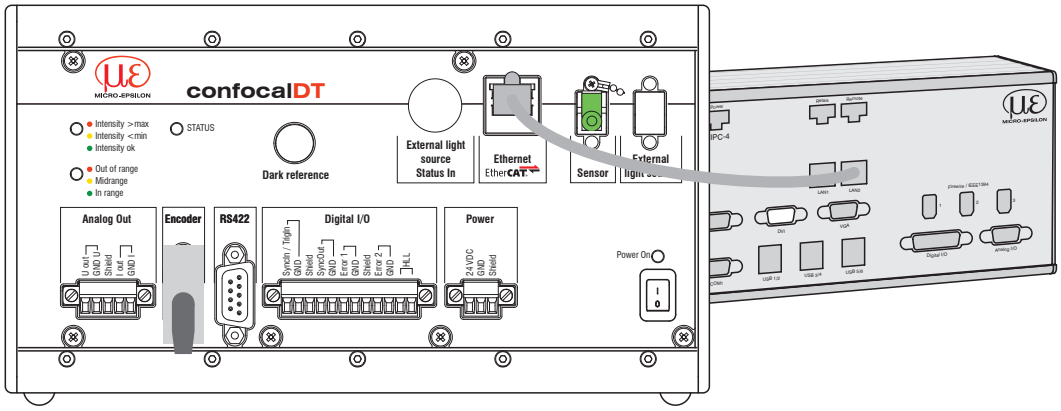


Fig. 10 Ethernet connection between sensor controller and boreSYSTEM

4.5.3 Rotation Unit

Connect the controller (connector “Sensor“) with the rotation unit. Use the S2410-x cable.

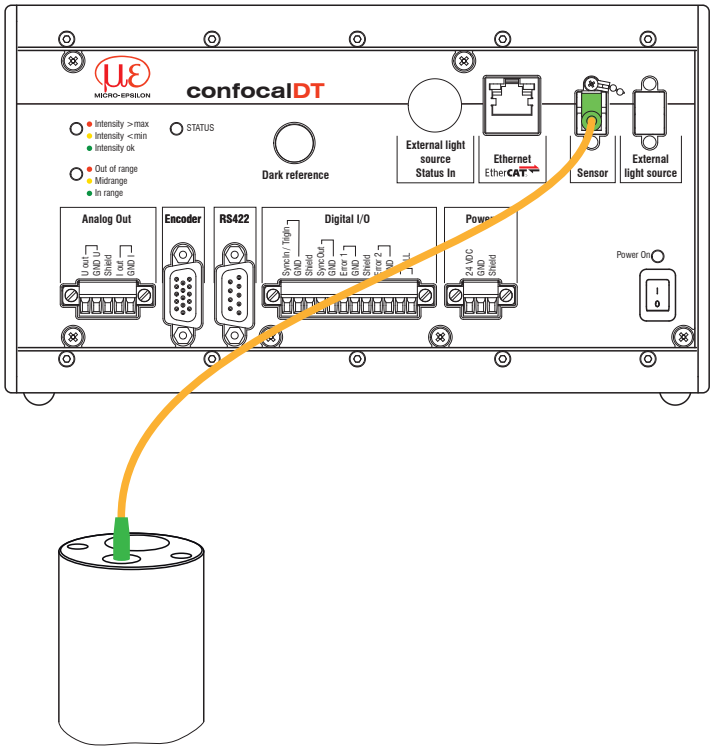
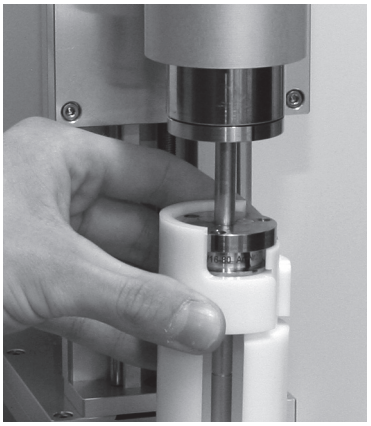


Fig. 11 Connected light source on the rotation unit

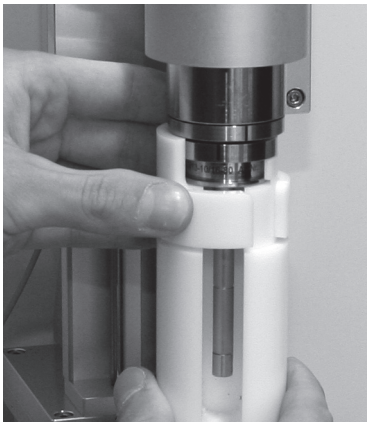
4.6 Mounting the Sensor Lance BCS241x-x

The removable sensor lance allows fast change of the miniature confocal sensor. Subsequently, the sensor mounting is described.

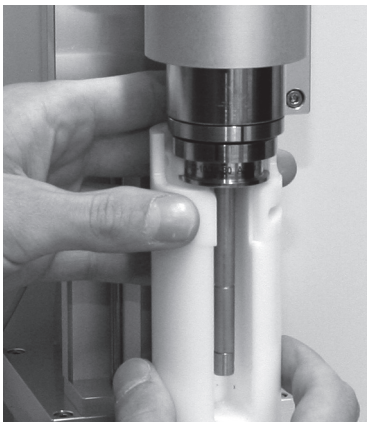
- Carefully remove the sensor lance from the packing.
- Move the sensor into the rotation unit.



- Turn the lock ring 90 degrees to the left.



- Remove the disassembly aid in horizontal direction.



- Rotate the sensor until the marks on the sensor and the rotation unit are on opposite side.

The sensor lance snaps in place of the rotation unit.

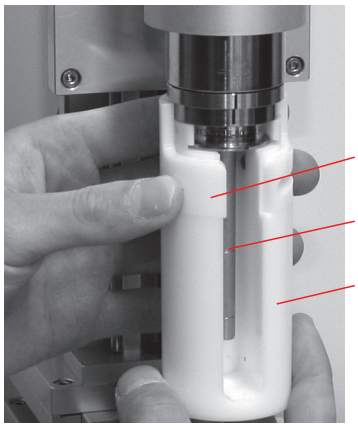
Now the sensor is mounted in the rotation unit.

- If you have finished the sensor change, measure the dark signal in the sensor, see Chap. 5.

4.7 Dismounting the Sensor Lance BCS241x-x

The removable sensor lance allows fast change of a miniature confocal sensor. Subsequently, the sensor dismounting is described.

➪ Slide the disassembly aid in horizontal direction on the sensor.

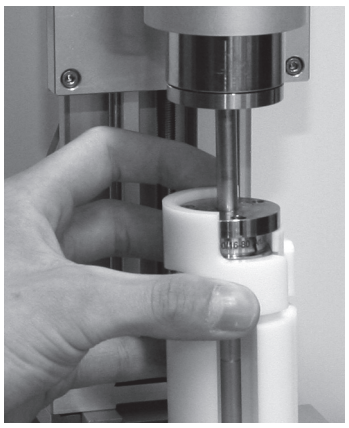


➪ Turn the lock ring 90 degrees to the right.

Now the sensor is locked in the disassembly aid.

➪ Extract the disassembly aid with the sensor vertically of the rotation unit.

➪ Carefully insert the disassembly aid with sensor lance into the packing.



5. Acquiring the Dark Signal

The dark signal of the sensor represents an intrinsic offset level generated by parasitic reflections inside the controller, which must be taken into account for the controller to be able to operate correctly. The level of the dark signal depends on the sampling rate. The dark signal should be acquired at all sampling rates in order to be able to subtract it while the controller is measuring. A dark signal acquisition is performed during adjustment by the manufacturer, but must be repeated at regular intervals.

➪ If you change the light intensity at the external light source or you change the sensor, you have to repeat the dark signal measuring.

i After each sensor change the dark signal has to be measured for the first time.

The dark signal compensation is described in the software manual.

6. Warranty

All components of the device have been checked and tested for perfect function in the factory. In the unlikely event that errors should occur despite our thorough quality control, this should be reported immediately to MICRO-EPSILON.

The warranty period lasts 12 months following the day of shipment. Defective parts, except wear parts, will be repaired or replaced free of charge within this period if you return the device free of cost to MICRO-EPSILON. This warranty does not apply to damage resulting from abuse of the equipment and devices, from forceful handling or installation of the devices or from repair or modifications performed by third parties.

No other claims, except as warranted, are accepted. The terms of the purchasing contract apply in full. MICRO-EPSILON will specifically not be responsible for eventual consequential damages. MICRO-EPSILON always strives to supply the customers with the finest and most advanced equipment. Development and refinement is therefore performed continuously and the right to design changes without prior notice is accordingly reserved.

For translations in other languages, the data and statements in the German language operation manual are to be taken as authoritative.

7. Service, Repair

In the case of a defect on the system, please send the affected parts for repair or exchange. In the case of faults whose causes are not clearly recognisable, please always send the complete measuring system.

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8. Decommissioning, Disposal

- Disconnect all power supply and output cables on both controllers.
- Disconnect all interface cables between both controllers and PC or PLC.

The boreCONTROL is produced according to the directive 2002/95/EC („RoHS“). The disposal is done according to the legal regulations (see directive 2002/96/EC).

9. Declaration of Incorporation

Declaration of Incorporation according to the

EC Machinery Directive 2006/42/EC, Appendix II B

We hereby declare that the following partly completed machinery

Machine design: boreCONTROL

Type designation: BCM2410 / BCC2410

Article: 7111116 / 2424001

- meets - as far as the scope of supply makes it possible - the basic requirements of the Machinery Directive 2006/42/EC and the EMC Directive 2004/108/EC.

Applied harmonized EN standards:

- EN ISO 14121-1 | Safety of machinery - Risk assessment
- EN 55011: 2007 | Group 1 Class A - Electromagnetic disturbance characteristics - Limits and methods of measurement
- EN 61326-1: 2006 | EMC requirements - Part 1: General requirements

We also declare that the special technical documentation for this partly completed machine has been created in accordance with Annex VII, part B, and commit ourselves to forward this to the market surveillance authorities on request.

The commissioning of this partly completed machine is prohibited until the partly completed machine has been installed in a machine that meets the requirements of EC Machinery Directive and for which an EC declaration of conformity according to Annex II A exists.

Ortenburg, 27 February 2012

Ehrnböck Florian

Dipl.-Ing. (FH) Florian Ehrnböck

R&D Design Engineering

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