BIOSTREAM

Technical specifications

BioBench

Microbial /Cell Culture

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Vision

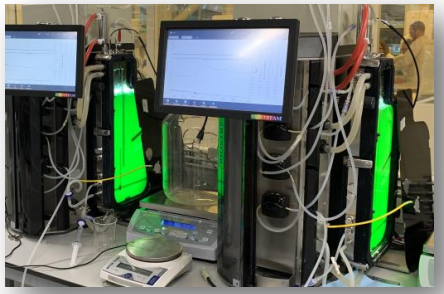
We offer total solutions

Open relation with the customer/ partner/suppliers and Employee's

Keep customer satisfied

Application fields

Food & Biobased



Algae

Cell culture

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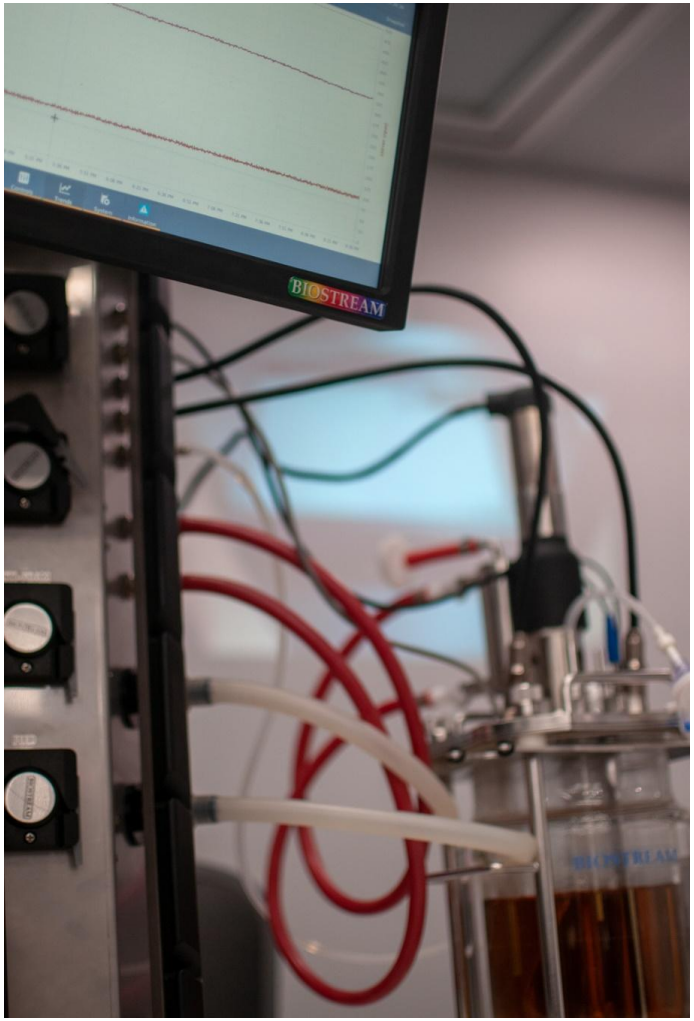
Type of Cells

All type of micro organisms
Fungi, yeast
Plant Cells
Solid state
Insect cells
Animal & human cells

Process Modes

Batch
Fed-batch
Continuous
Perfusion



Applications

Process development,
optimization and characterization
Scale-up and scale-down studies
Small scale production

Industries

Biopharmaceuticals
Vaccines
Cell therapies
Industrial biotechnology
Basic research
Education

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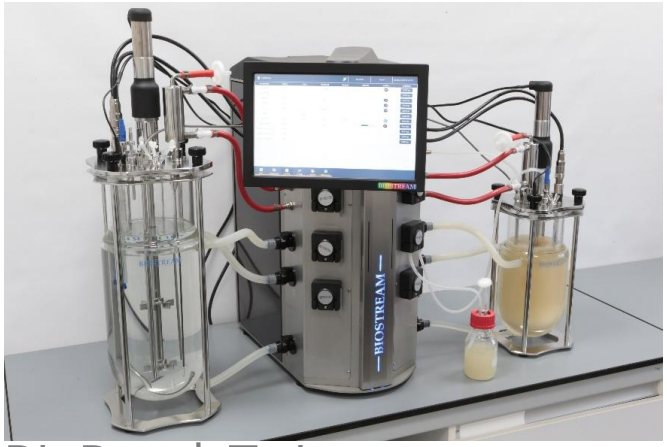
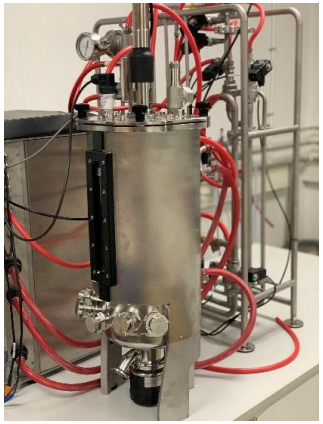
Range of Bioreactors

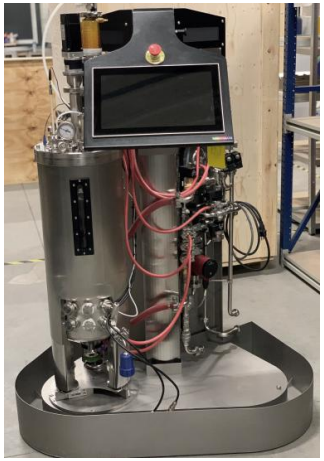
BioCompact multitiple reactor



BioBench Twin

BioBench





BioTwin

Double vessel

BioTwin

Single vessel

BioPilot

Bioproject

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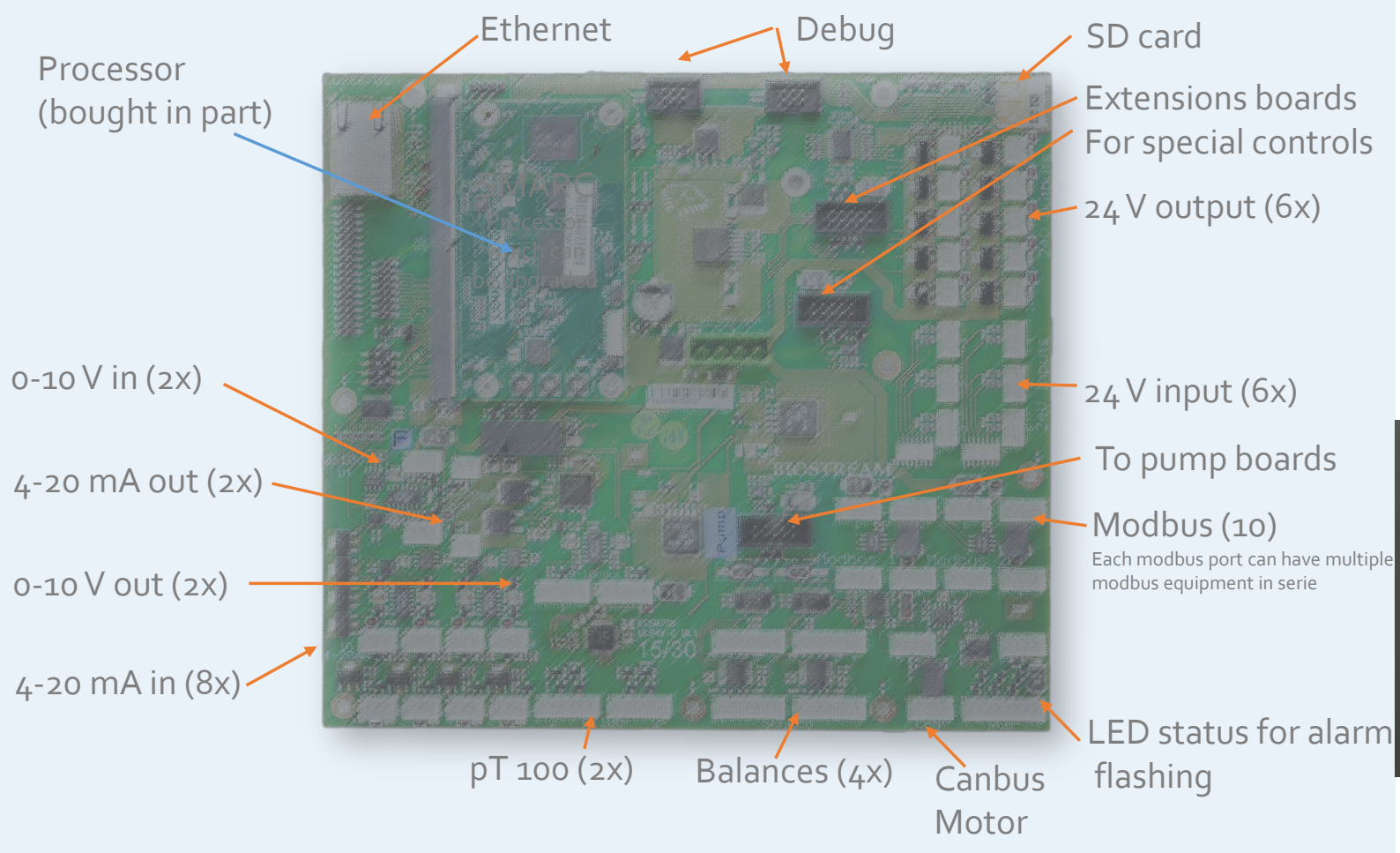
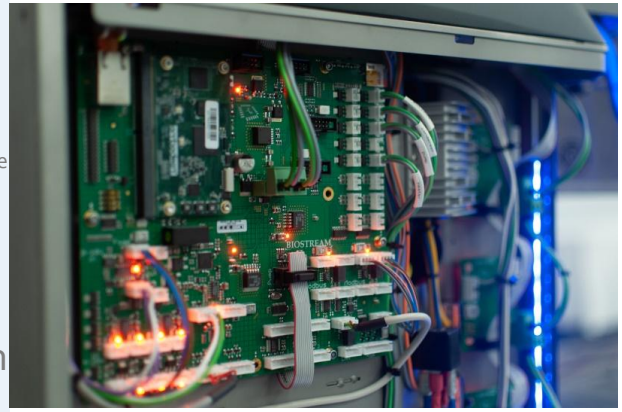
Basic control print



Extension board possibilities

- Extra I/O channels
- Valve boards
- Connection of old equipment
- Custom made options



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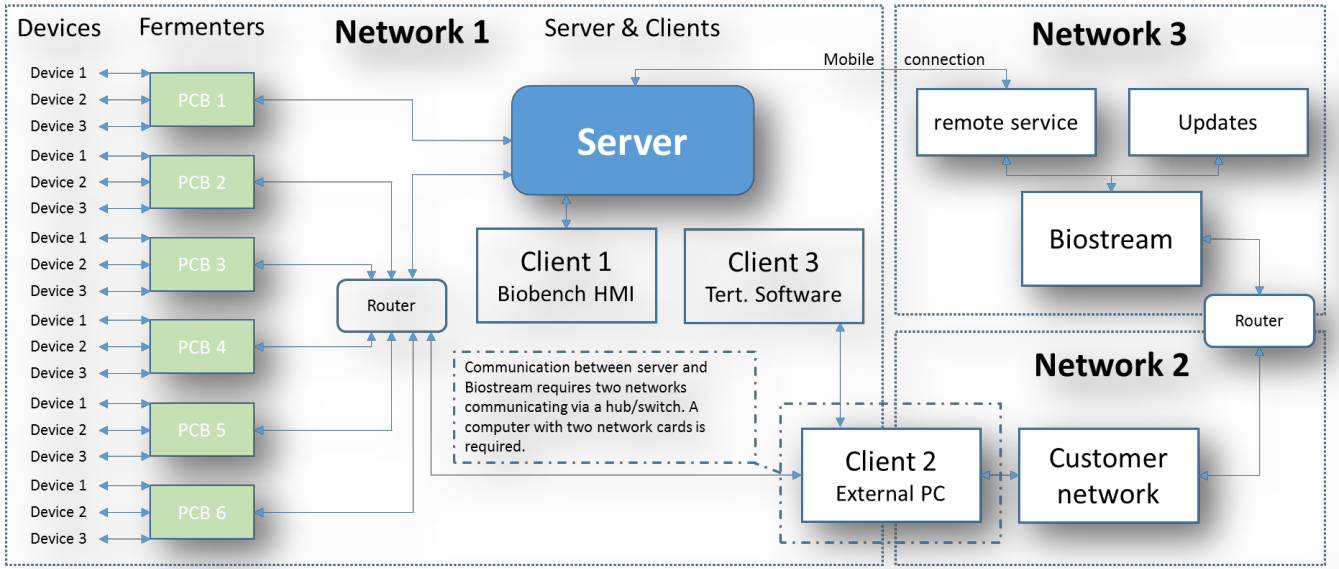
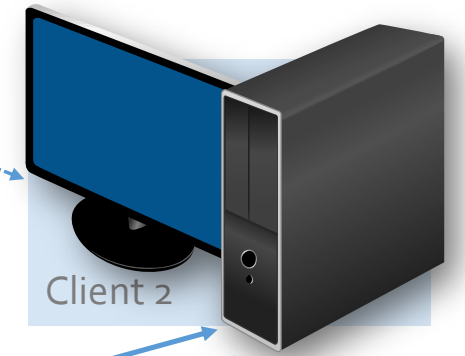
BioBench overview

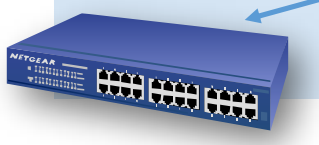


Customer network



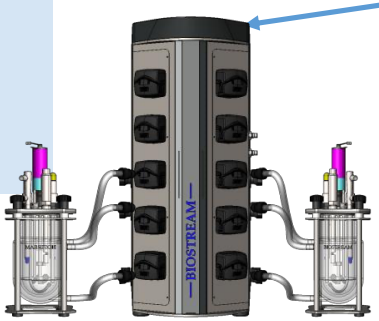
Client 2

Customer needs to give access to a VPN connection for Biostream if this is allowed
Possible to have Wi-Fi & Bluetooth connection or call in via mobile connection



Router

Client 1 & Server
(can be also a computer)



Apps

Expandable to 32 fermentors and more

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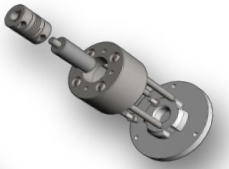
Connections of external equipment

Internal/
External pumps

Biomass/ OD

valves

Example:
Adapter for Applikon vessel



All kind of motors
with adapter

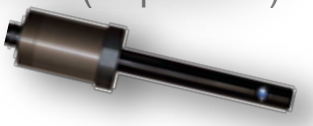
Mass flow controllers
& Gas mixers

CO2 in-line

Chillers

Balances

pH and Do sensors
(disposable)



Some Examples are shown in this overview

All measurement devices and actuators with an in- or output can be connected

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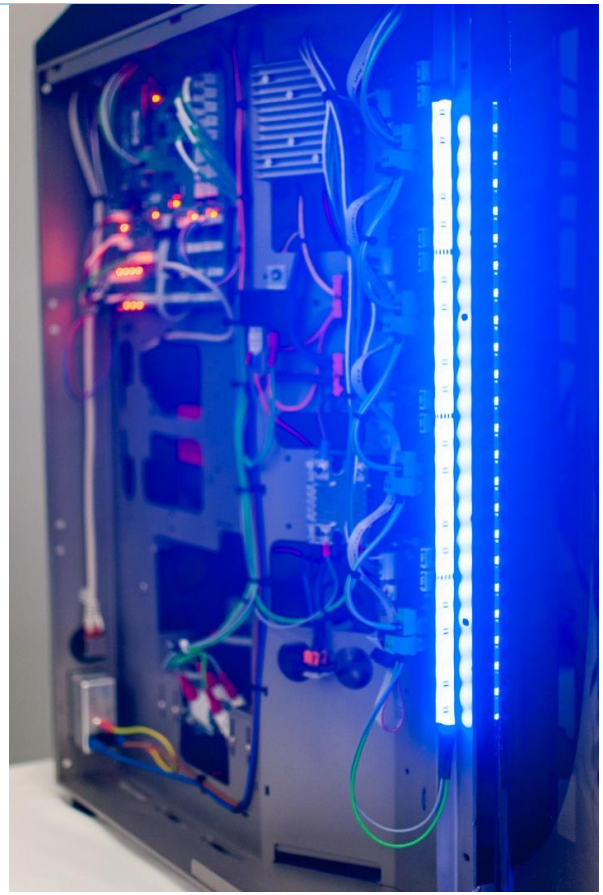
Integration of Sensors, actuators and PID control loops in a standard BioBench

Setting	Number	Type of sensor&actuator
Modbus	64	For pO2, pH, MFC, Off gas and other digital sensors
0-10 V Output	2	For pumps, LED, pressure, gasmix
0-10 V input	2	Redox-sensor, Gas-sensor, OD, Pressure, load cells and more
4-20 mA output	4	For pumps, LED, pressure, gasmix
4-20 mA Input	4	Redox-sensor, Gas-sensor, OD, Pressure, load cells and more
24 volt Output	10	Valves, solid state relais, pumps
24 volt Input	6	Others
CAN Bus	1	Digital motor control
RS-232	4	Balances
PT-100 config	2	pT100 sensor
Connection to pump boards	5	Only for integrated pumps in the Biobench
RGB option	1	For alarming and camera
Extension boards	2	

Extension boards can be used to get more I/O signals on the control board



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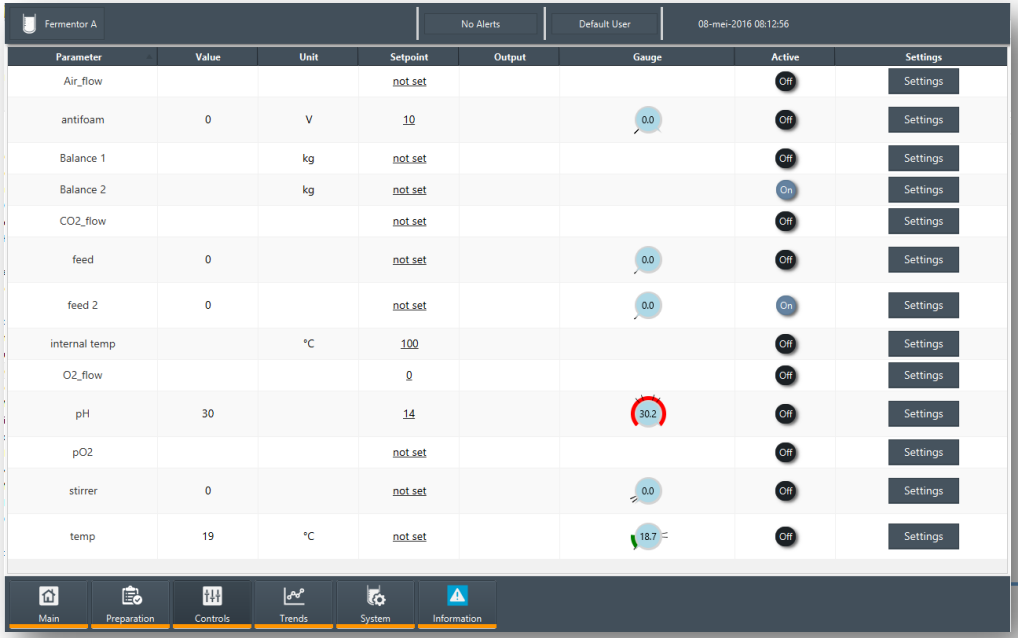
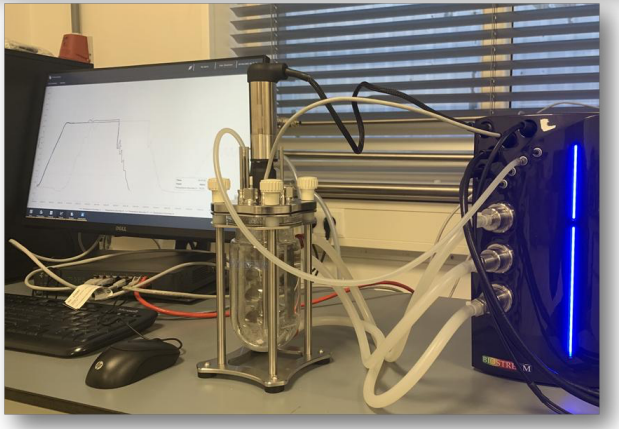


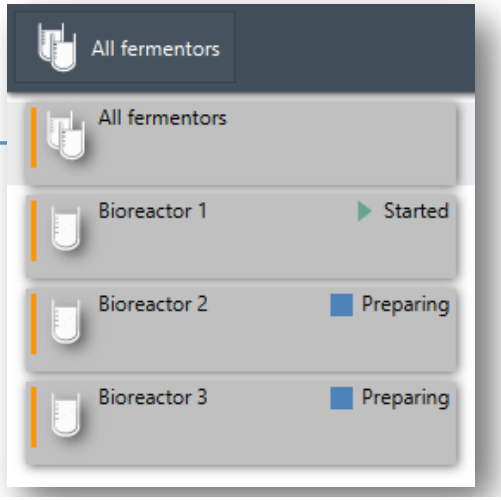
BOS Controlling & Logging Software

Possible to use BOS software via Touch screen, tablet or via computer.
App available for Mobile phones.
Easy and free installation on PC.
Simple and intuitive use.
No license needed for more users.
Control via OPC UA/XML-DA.

FREE upgrades of software. Each 2 months there is a release of new features. This can be downloaded and can be upgraded by yourself.



Selecting all the bioreactors or a specific one.
Easy addition of new bioreactors.
Adding new computers in the network where you can Work the same as the local HMI.



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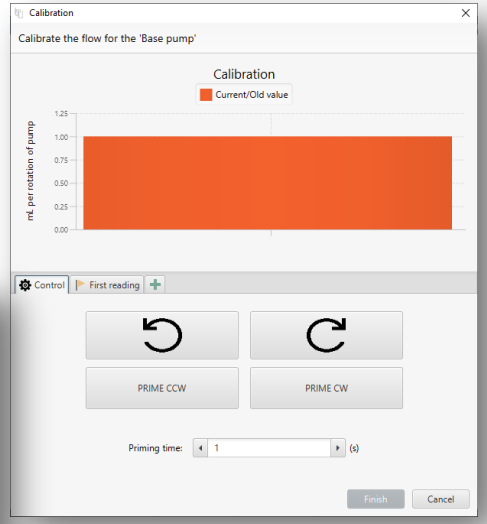
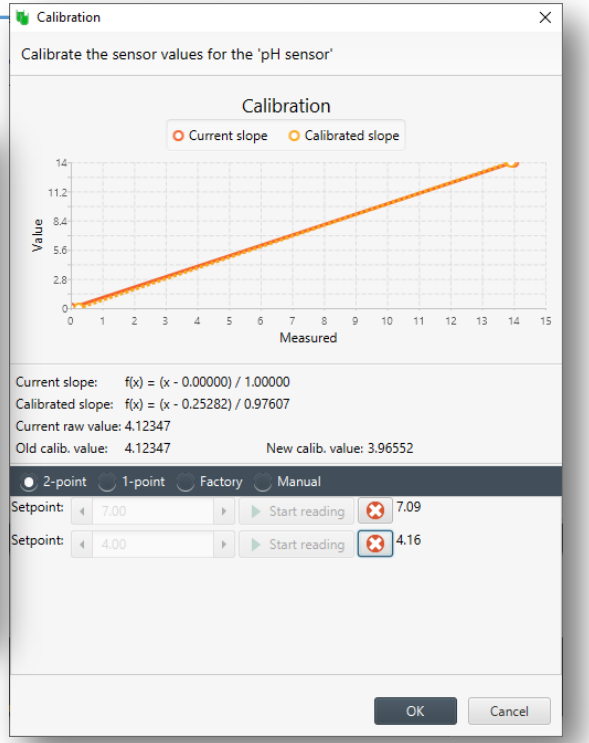
BOS Controlling & Logging Software

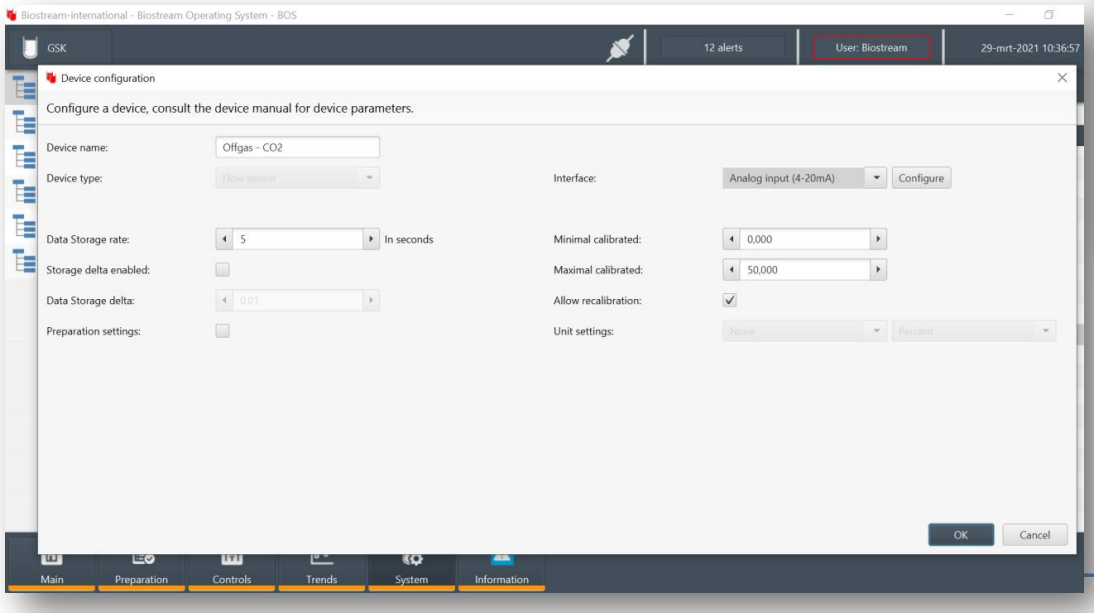
Easy one & two point calibration with graphical view and raw data for all sensors and pumps.
Multiple calibrations available for pumps to get a higher accuracy.
Maintenance information sensors.
Priming and control direction of the pumps.



Example: Pump calibration.



Example: Sensor calibration.



Adding external devices like sensors, pumps and valves yourself.
Design your own parameter control loops.
Parameters can be P&ID controlled

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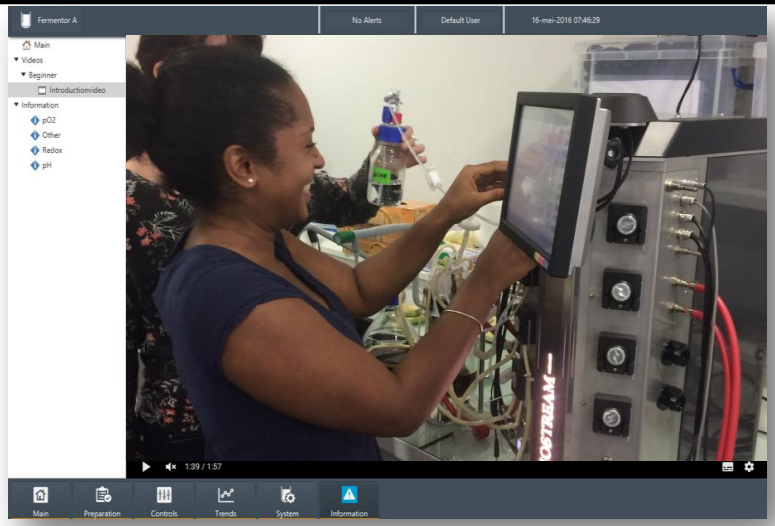
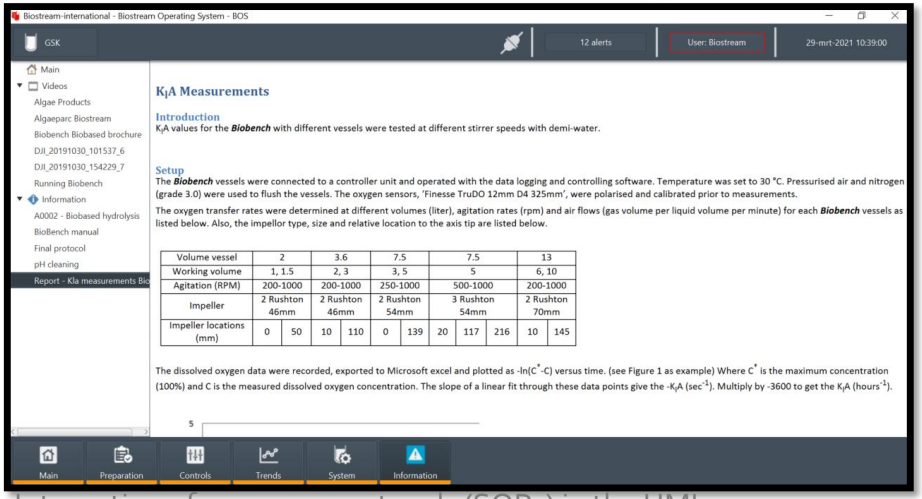


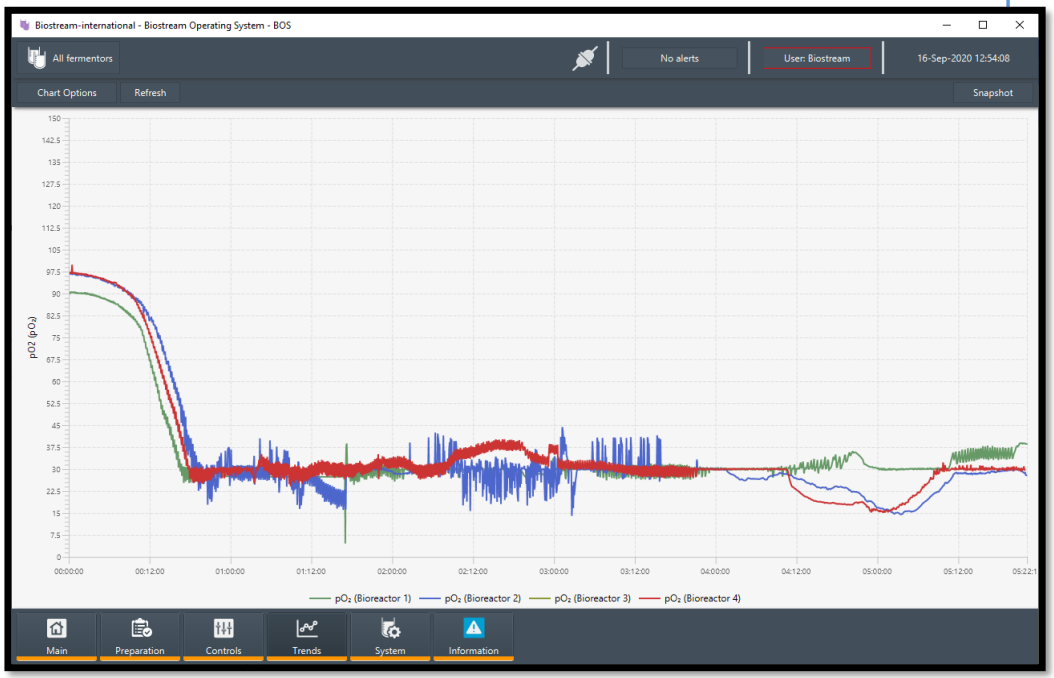
Multimedia integration like movies from phone & tablets in the HMI.



Integration of your own protocols (SOPs) in the HMI.

BOS Controlling & Logging Software

Own defined multiple graphs.
Comparison with on-line and historical data.
Change graph settings during the run.
Store different graphs per user.
Take a snap shots of graphs.
Running with one year of data
For each parameter can be set a logging rate and logging on a change of value



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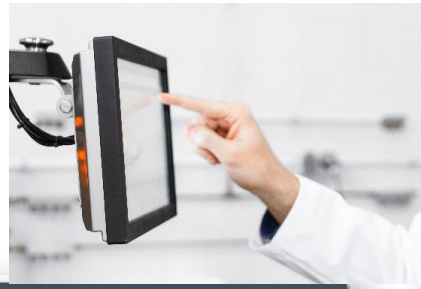
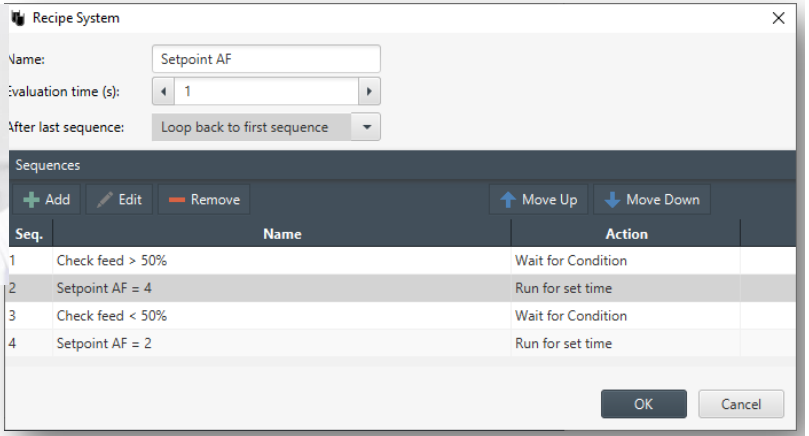
Cascading and automation possibilities

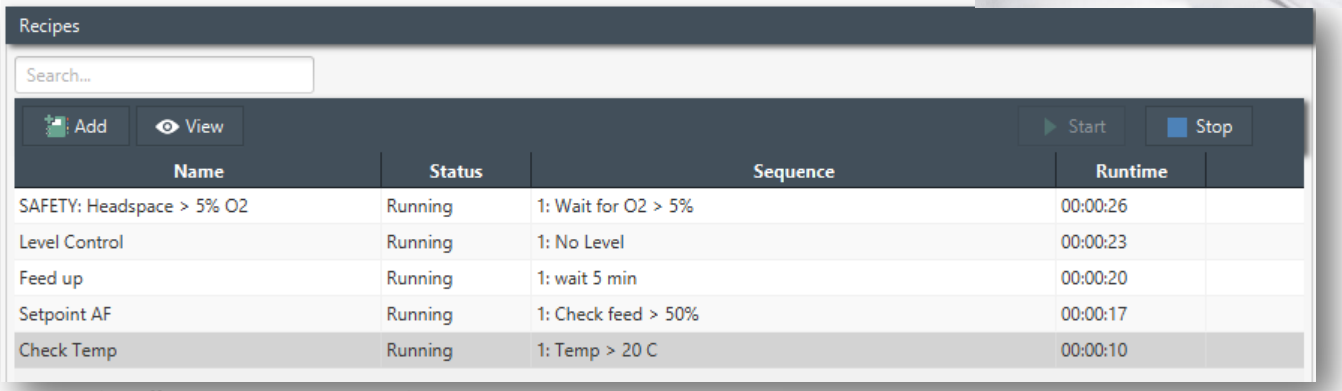
Recipes

Independent automatic control of parameters and also simultaneously.
Unlimited numbers of programs.
All kinds of programming possible.





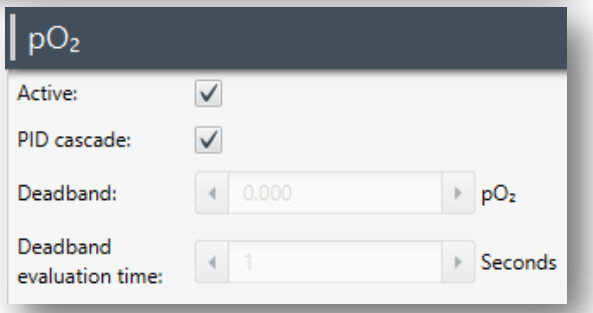
Example: Program block



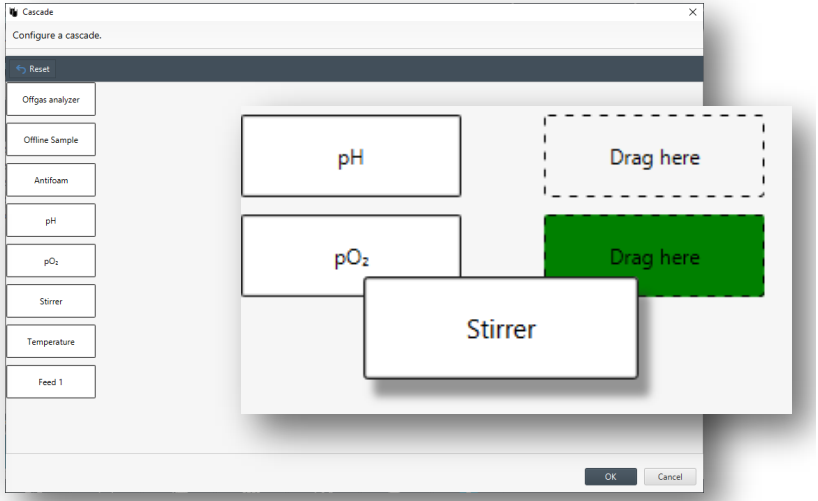
Example: Different automation protocols

Cascading with P&ID

All kind of positive and negative cascades possible.
Selection of simple cascading or with P&ID.



Example: Switch between normal and P&ID cascading



Example: Drag and drop blocks for cascading possibilities

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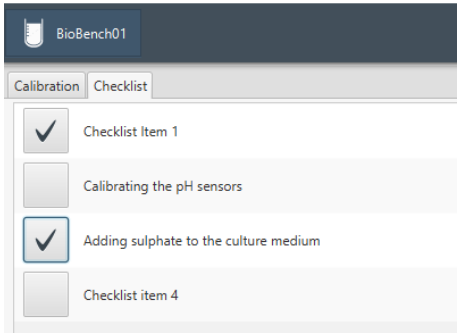
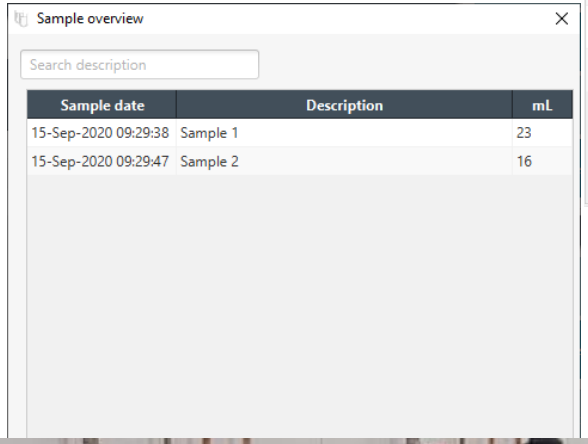
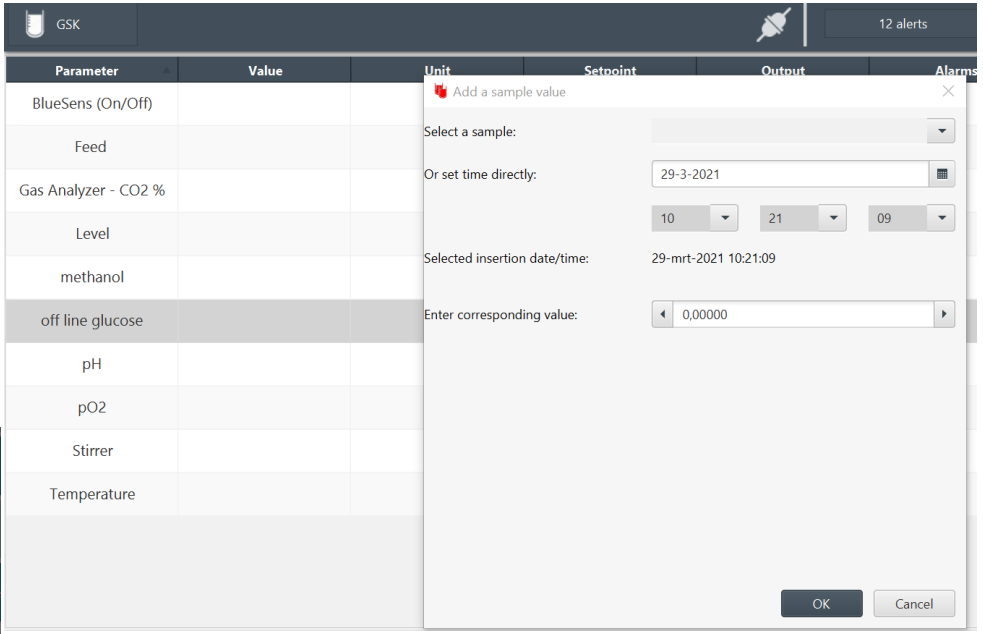
BOS Controlling & Logging Software

Create your own simple check list for starting up a bioreactor

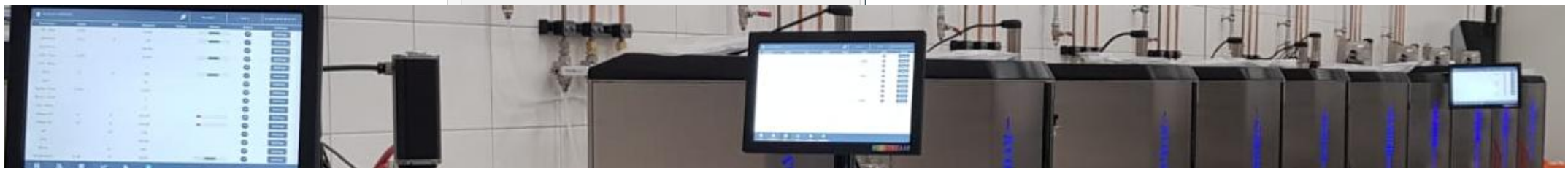




Sample tracking
With possible volume correction on total Volume to change feeding protocols



Off-line measurement input



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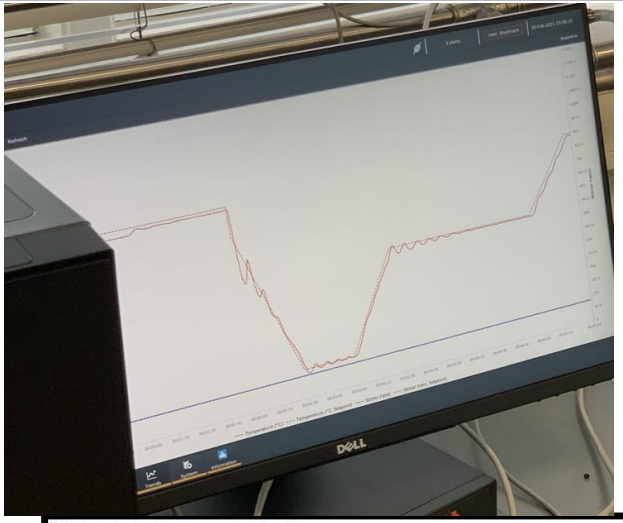
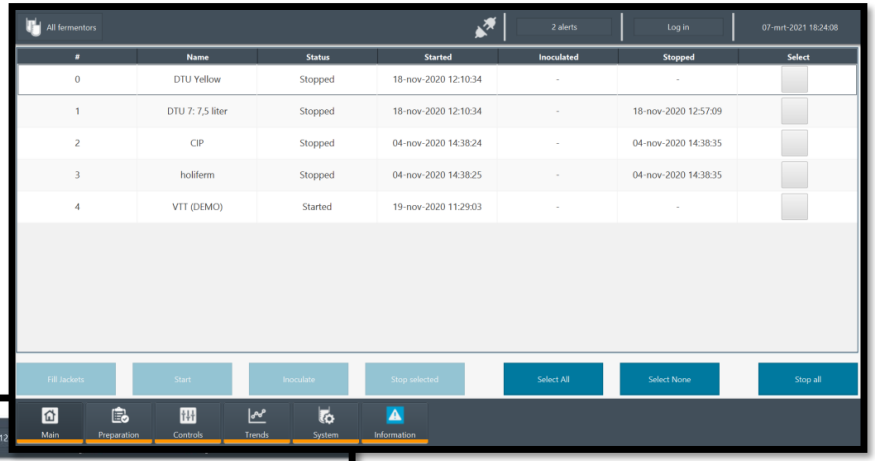
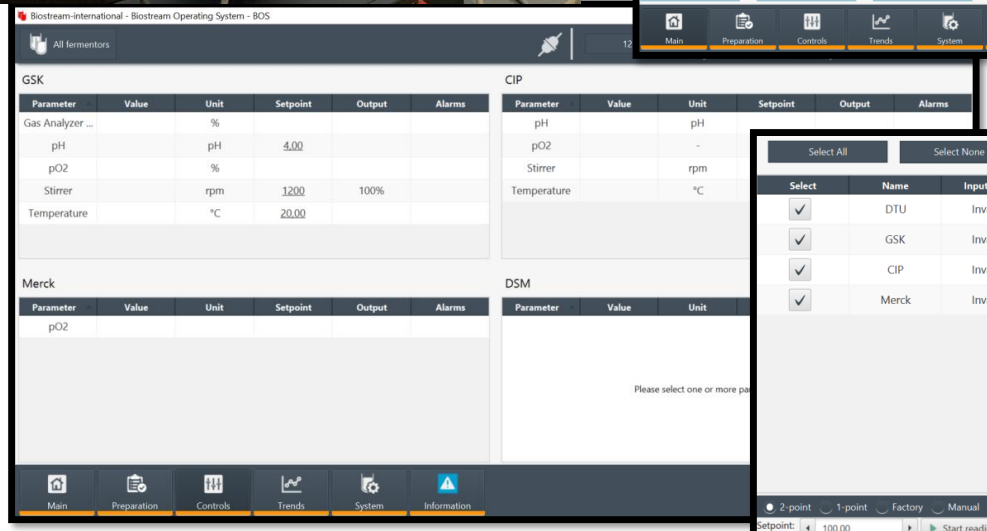
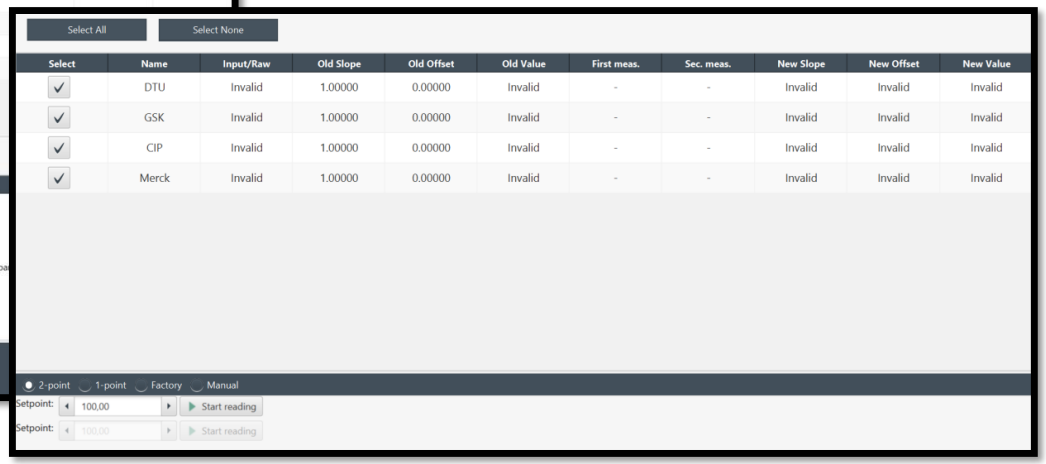
BOS Controlling & Logging Software parallel functions









Parallel starting and inoculation
Parallel calibration of pumps
Overview control of bioreactors
Parallel graphs with existing data and historical data.

REQUEST a demo for testing

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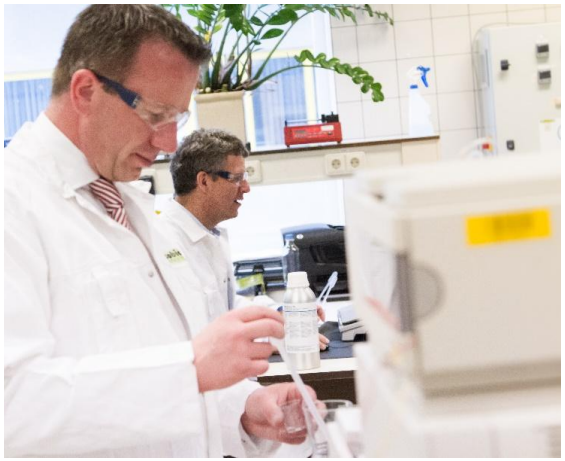
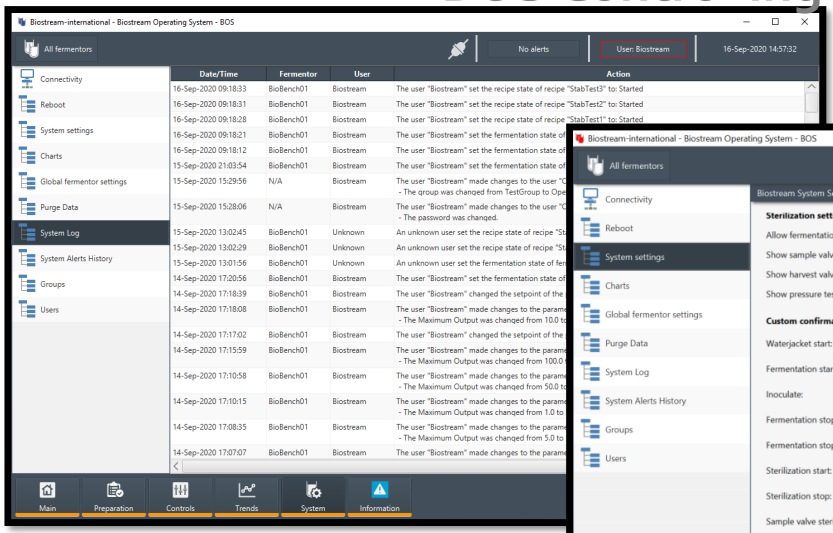
BOS Controlling & Logging Software

On-line service and validation purpose
21 CFR part 11 compliance.
With user login and tracking user actions.
Logging of confirmed alarm overview by user.
Service tools for distance service and assisting.

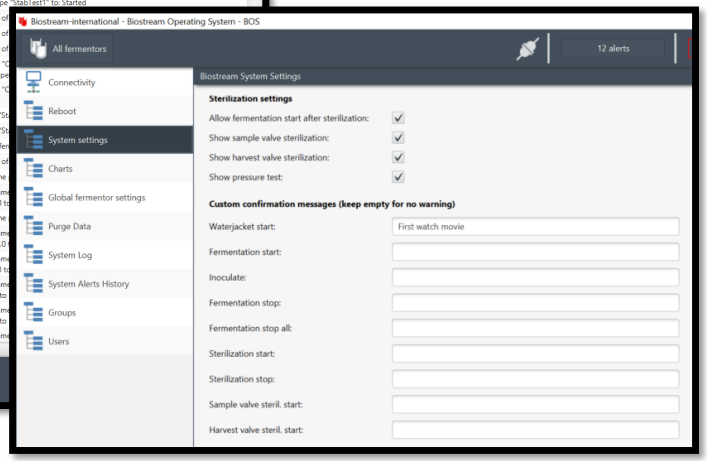
Advanced options:
Filtering of parameters like OD raw value
pH temperature correction
Confirmation to inform users before starting a run
Force check list for completion
Auto log on/off
Auto calibration of pumps

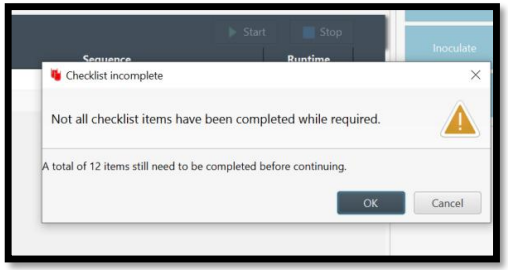




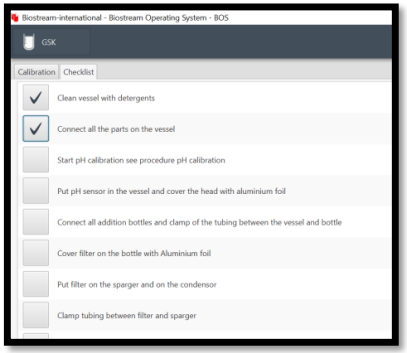
User actions

Advanced options





Start bioreactor not allowed before check list if finished



Checklist

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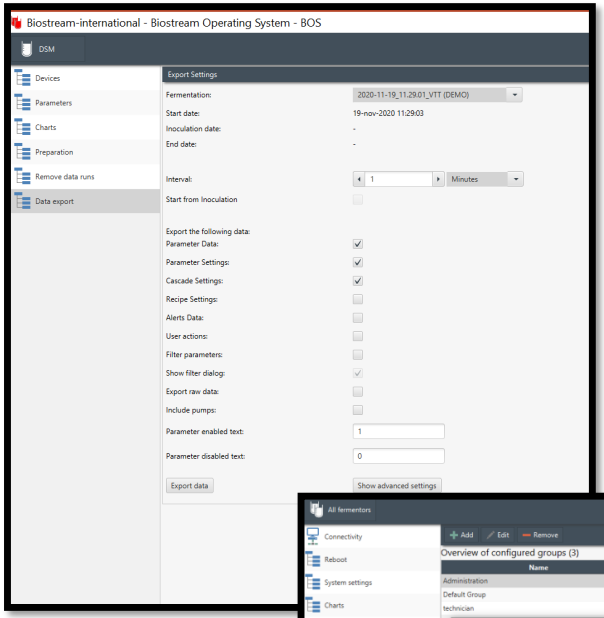
BOS Controlling & Logging Software

Export data and backup

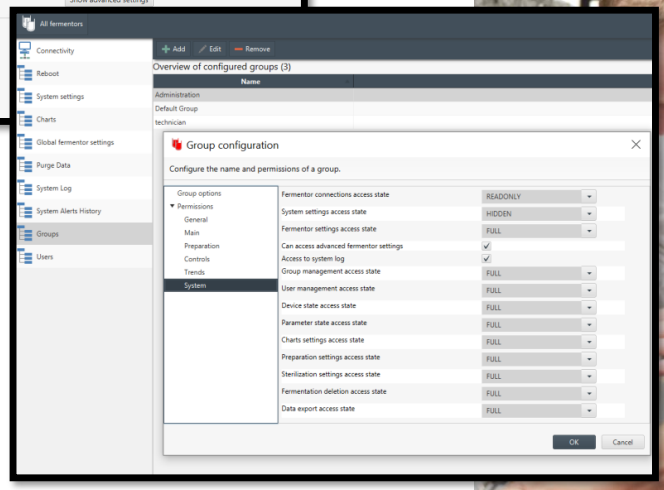
Data export function to excel of csv files
All the information which is stored can be exported

Database back up can also be automatically done
On your network

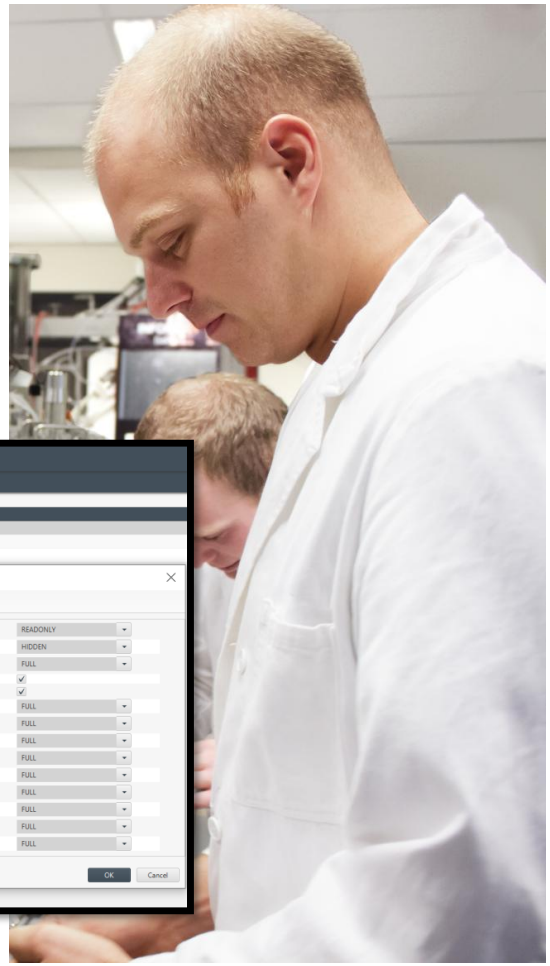
Connection to tertiary programs.
like Lucullus, Matlab, python or even mathematical & prediction software via OPC



Data export



User management

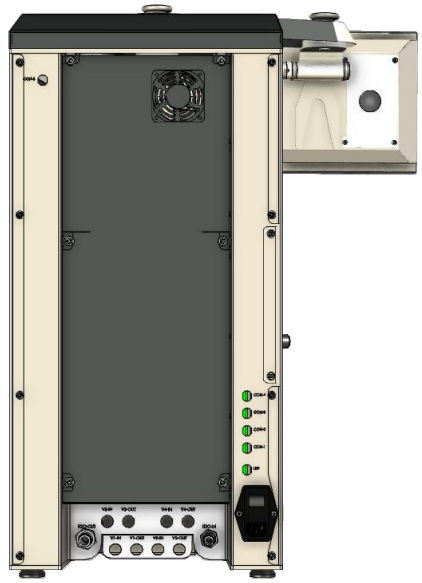


User management system to give access to options.
User should only see the bioreactor and options which are Allowed to see.

Internal room Biobench

Integrations in the standard base unit

- Motor holder
- Gas mix
- 4 Mass flow controllers
- 3 rotameters
- Network connections
- Room for gas analyzers or other sensors
- 5 on/off or analog pumps



Back plate can be dismantled

Vessel specifications

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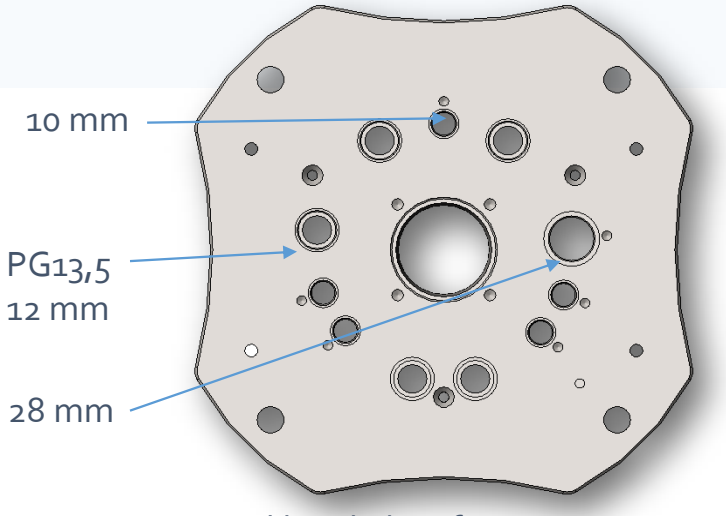
Total Volume	250 ml	500 ml	750 ml	1 .5L	2 L	3L	4L	5L	7.5L	13L	15L
Working volume	50-250ml	100-300ml	100-500ml	0,2-1L	0,4-1,5L	0,4–2L	0,5-3,4L	0,5-4L	0,5-5L	0,5-10L	0,5-13L
Head plate											
Type op ports (standard)											
8 mm	-	-	4	-	-	-	-	-	-	-	-
9 mm	8	9	-	4	-	-	-	-	-	-	-
10 mm	-	-	4	4	5	5	5	5	5	5	5
12 mm (PG13,5),	3	3	4	4	5	5	5	5	5	8	8
28 mm (for four way needle)	-	-	-	-	1	1	1	1	1	1	1
Half moon addition	-	-	-	-	-	-	1	1	1	-	-
Impellers Marine (0,5ID)	1	1	1	1	1	2	2	2	2	2	2
Vessel type:	Round bottom										

Pitched blade impeller



Vessel head plate from 2 to 7.5 L

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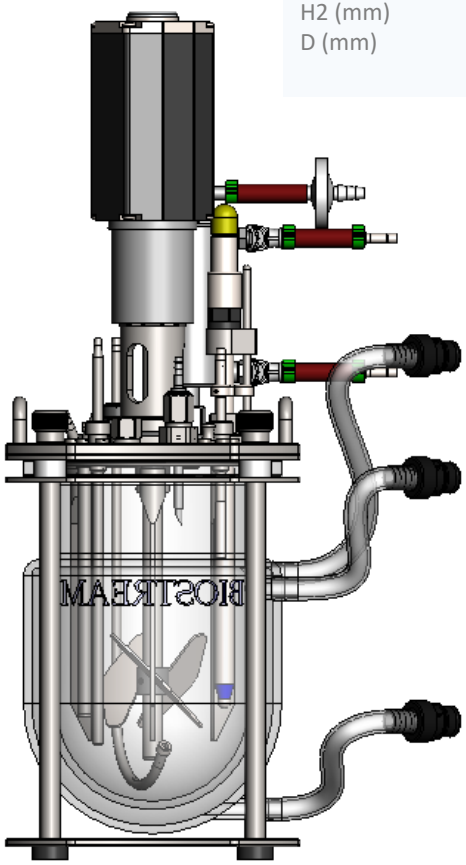
Universal water jacketed vessel

Total Volume	250 ml	500 ml	750 ml	1 .5L	2 L	3L	4L	5L	7.5L	13L	15L
Dimensions											
H1 (mm)	199	242	269	373	254	345	309	309	496	605	715
H2 (mm)	307	351	378	482	377	467	434	434	660	666	859
D (mm)	158	158	158	174	208	201	194	194	169	290	290



Linear scale up and down based on the same vessel dimensions.
Direct and magnetic drive systems.
Special designed for small autoclaves
Pitched blade, Marine, Spin filter, Cell lift or other mixing system
3D vessel will be available at delivery for easy finding parts

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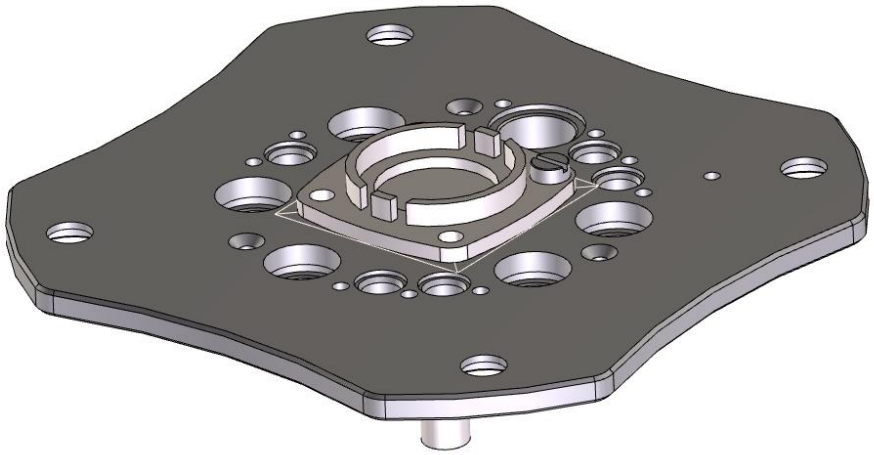
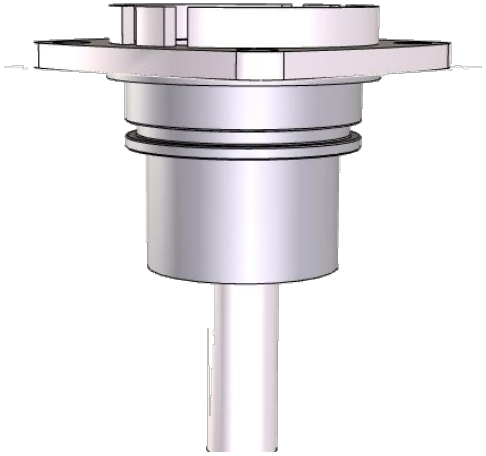
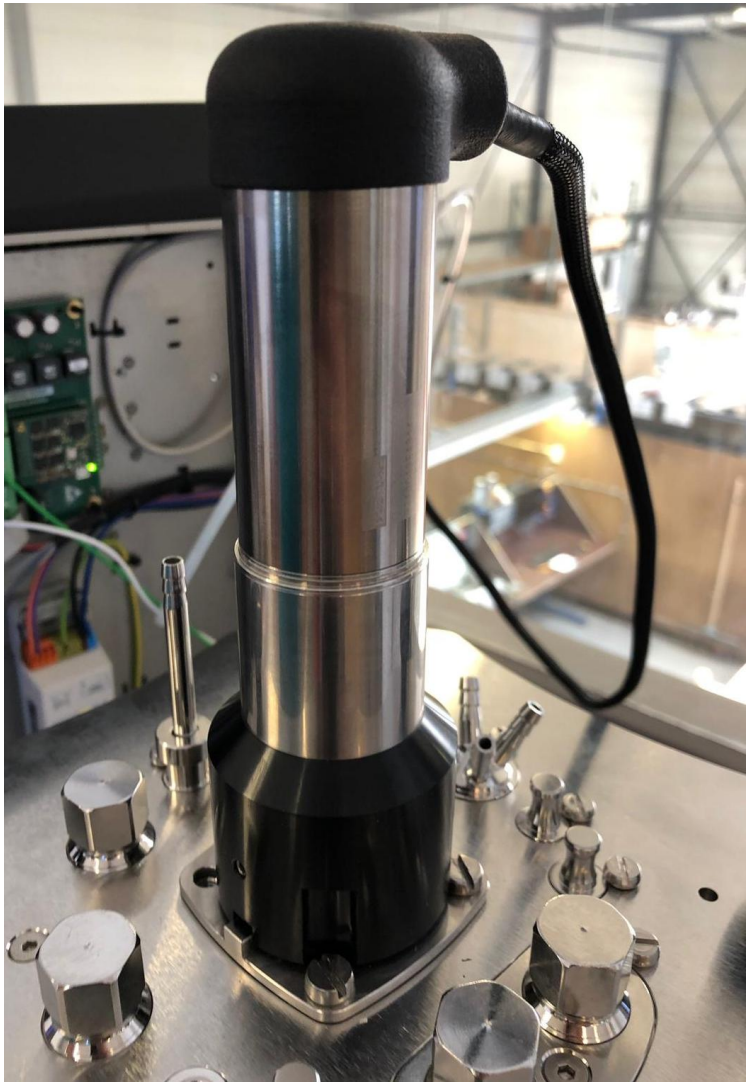
Mechanical drive system



To maximum 700 rpm





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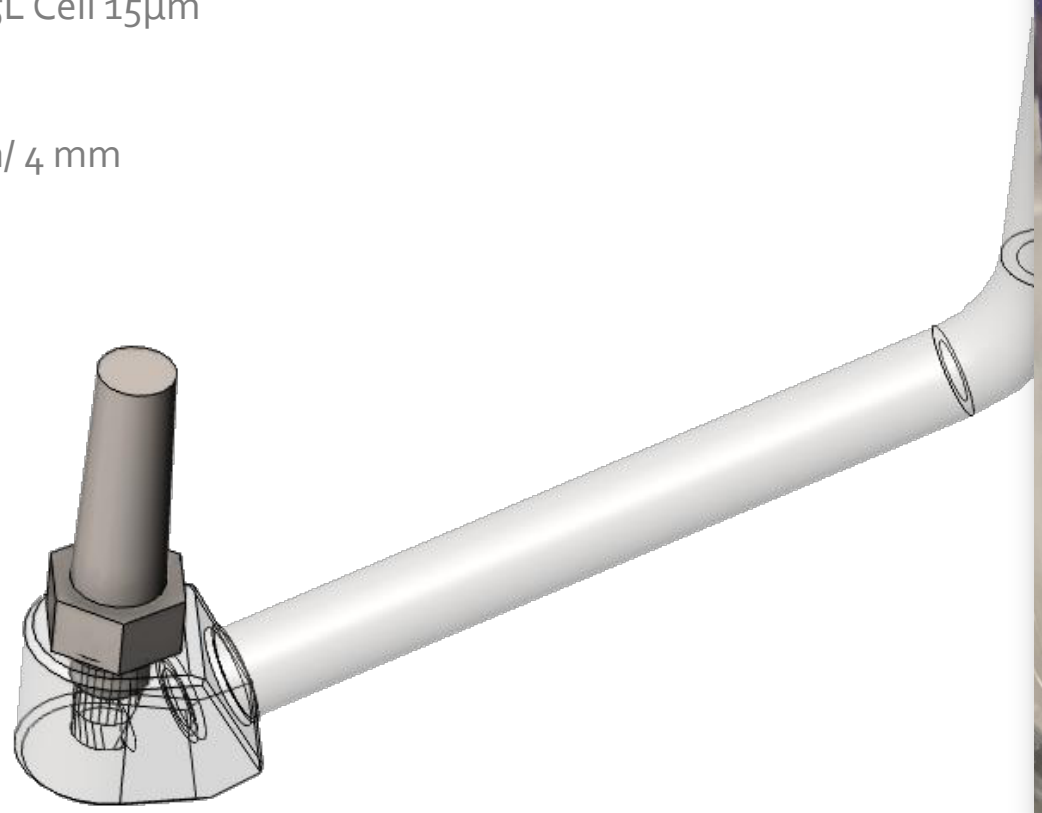
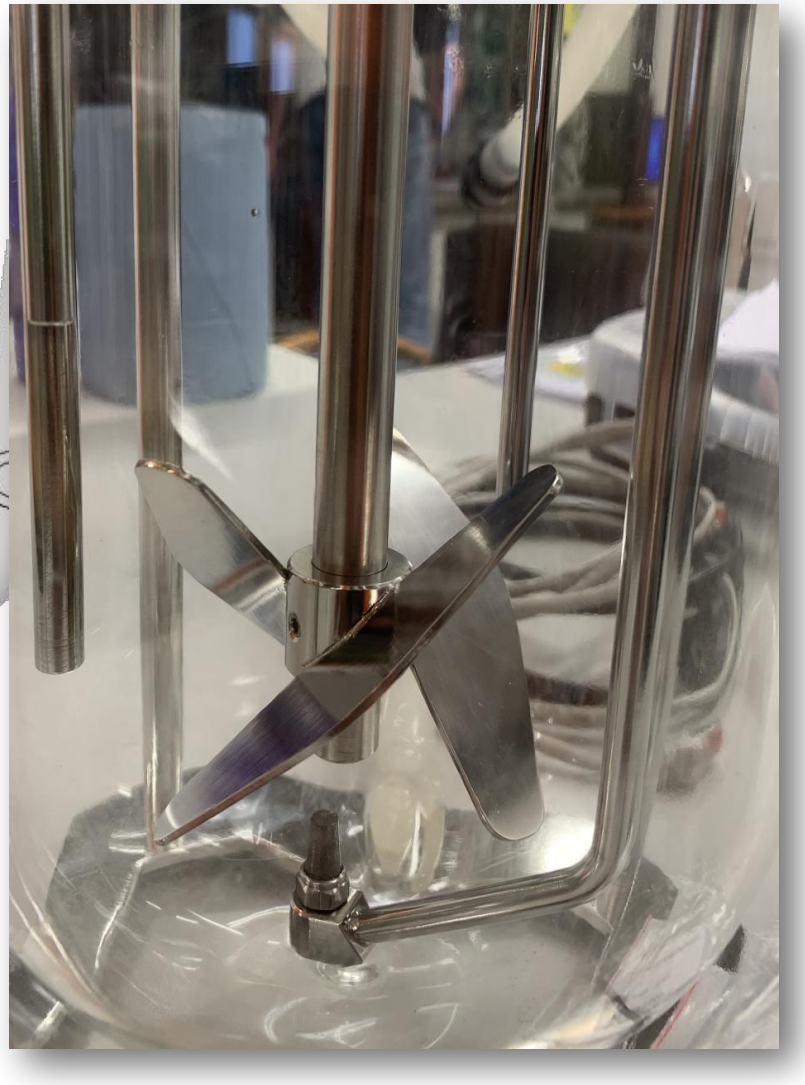
Sintered spager

Sintered Sparger 5L Cell 15µm

Specifications:
Tube OD/ID: 8 mm/ 4 mm





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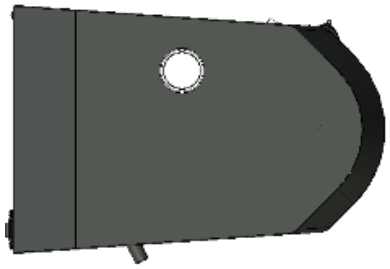
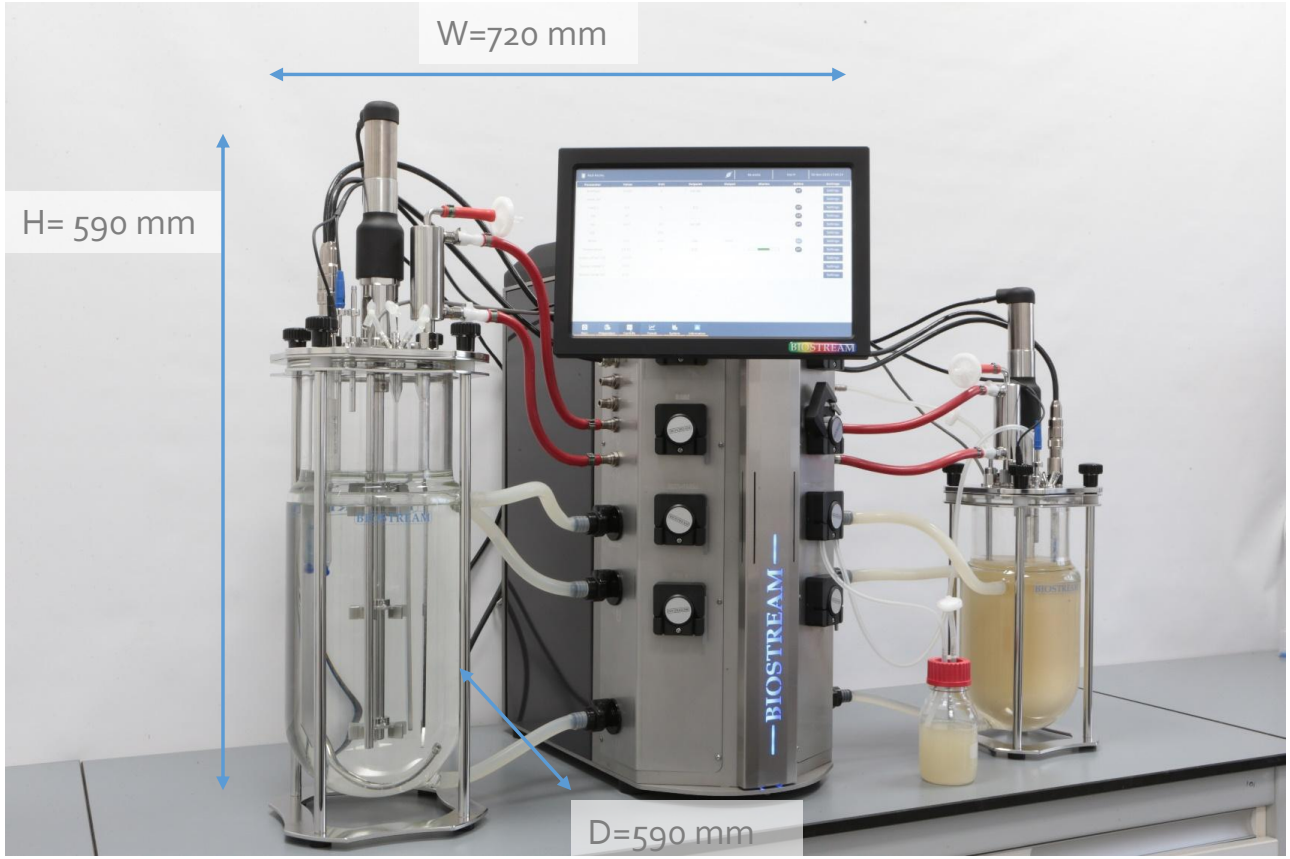
Dimensions base unit

W=500 mm





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Analog and On/off Pumps

Pumps (also other pumps integration possible)

Free configurable for feed, base, acid, antifoam and more

Maximum 5 pumps in the cabinet. More pumps can be connected separate

Pump possibilities:

- Acid
- Base
- Foam & Level
- Feed 1
- Feed 2

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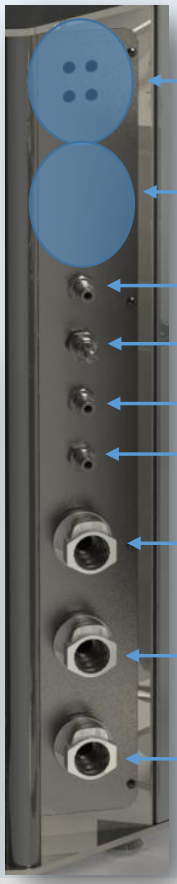
Connections to vessel

Custom made panels. No open holes



pH, DO, Temp, Antifoam cables

Room for extra sensors and connectors for Gas mix, head space, switches

Gas mix in

Control flow condensor

Condensor out

Condensor in

Overflow water jacket

Water in jacket

Water out jacket

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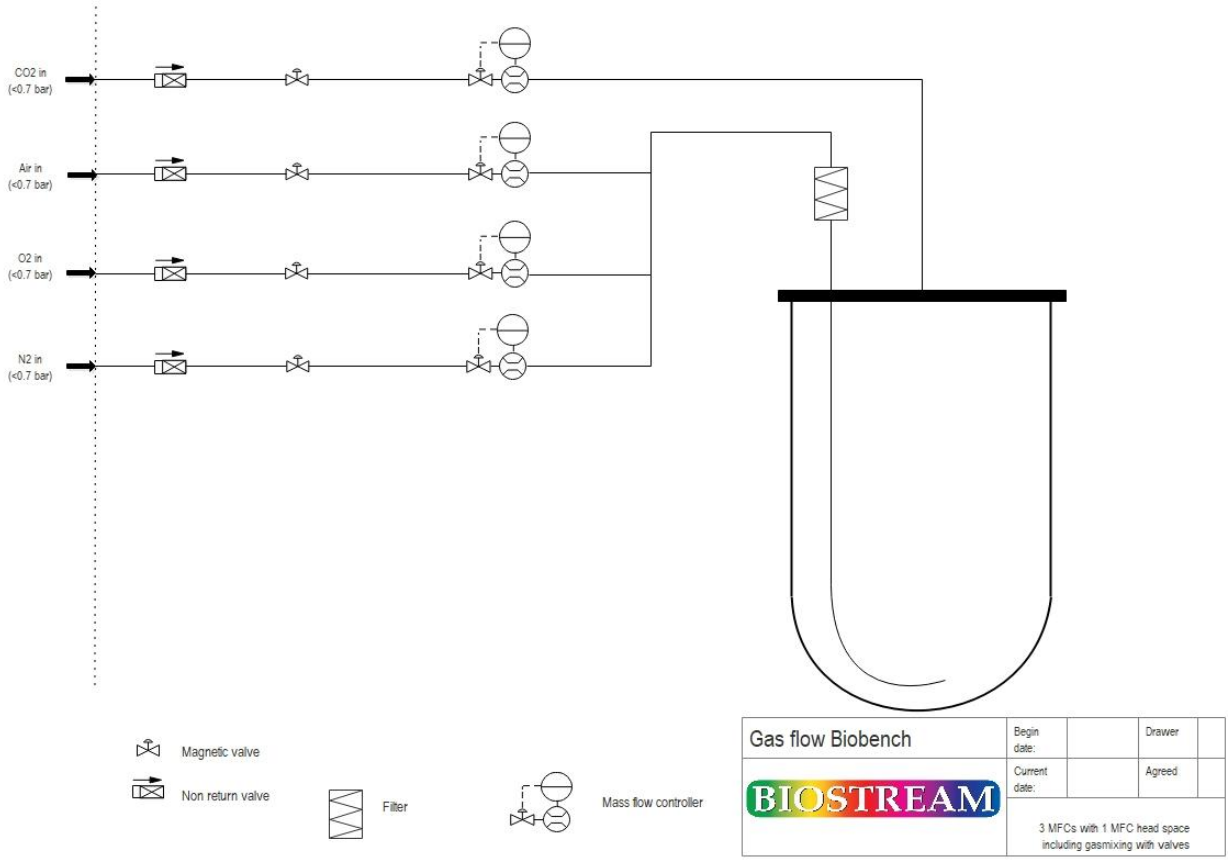


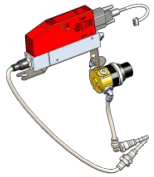
Define your own Gas mix

Option for more gas mixing strategies

O2 N2 air CO2 and more gasses

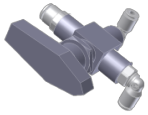
With flow meters:

Rotameter



Mass flow controller

Manual switches for flexibilty



Gas mix can be adapted and you can use the gasses for head space and sparging

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Controller specifications

1 Controller

Design	Multi touch 9 inch screen with advanced control or a separate PC
	Capable of communicating optimal with 6 utility stations
	Total 32 controllers possible.
Function	Monitoring (data storage) and control

2 Agitation

Drive	magnetic or mechanical
Stirrer speed	Speed is adjustable between up to 700 RPM.
Control	PID control.

3 Temperature:

Range	Water jacket vessel
	5-8 ° C above coolant (>0°C) from around 5°C above room temp to 85 °C.
Sensor	Pt-100 sensor (vessel and water system) Delta temperature control possible
Accuracy	+/- 0.1°C in range +10° to +60°C in fluids.
Control	PID control with cooling valve and water jacket heater
Temp. security	Automatic safety thermostat

4 pH

Range	2 - 14
Control	PID. Base and Acid (or CO2 gas) addition to control pH. Setting of dead band
Sensor	Intelligent pH probe with calibration data, runs and more (depends on brand)

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Controller specifications

1 DO

Range	0 – 200 %
Sensor	Intelligent DO probe with calibration data, runs and more (depends on brand)

2 Exhaust

Filter	Standard 0,2 µm absolute filter (also other options available)
Condenser	High condensation and can be dismantled completely.

3 Integrated Pumps

5 corrective reagent and Substrate pumps.
Standard 2 on/off (base, acid, foam) and 2 analog (feed in and out)
Easy adjustable from analog ↻ digital
Additional integrated and external pumps possible.
Free configurable with a block at the back
Range from 0.001 to 347 ml/min with different tubings

4 Utilities

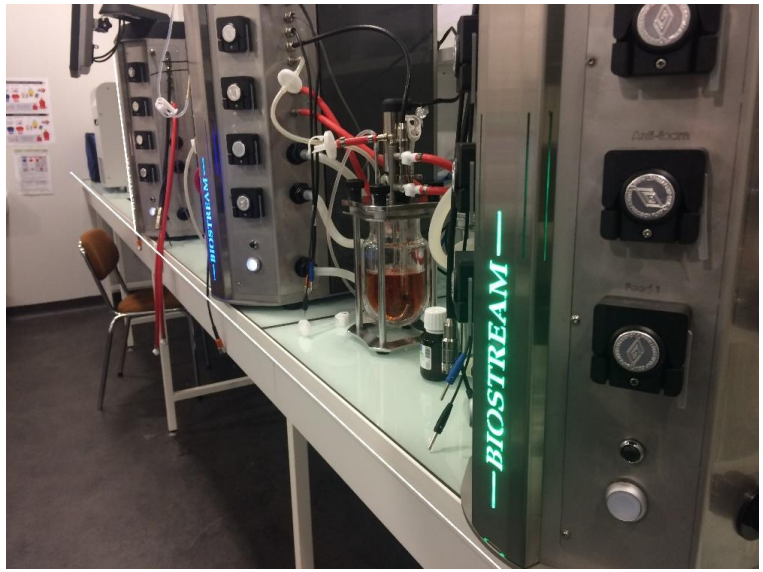
2 bar oil free gasses
0,5 - 3 bar water (normal tap water pressure)
The Biobench itself has pressure regulation internally for safety issues.

5 Aux. equipment

All kinds of external measurements can be integrated in the touch screen.

6 Electrical requir.

230 V; 5 Amp (others also available)



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Hamilton Digital DO sensor

DO Arc-sensor 12 mm

The VisiFerm DO Arc is the first optical oxygen sensor with integrated opto-electronics, having the full functionality of a measuring device with self diagnostics. It is steam sterilizable, autoclavable and CIP compatible. The VisiFerm requires less maintenance than a classical oxygen sensor as it does not have a mechanically sensitive membrane or a corrosive electrolyte.

Advantages:
- No electrolyte or polarization is necessary.
- Quality of the sensor
- Calibration data available
- Re-calibration of the sensor during the run.
- Cascade possibilities with Stirrer, Flow, Gasmix and O2

a-length	120 mm
Accuracy at 25 °C	1 ± 0.05 %-vol: 21± 0.2 %-vol; 50 ± 0.5 %-vol
Analog Interface 1	4-20 mA for DO, programmable
Analog Interface 1 and 2	galvanically not isolated; pulse width modulation 3.5 kHz
ATEX Approval	No
Autoclavable	Yes
Baud Rate	4800, 9600, 19200, 38400, 57600,115200 bd
Certificate	Yes, with parameter settings and materials used
CIP	Yes
Diameter	12 mm
Digital RS485 Interface:	Modbus RTU, max 31 addresses
Drift at Room Temp. under Constant Conditions	< 1 % per week
Electrical Connector	VP 8
Electrolyte	None

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Hamilton digital pH-sensor

The EasyFerm Plus sensors are designed to withstand demanding applications in pharmaceutical, biotechnology, and food & beverages industries. It is also suitable for harsh chemical processes. It withstands steam sterilization, autoclavation and cleaning in place (CIP). The electrolyte of the EasyFerm sensors is pre-pressurized to prevent the diffusion of sample into the sensor. The Everef-F reference cartridge ensures that the reference electrolyte remains free of silver and precipitation of proteins.

Advantages:

- Wide range of applications
- Ceramic diaphragm is an improved barrier of the electrode
- Highly reliable measurements after steam sterilization, autoclavation and CIP cleanings
- Drift-free measurement

EasyFerm Bio specifically designed for applications in Pharma and Biotechnology (EHEDG, Biocompatibility)

Pre-pressurized reference electrolyte ensures a clog-free diaphragm

Specifications	
Measuring range	0 – 14 pH
Process temperature	0 – 140 °C (Arc: analog 0 – 110 °C, digital 0 – 140 °C)
Pressure range (relative to ambient)	0 – 6 bar (pressurized)
Hygienic aspects	Autoclavable, SIP, CIP
pH glass	PHI
Electrolyte	Phermlyte
Reference system	Everef-F
Diaphragm	HP Coatramic
Temperature sensor	Pt100 in VP version Pt1000 in LEVP version

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Option: Touch screen

- Touch screen computer
- Twistable arm and can be fixed in each position