

- 1 *Control electronics for sensors*
- 2 *"SensBio" multimodal sensor test bed*
- 3 *"SensBio" testing facility in operation as a bioreactor*

MULTIMODAL TEST BED "SensBio"

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Our Vision

Process monitoring and control is becoming more and more important in our increasingly automated and digitized world. The sensor technology used for this purpose requires an ongoing development.

The moment new, fundamental measuring principles have been developed, extensive system testing becomes indispensable. This begins with the testing of the functional relationships throughout the intended measuring range, extends through calibration, and is concluded by long-term validation under realistic conditions.

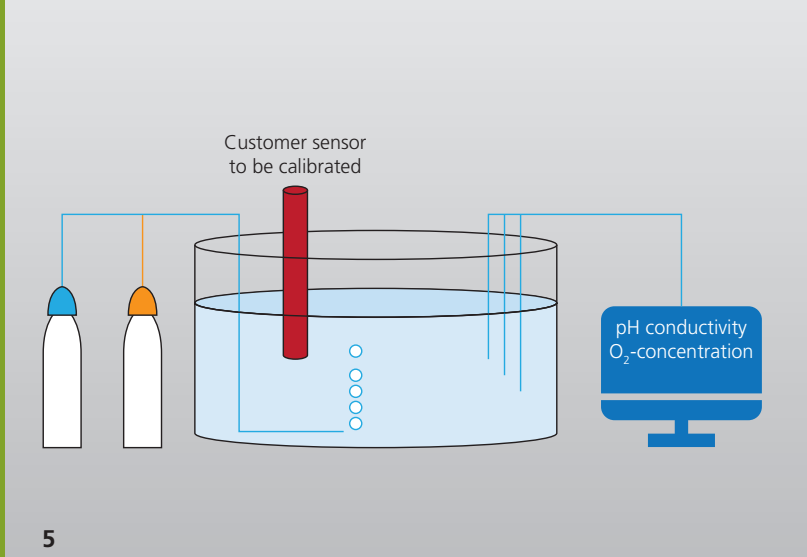
R&D organizations often do not have the appropriate equipment to carry out this kind of testing themselves. To meet these needs, the Fraunhofer FEP now offers a novel instrument-based system that can satisfy these requirements.

The "SensBio" test bed is designed as a measurement station for gas sensor technology, where the main focus is adjusting precisely defined measurement conditions and conducting the subsequent monitoring. Using the example of the oxygen sensor technology, special attention was paid to both guarantee the most precise adjustment of the required partial pressure, as well as to simultaneously measure the oxygen level independently. The novel system functions correctly and reliably thanks to the proper setting of these parameters.

Compared to commercially available systems, the Fraunhofer FEP "SensBio" configuration offers the opportunity to perform measurements in the gaseous phase as well as in the liquid phase (aqueous-based medium). This ensures a wider range of possible applications for the given sensor technology under investigation.



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Technical data

In order to be able to provide the widest possible range of measurement parameters, the test bed has a largely modular design:

- Large main vessel (6 liters) with access ports of various sizes
- Gas mixing station for 2 gases each (O₂, CO₂, air, N₂) in any mixture ratio, dosing via precision MFCs
- Gassing of the system via gaseous phase and via liquid phase
- System for temperature control
- pH measurement

The test bed also offers:

- 2 independent oxygen sensors
- Process monitoring by pH sensor, conductivity measurement
- Sterile operation mode for simulation of a bioreactor process (optional)

All integrated devices are calibrated in accordance with ISO 9001 and ISO/IEC17025.

The output format is ASCII-based.

Services offered

The “SensBio” test bed at Fraunhofer FEP offers developers and manufacturers of gas sensors the opportunity to test and verify their new measurement principles as well as their sensor applications.

The operational spectrum of “SensBio” ranges from basic functional tests, to verification of functional relationships between experimental condition and measured value (calibration), to long-term simulations under demanding environmental conditions.

At the same time a very broad range of experimental conditions is achieved by the large number of variations and the modular concept of the “SensBio” system. This facilitates simulations – from ideal laboratory conditions to realistic operating conditions.

Adjustable parameters

Volume	6 l
Oxygen content for gaseous phase	infinitely variable 0 – 100%
Oxygen content for aqueous phase	infinitely variable 0 – 100%
Temperature range	RT – 100°C
Working pressure	Standard air pressure
Measurement speed	30 s

Measurement variables	Measurement range	Accuracy
Oxygen content		
- Gaseous phase	0 – 50%	0.1%
- Dissolved oxygen	0 – 20 mg/l (200%)	0.1 mg/l
pH-value	0 – 14	0.01
Conductivity	1 µS/cm – 200 mS/cm	0.5%
Mass flow	0.7 ml _n /min – 20 l _n /min	0.3%

4 Measuring station of the “SensBio” test bed with sensing accessories

5 Schematic illustration of the “SensBio” test bed



We focus on quality and the ISO 9001.