



bbi-biotech

innovation for biotech

product presentation

Made in Germany



bioPROBE

xCUBIO

Projects & Services

About bbi

Sample Handling



xCUBIO



References



bioPROBE

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Automated Sampling



Sample Storage



Atline Complex





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bioPROBE single

Takes samples from **ONE** bioreactor

- Fully automated and working 24 h / 7 d
- Minimized human resources demand
- Sterile by design
- Dead volume free
- Starting with volumes of 0.5 ml
- With disposable and stainless steel sampling probes
- Configurable via PC, tablet or PDA

bioPROBE

orbitSAM

multiSAM

Atline Complex



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bioPROBE quad

Takes samples parallel from up to **FOUR** bioreactors

- Fully automated and working 24 h / 7 d
- Minimized human resources demand
- Sterile by design
- Dead volume free
- Starting with volumes of 0.5 ml
- With disposable and stainless steel sampling probes
- Configurable via PC, tablet or PDA

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Real PAT

Closing the gap between up- / downstream and analytics

Automated Sampling

Higher process and product quality of biotech processes

Sterile Sampling

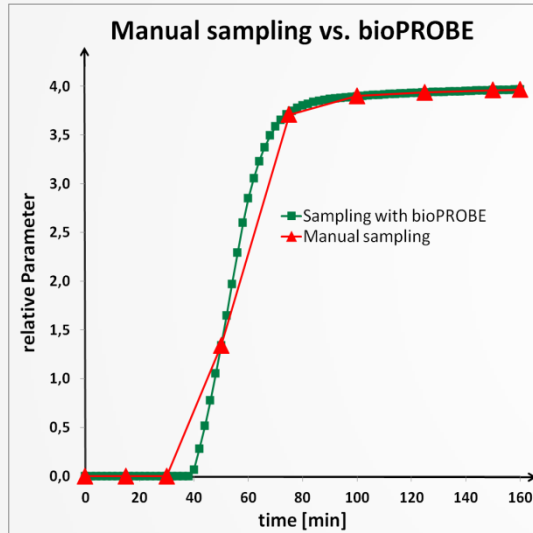
Unique and patented sampling technology sterile / aseptic by design.

bioPROBE

orbitSAM

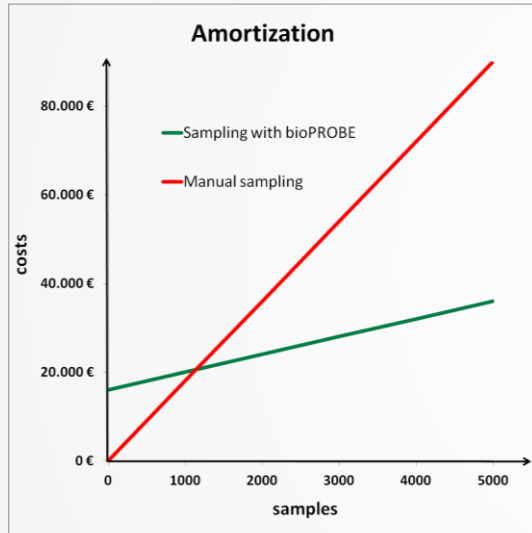
multiSAM

Atline Complex



High Throughput Sampling

- Increased sample count and quality
- Maximized resolution in relevant process phases
- Improved quality and process control
- Optimized data comparability and reproducibility
- Advanced process safety and reliability



Amortization of bioPROBE

- Amortization usually within one year
- On average around 1200 samples to pay for itself
- Even more cost reductions in conjunction with autosamplers and analytical devices

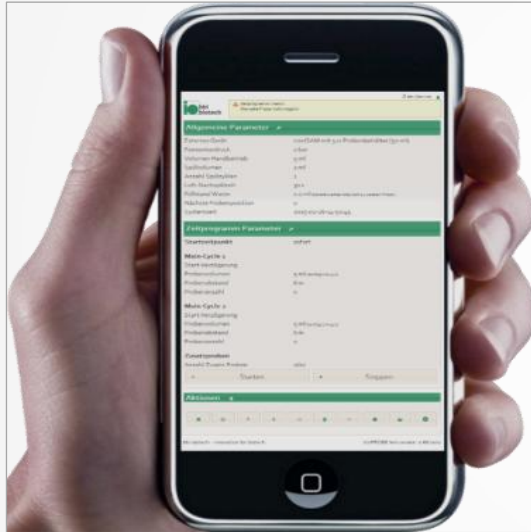


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bioPROBE Interface

- Offline-analysis becomes atline
- New analytical data can be used for reactor automation
- System is independent of OS type
- System is open for communication with every device
- Remote control via web

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multiSAM

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orbitSAM

- Complete automated control via **bioPROBE**
- Interchangeable racks for up to 51 sample vessels
- 15 ml, 20 ml, 30 ml or 50 ml sample volume
- Sample vessels with septa for aseptic storage available
- Easy integration into different lab applications
- Optional: cover box with UV-sterilized environment

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multiSAM

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About bbi



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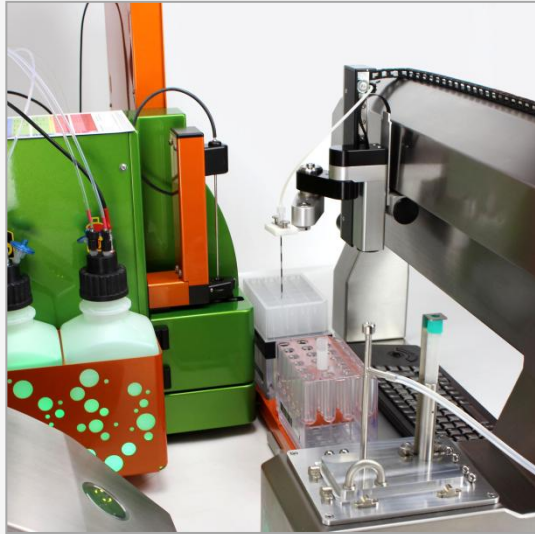
- Complete automated control via **bioPROBE**
- Storing samples from 1 - 4 parallel bioreactors in up to 384 cooled positions
- Customized sample storage vessels
- Allows to filtrate the samples
- Aseptic sample transfer / storage to everywhere
- Exact tempering and heating profile control
- Optional: **multiSAM** as disseminator unit for unlimited atline processes

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Customization of the extension plate

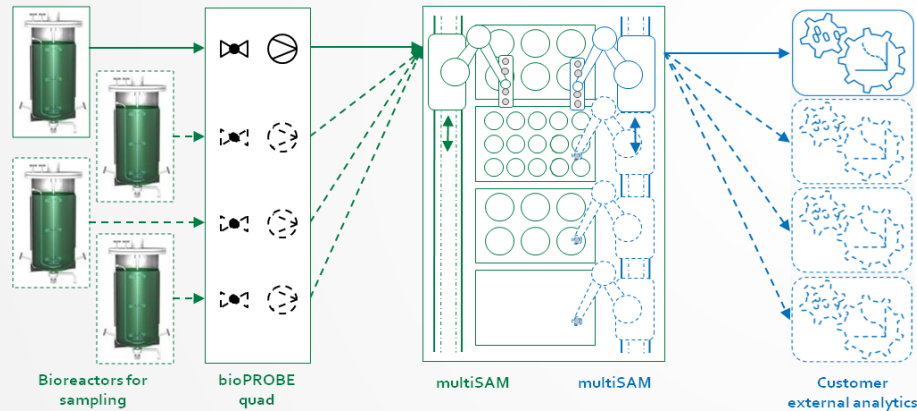
- Flexible size and design
- Working area 400 mm x 120 mm x 120 mm
- Custom made extension plate for every devices or vessels
- Non-obstructive traverse path
- Communication with every device via OPC, USB, RS232
- Optional: cooling and filtration

Example: **multiSAM** and **bioPROBE** with
MACSQuant flow cytometer from Miltenyi Biotec GmbH



Aseptic Automatic Four-Fold Sample-Analysis

- Sample acceptance from up to four parallel vessels
- Maximal equipment set: Transfer of samples to analytics on up to four separate aseptic paths



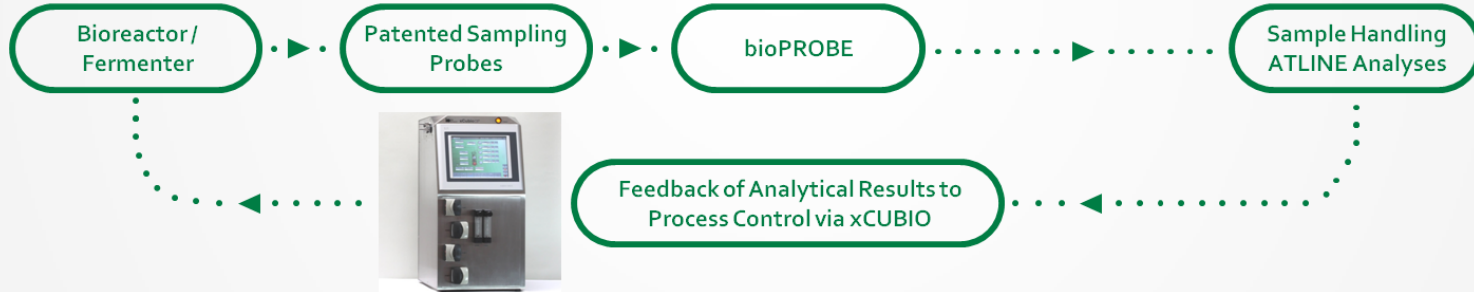
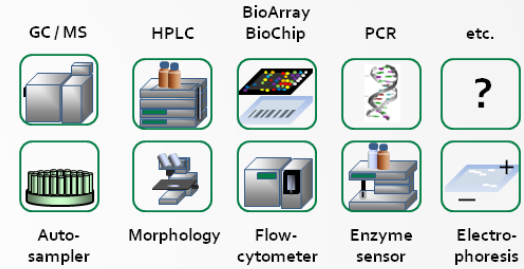
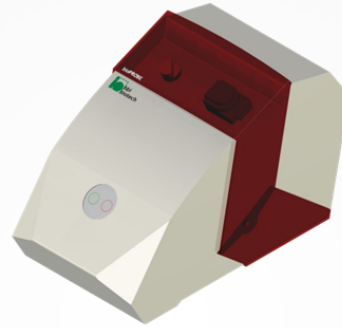


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Our Services for your Atline Complex

- Analysis and evaluation of measuring task and existing analytics
- Integration of all tasks into control system of **bioPROBE**
- Delivery of the required sample to analytical device
- Record of measuring results and transfer to bioreactor control
- Pre-installed in combinations of **bioPROBE** sampling systems, **xCUBIO** bioreactors and **SAM** handling systems

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orbitSAM

multiSAM

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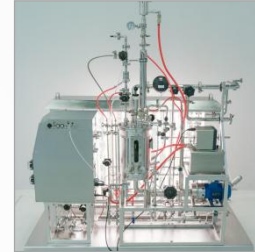
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Customization



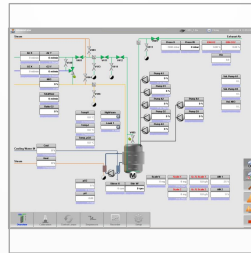
xCUBIO Series



About xCUBIO



Automation



xCUBIO Extras





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The **e**xpandable **C**ontrol **U**nit for **B**IOsystems

- Flexible adaptation to EVERY bioprocess (cultivation of bacteria, fungi, cells, algae etc. from lab to production scale)
- Customized configurations for all levels
- Intuitive process control via touchscreen
- License-free remote access
- Bidirectional communication with SCADA systems
- Unique integrated sampling system **bioPROBE**

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Customization Modules

Automation

xCUBIO Series

Extras



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The **e**xpandable **C**ontrol **U**nit for **B**IOsystems

- Unlimited sensor technology integration
- Integrated exhaust analyses
- External pumps, balances and analytics
- Integration of arbitrary external analytical data

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Automation

xCUBIO Series

Extras



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Learn more about xCUBIO`s features on the following pages.



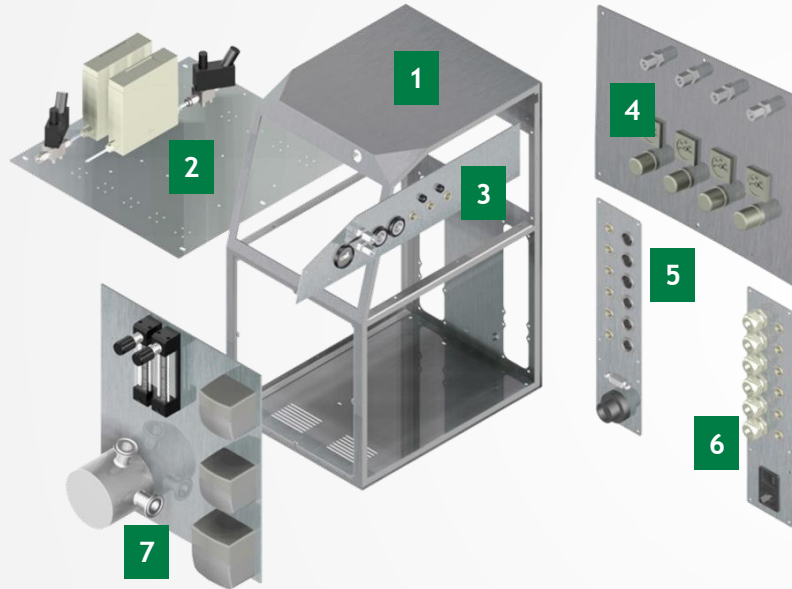
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Automation

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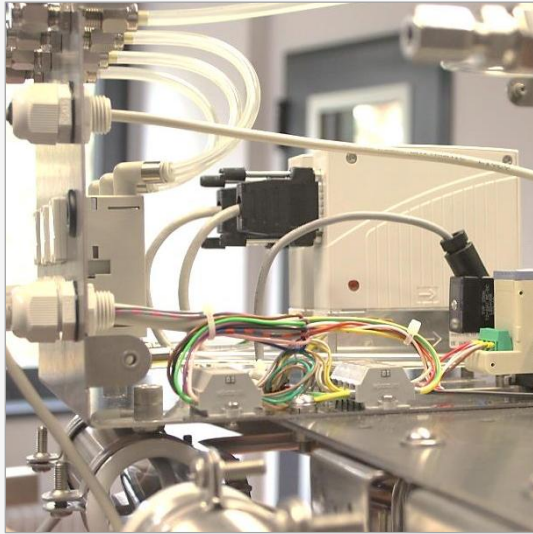
Extras



The Customization Modules of xCUBIO

1. Main case frame
2. Gassing plate
3. Side panels
4. Rear panel 1
5. Rear panel 2
6. Rear panel 3
7. Front panel

xCUBIO provides all solutions for economic customization.

[bioPROBE](#)[xCUBIO](#)[Projects & Services](#)[About bbi](#)

The Gassing Plate: Gas Feed

- Supply with natural or artificial air, CO₂, O₂, N₂ or other gasses on your demand
- Up to six different gasses in one xCUBIO
- Up to 12 MFCs for complex gassing regimes
- Pulsed gas feeds via magnetic valves
- Total flow control or manual intervention via front rotameters

[About xCUBIO](#)[Customization Modules](#)[Automation](#)[xCUBIO Series](#)[Extras](#)



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The Gassing Plate: Exhaust Analysis

- Integrated exhaust analysis for O₂, CO₂ etc.
- Accurate mass balancing
- Automatic calculation of e.g. RQ and OUR
- No further external device necessary
- Internal installation within **xCUBIO**

- External stand-alone version for expansion of existing biosystems available. Please see **xCUBIO accessories**

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Automation

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Extras



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The Side Plates: Online Sensors

- Pt100, Pt1000
- pH, ion sensitive or optical
- pO₂, Clark or optical
- pCO₂
- Redox
- Foam/level (conductivity)
- Turbidity / OD (NIR) inline or bypass
- ...many more!
- All signal interfaces: Memosens, Arc, D/A standards etc.
- Atline sensorics via automatic sampling with integrated **bioPROBE!**
- Customize your set of sensors!

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Automation

xCUBIO Series

Extras



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The Rear Panels: External Devices

- Culture and/or feed vessel balances for gravimetric flow control via serial connection
- Scaled pumps for harvest, transfer or inoculum with gear, direct or FC-drive via serial, serial bus or other connections
- Integration of arbitrary external analytics via analogue standard signals, Ethernet, OPC etc.
- Integration of arbitrary other external devices which supply standardized communication signals
- Bidirectional integration into superior SCADA networks with e.g. MFCS, LabVIEW, MatLab etc.

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Automation

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Extras



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The Front Panel: Flexible Feed Control

- **Up to 12 digital or analogue peristaltic pumps** with free purpose allocation and independent drives
- Wide range of pump heads for many different feed rates available
- **Up to 4 rotameters** for manual total flow limit or partly automated gassing control
- **Touchscreen panel** for all-round system access functions, available as 10", 19" or 21,5" version

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Automation

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Extras

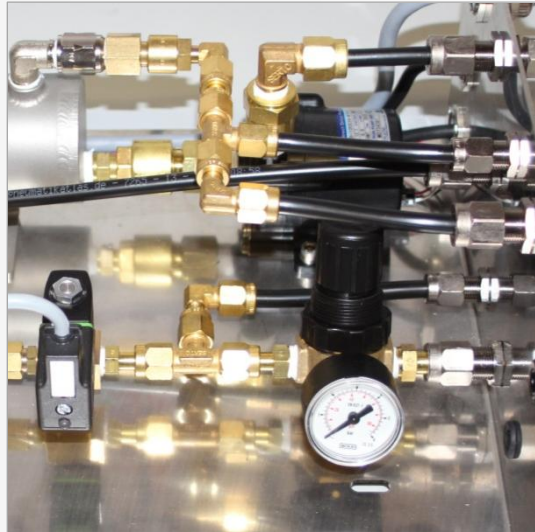


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Temperature Control & Tempering

- Integrated thermostat system in split case under xCUBIO
- Cascaded temperature control of 8° C above cooling water temperature to 65° C cultivation temperature
- High tempering accuracy
- Easy-to-handle connections with quick connectors
- Automatic filling procedure
- Self-surveillance of temperatures, pressures and fill level
- Optional connection of cryostats for cryophilic MO

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Automation

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Extras

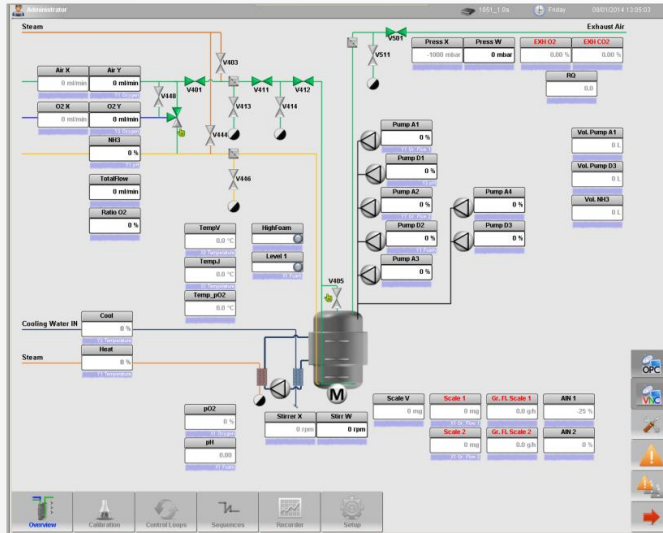


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Automation Software

- **All biotech experience of bbi's staff** is base for this biotech-optimized automation solution – **our own development!**
- **Touchscreen HMI:** User friendly interface with intuitive menu structure and access opportunities
- **User Profiles:** Individual interfaces and access
- **Customization:** Each system with **xCUBIO** automation is exactly adapted to your demand
- **The xCUBIO automation** is proven in all biotech applications, both upstream and downstream and accessories, additionally.

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Customization Modules

Automation

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Extras

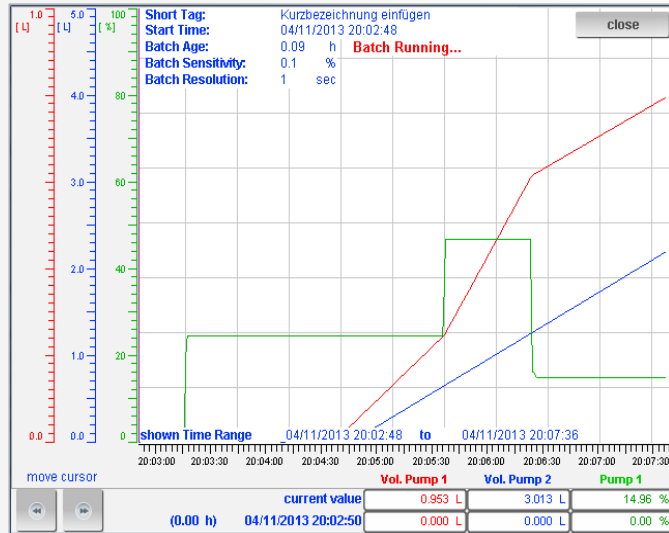


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Automation Software

- **Graphical analysis:** Up to eight y-axes in 19"-display for visual investigation of trends and process
- **Free allocation:** Choose inputs, outputs or else for display
- **Export data:** Screenshot as bmp-file, screen data or full batch data as csv- or encrypted file, all via USB-port
- **VNC-Terminal:** Remote access via integrated VNC-Server. No purchase of further software needed!
- **OPC – Connectivity:** Open standard for bidirectional connections to SCADA (MFCS, LabVIEW, MatLab etc.), MES, DOE systems and a huge variety of OPC solutions

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Customization Modules

Automation

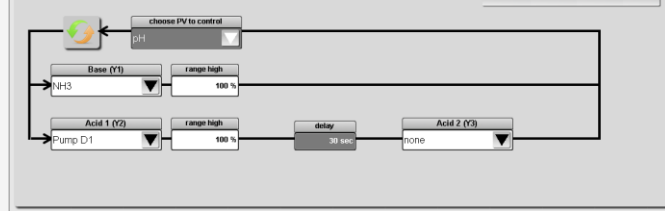
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Extras



choose Control Loop ...	W (Setpoint)	X1	Y1	Y2	Y3	Channel
Temperature	37.0 °C	0.0 %	0.0 %	0.0 %		Disabled
Oxygen	50 %	0.0 %	100 %	0.0 %		Enabled
pH	6.00	0.00	0.0 %	0.0 %		Disabled
Foam		0	0 %			Disabled
Level						Disabled
Gr. Flow 1	0 mg	0 mg	0 %			Disabled
Gr. Flow 2	0 mg	0 mg	0 %			Disabled

pH



Automation Software

- **Control functions:** All parameters, actuators and controller preferences are editable by operating staff
- **Cascaded control:** Up to 4 escalation steps in each control circuit
- **Sequence editor:** Easy-to-handle process editor for user specific sequences, e.g. sterilization, feed circles, etc.
- **Configurations vault:** All configuration sets can be stored for reload in the future.
- **Protocol function:** All configuration changes and calibration processes are logged with user data

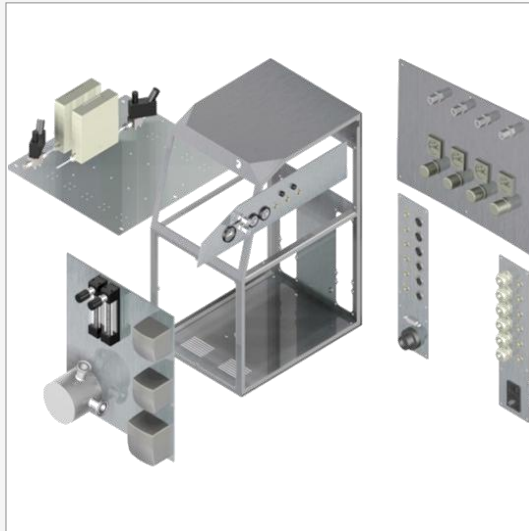


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Standardized Bioreactors and Fermenters: The xCUBIO series

- **xCUBIO single**: start-up with **1 single vessel**
- **xCUBIO twin**: scale and produce with **2 vessels**
- **xCUBIO multi**: multiple applications with **up to 12 vessels**
- **xCUBIO in-situ**: high-end cultivation, **SIP/CIP-cleaning**
- **xCUBIO retrofit**: biosystem **upgrade and refurbishment**
- **xCUBIO phar**: high-end **phototrophic cultivation**

- Discover your optimal **xCUBIO** solution!

xCUBIO Series

single

twin

multi

in-situ

retrofit

phar



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xCUBIO single

- Maximal configuration opportunities for **one single vessel**
- **Standard vessel:** 0.5, 1, 2, 5 and 10 liters borosilicate glass vessel with double tempering jacket
- **Vessel options:** airlift, steel, disposable or single wall vessels
- **Up to 12 MFCs** for complex gassing regimes
- **Up to 10 both digital and analogue peristaltic pumps** with free purpose allocation
- **Optimized lid design** for maximal sensor installation and media handling opportunities

xCUBIO Series

single

twin

multi

in-situ

retrofit

phar



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xCUBIO twin

- **Two vessels** both autoclavable or in-situ sterilizable in parallel or independent operation
- **Identic or entirely different vessel design** – from system type to scale
- **All standard vessel types:** glass up to 10 l, steel up to 5 l, disposable up to 10 l
- **Up to six MFCs** for each vessel
- **Up to five both digital and analogue peristaltic pumps** with free purpose allocation

xCUBIO Series

single

twin

multi

in-situ

retrofit

phar



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xCUBIO multi

- **Up to 12 autoclavable vessels** in parallel or independent operation
- **All standard vessel types:** glass up to 10 l, steel up to 5 l, disposable up to 10 l
- **Central control and access interface:** large touchscreen with direct access to all vessels
- **System upgrade in stages** to maximal vessel count possible
- **Up to six MFCs** for each vessel
- **Up to five both digital and analogue peristaltic pumps** with free purpose allocation

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xCUBIO in-situ

- **Standard:** One in-situ sterilizable steel vessel up to 30 l
- **Option:** Twin installation for maximal footprint utilization
- **Fully** automatic or **partly** automated operation: customized automation levels
- **Compact installation** with small footprint
- **Up to six MFCs** for gasmix control
- **Up to ten both digital and analogue peristaltic pumps** with free purpose allocation
- Scaled in-situ sterilizable biosystems available under Projects & Services



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multi

in-situ

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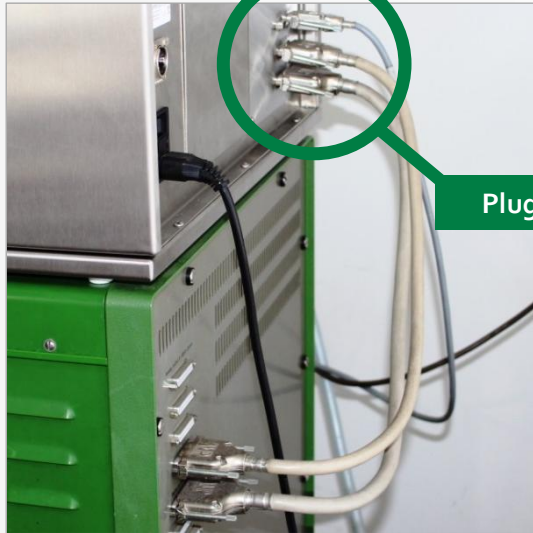


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Plug & Play !

xCUBIO retrofit

- **Economic upgrade** for all bioreactors and fermenters in case of control system damages or aged automation sets
- **Biosystem-refurbishment** of every type, scale, manufacturer and application
- **Valuable existing equipment** is saved and can be used continuously with just a few hours of installation break.
- **Plug-in-compatible** interface design to existing devices
- **Installation upgrade** with integrated formerly external devices, novel processes and state-of-the-art procedures

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twin

multi

in-situ

retrofit

phar



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Old-fashioned biosystems in good state



Biostat® ED: Plug-In Operation of xCUBIO retrofit Plug and Play



xCUBIO retrofit replaces bioreactor and fermenter automations of every

- Type
- Scale
- Manufacturer
- Application



Multiple Split Controllers



New xCUBIO retrofit controller for old Biostat® C-DCU 3



Contact us for your personal xCUBIO retrofit solution!



Arbitrary External Devices

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single

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xCUBIO phar

- **The world's smallest tubular glass photobioreactor**
- Max. 5 liters cultivation volume – **fully sterilizable** in standard lab autoclave
- **100 % sterile cultivation conditions** for all phototrophic microorganisms (e.g. algae, cyanobacteria, purplebacteria, mosses, plant cells) from all environments
- **Maximal sensor installation opportunities** for full-range scientific approaches
- **Special automation** for phototrophic cultivation (e.g. pH-control via CO₂, variable illumination system)

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xCUBIO bubble

- **Reliable, proven and efficient**
- Customizable **single, twin and quad configurations**
- Autoclavable jacketed vessels from **0.5 to 1.0 liters**
- **Multitude of options** for sensors, illumination and integration available
- **LED illumination** with algae- optimized wavelengths and **multi-channel λ control**
- Intelligent algorithms and sophisticated **sequence editor** for **easy setup** of superior experiment planning
- xCUBIO is the **most advanced and customizable bioprocess automation** solution worldwide.

xCUBIO Serie

single

twin

multi

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phar



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xCUBIO in-situ phar

- **Tubular glass photobioreactor, in-situ steam sterilization**
- **Standard sizes:** 25, 100 and 250 liters with CIP and/or SIP sterilization for clinical sterility
- **GMP-compliant design** for high value products
- **Cultivation of sensitive** algae strains , GMOs or for cleanest inoculum for scaled installations
- Tubular design for **scalable experimental results**
- **Phased system upgrade** with additional tubular modules possible
- **Pharmaceutical efficiency** for algae's excellence

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multi

in-situ

retrofit

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MEDUSA

- **In-situ sterilizable airlift photobioreactor**
- **Airlift principle** for highly sensitive algae strains of e.g. filamentous morphology
- **Standard sizes:** 25, 50 and 100 liters with SIP sterilization for clinical sterility
- **Aseptic environment** for low-growing algae strains and GMOs
- **GMP compliant** pharmaceutical phototrophic biomass production

xCUBIO Series

single

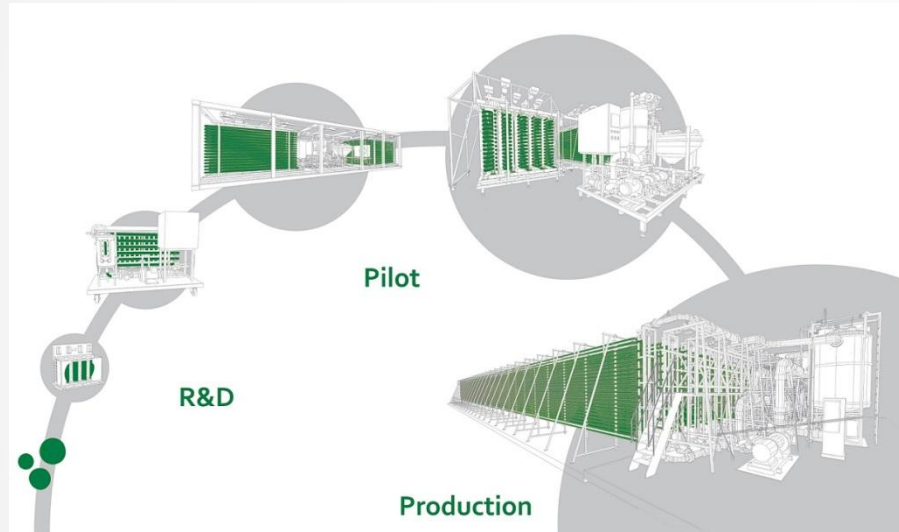
twin

multi

in-situ

retrofit

phar



Photobioreactor Scaleup

- All scales for reliable process development
- Extensively equipped pilot scale volumes to develop optimal processing
- Industrial quality and equipment selection to operate on economic level
- Same functional principle for all scales

- Following the 30 years history of successful photobioreactor development by Prof. Pulz and IGTV

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multi

in-situ

retrofit

phar



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Scaled Pilot and Outdoor Production Photobioreactors

- Modular construction for flexible layout opportunities
- Pilot scale and production photobioreactors from 4'000
- Up to 100'000 L cultivation volume per photobioreactor

High-Quality Glass Tubes

- Optimal transmission rates and light-fastness
- Guaranteed glass tube shelf life of at least 10 years
- Reduced investment in comparison to plastic tubes

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twin

multi

in-situ

retrofit

phar



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Equipment and Spare Parts for Every Application in Every Cultivation System

- **Expand** existing biosystems with additional sensors
- **Upgrade** process automation systems
- **Replace** existing vessels
- **Change** operating volume and system output
- **Install** utility media supply technology
- **Get** new stirrers, ports, adapters and other accessories

About xCUBIO

Customization Modules

Automation

xCUBIO Series

Extras



xCUBIO vessels

- Adaption of different cultivation systems on one platform
- Glass vessels with a size of 0.5, 1 L, 2 L, 5 L or 10 L
- In-situ sterilizable vessels
- Phototrophic vessels
- Disposable vessels
- Vessels by bbi-biotech or your existing vessels of any type or manufacturer can be used. Check **xCUBIO retrofit!**



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xCUBIO gasscan unit

- External, autarchic bioreactor and fermenter upgrade
- Usable for every reactor size
- Minimal gas flows
- Exhaust analyzer for O₂ and CO₂
- Others gasses on demand
- Up to four parallel bioreactors and fermenters
- Automatic calculation of OUR, CER and RQ

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Customization Modules

Automation

xCUBIO Series

Extras

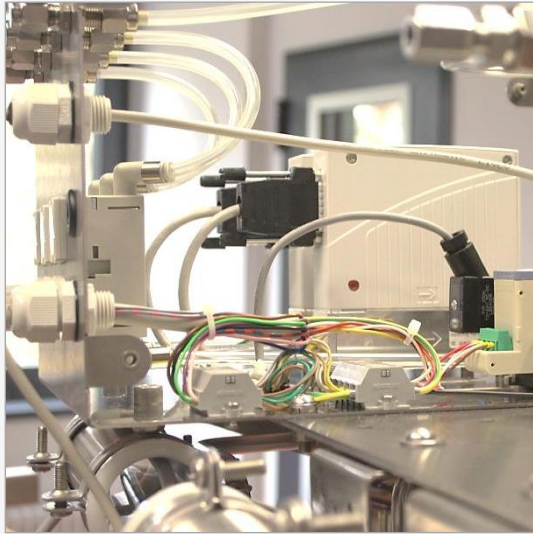


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xCUBIO gasmix unit

- External, autarchic bioreactor and fermenter upgrade
- Usable for every reactor size
- Up to 4 gasses (Air, O₂, N₂, CO₂, other on demand)
- Up to 8 mass flow controllers (MFC), two per gas
- Up to 8 rotameters
- Two gasmix output interfaces
- All flow ranges from bacteria down to cell cultivation
- Multiple process control strategies
- Easy integration via standardized gassing connectors

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Automation

xCUBIO Series

Extras



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xCUBIO single & twin Steam Generators

- Up to 100 kg/h
- Intelligent power-management
- Double-chamber pressure vessels
- Automatic elutriation and water feed control
- Dry run protection, overpressure shutdown
- Condensate return
- Qualifiable
- Remote control via Ethernet and free VNC client

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Automation

xCUBIO Series

Extras



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Bioreactor Accessories

- Harvest pipes
- Sampling pipes
- Manual samplers
- Inoculation ports
- 4-fold ports
- Correction media bottles
- Scales
- Probes
- Jacketed vessels with high-quality servo motors
- Drives
- Seals
- Venting organs
- Adding ports
- Supply and exhaust air filters
- Many more...

More information: www.bbi-biotech.com/biotech-shop/

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Customization Modules

Automation

xCUBIO Series

Extras

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About bbi

Bacteria



Cell Culture



Microalgae



Retrofit



Disposable



Engineering



Service





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Bacteria Fermentation

- Pilot production fermenter
- Total volume 650 L
- High performance gassing system
- Mechanical foam breaker
- Complete automation system **xCUBIO in-situ**
- Integrated SIP/CIP-system

Bacteria

Cell Culture

Microalgae

Retrofit

Disposable

Engineering

bbi's Services



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Cell Culture

- Operating volume 100 L
- Complete new construction by bbi-biotech
- Gas supply with 4 MFC's
- Headspace and sparger with different mixing strategies
- Additional sequences for sterilization of aeration, degassing, sampling lines and transfer from inoculation bioreactor
- Delivery with xCUBIO steam generator 40 kg/h

Bacteria

Cell Culture

Microalgae

Retrofit

Disposable

Engineering

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High-End R&D with Microalgae

- The world's smallest tubular glass photobioreactor
- Novel **xCUBIO phar** with 5 Liter operating volume
- Version 2015 with autoclavable circular system pump
- Optimized LED illumination and gassing strategies
- Extended sensor selection opportunities
- Accurate gas balancing via MFCs and exhaust analyzer
- Successful growth tests with selected algae species

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R&D-Fermenter Refurbishment

- Replacement of broken DCU of Biostat® ED with 10 Liter vessel with **xCUBIO retrofit**
- Cultivation R&D and inoculum bacteria fermentation
- Exact rebuild of existing DCU configuration
- Compatible plug design for fastest installation and start-up
- New precise and powerful motor incl. controller
- Integration of two additional external sensor devices

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Disposable Bioreactor Development

- Development of single-use bioreactor with **xCUBIO** automation
- Replacement of internal automation system with proven technology
- Adapted automation for disposable sensors
- Cell culture double-zone gassing package

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Turn-Key Fermenter Suite Delivery

- Bacteria fermentation for sustainable soil additive products
- Main fermenter 7200 Liter
 - High performance gassing system
 - Mechanical foam breaker
- Seed fermenter 100 Liter
- Additive vessels acid, alkali, antifoam
- Fully automated with **xCUBIO**
- Whole installation in-situ SIP/CIP-able with automatic sterilization sequences, CIP-system integrated in supply range

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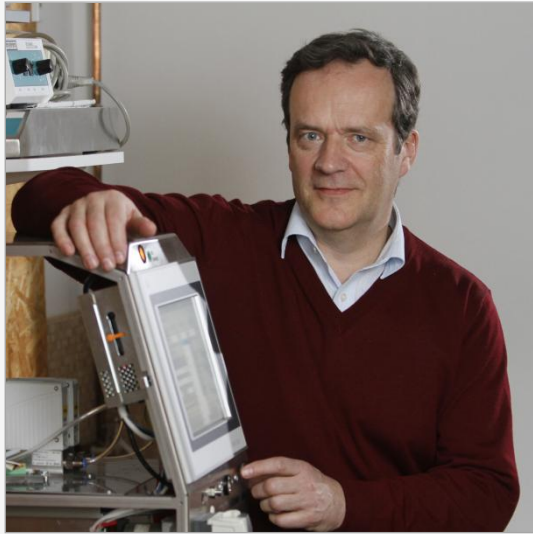


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bbi's Biotech Services

- General biotechnology consulting
- IQ – Installation Qualification, OQ – Operation Qualification
- FAT – Factory Acceptance Tests, SAT – Site Acceptance Tests
- Validation support
- Calibration of sensors and measuring instruments
- On-site repair and general overhaul
- Fastest procurement of spare parts
- Lectures and biotechnology theory education
- Etc...

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bbi's Engineering Services

- Feasibility studies
- Technological process support and optimization
- Basic engineering, detail engineering, 3D-CAD
- URS/FRS development
- Commissioning
- Qualification support
- Complete planning, production and erection of a production facility for biotechnological plant protection products

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