

Customized scalable batch Single-Use-Fermentor



**BactoVessel
for microbial
bio-manufacturing**

November 2018



Per Stobbe



The building block's for fermentation **ready SUF's**

Ready to use
"right out of
the box"

Single-Use-Fermenter

Scalable Vessel Volume, agitation, aerator, desired length and hose brand, fit your existing PCS, etc.

Aeration & Agitation

Freedom to choose the turbine you prefer. As many and different as needed.
Freedom to choose the sparger you prefer.

Thermal Control

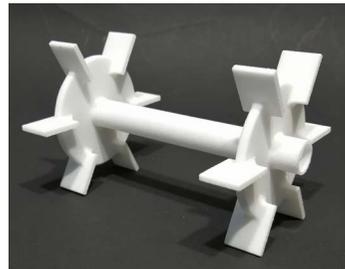
Process control involves thermal control.
Freedom to choose electrical or liquid thermal control as you prefer.

Single-Use-Sensor's

Single-Use-Sensor's which fit your existing Process-Control-System connections.
Parameters measured as minimum DO, pH and temp.

Servo motor drive

Use your preferred PCS and the associated servo motor for agitation.



What does **“Customized”** really mean?

Build your next SUF exactly to your needs ...

We have more than 2.000 components designed to fit each other.
That's millions of combinations !

Build your own Fermenter



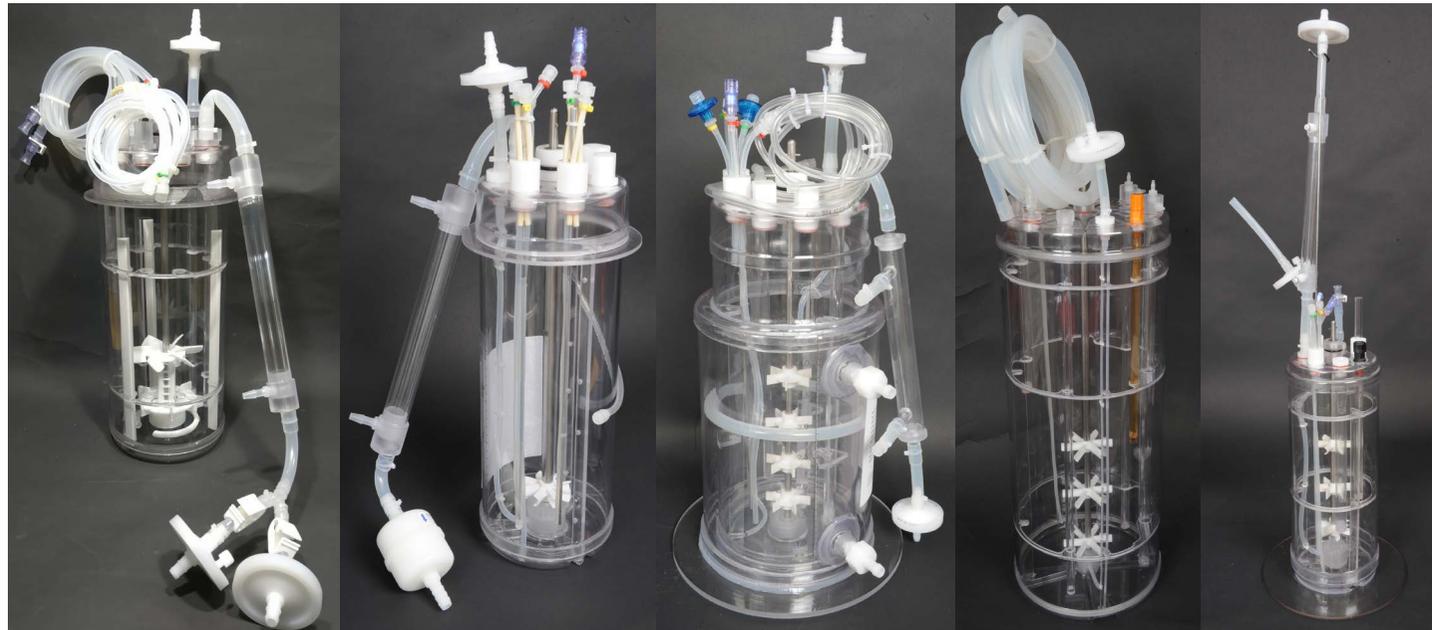
BactoVessel parts are all Plug & Play!

BactoVessel SUF portfolio

Size 3,2 - 5,7 - 13 - 30 liter VV

BactoVessel are all Fermentation- Ready

- BactoVessel SUF with from 2,1 to 30 liter Vessel Volume (VV) (big, large, medium, small, mini)
- SUF with any type of turbine single or dual or triple
- Agitation by Magnetic-Bottom-Drive (MBD) by Magnetic-Stirrer-Table (MST) with any servo motor < 3,2 liter
- Agitation by Head-Plate-Drive (HPD) by any servo motor you may have > 5,7 liter
- Range of Single-Use-Sensor's with connectors which fit your PCS
- Thermal control electrical or liquid



BactoVessel 3 liter SUF

with Single-Use-Jacket

Small size BactoVessel

- BactoVessel-3 is a pre-assembled SUF ready to use right out of the box
- BactoVessel connects to your process via long silicone hose (and if preferred aseptic couplings)
- For use with your own Process-Control-System (PCS) and servo motor
- Single-Use-Sensor's (SUS) as required (and available)
- Check out thermal control below
- SUF here shown with integrated Single-Use-Jacket (SUJ)
- Here shown for BioStat PCS and servo motor

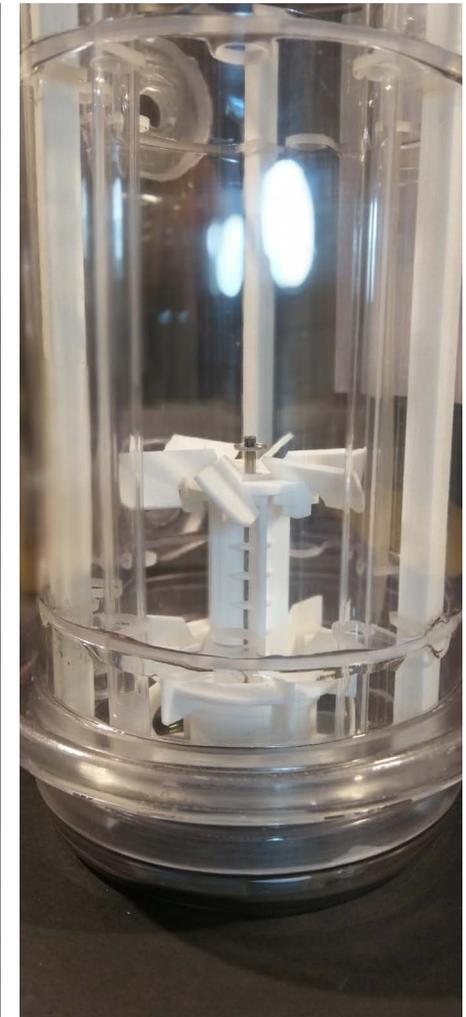
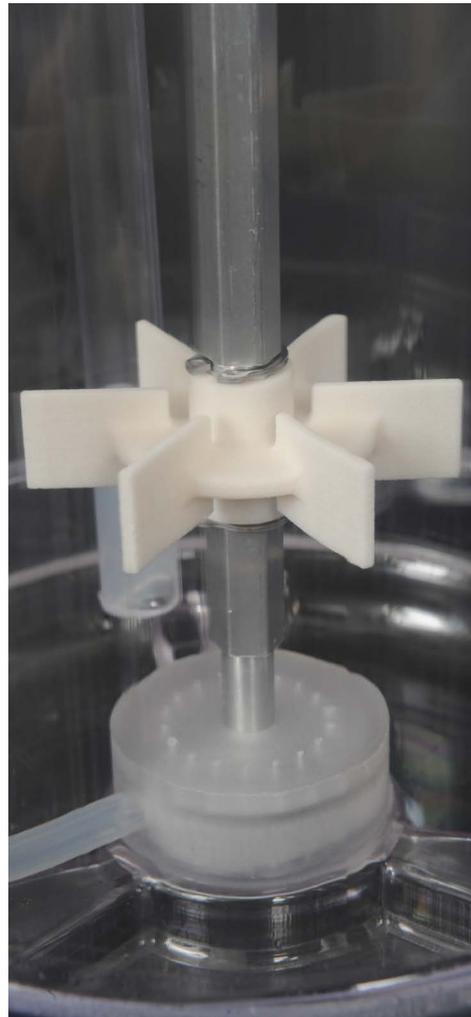


BactoVessel 5,7 liter SUF

with Single-Use-Sensor's

Medium size BactoVessel

- BactoVessel-6 is all pre-assembled and ready to use right out of the box
- BactoVessel-6 designed for connection to your own preferred PCS and servo motor
- BactoVessel-6 outlet / inlet connection with long silicone hoses and connectors
- Exhaust gas cooler if preferred
- Fully customized baffel design
- Single-Use-Sensor's (SUS) as required (and available)
- Check out thermal control below
- Here one SUS shown with highly customized dual combined turbine setup and Magnetic-Bottom-Drive

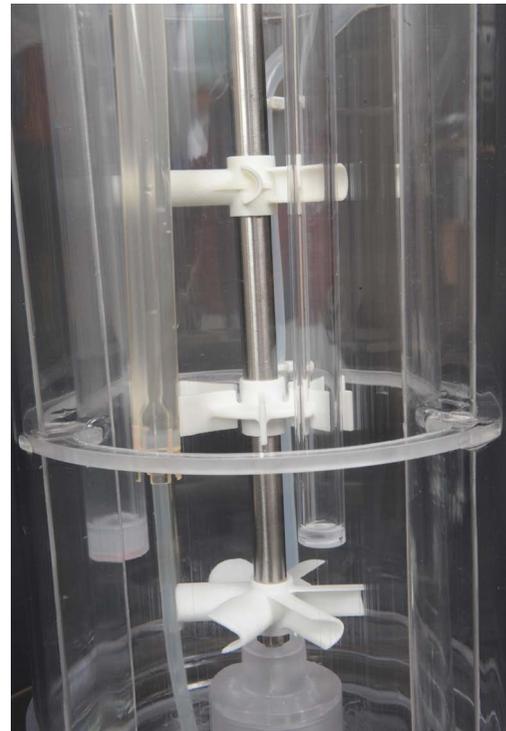


BactoVessel 13 lite SUF

with Single-Use-Sensor's

Large size BactoVessel

- BactoVessel-13 is all pre-assembled and ready to use right out of the box
- BactoVessel-13 designed for connection to your own PCS and servo motor
- BactoVessel-13 outlet / inlet connection with long silicone hoses and connectors
- Designed for rugged drive up to 1.500 RPM for microbial applications
- Single-Use-Sensor's (SUS) as required (and available)
- Check out thermal control below
- Here shown with triple turbines, Head-Plate-Drive and SUS
- Here shown for use with Applikon type of drive connection



BactoVessel 30 liter SUF

with Single-Use-Sensor's

Big BactoVessel ready for microbial applications

- BactoVessel-30 is all pre-assembled rigid plastics 30 liter VV ready to use right out of the box
- Fermentation-Ready for connection to your own PCS and servo motor
- Fully customized SUF design
- Single-Use-Sensor's (SUS) as required (and available)
- Head plate driven agitation (HPD)
- Any number, type, size, and mix of turbine's
- Any size and length silicone hoses
- Available with foam collecting bottle and / or gas cooler
- Here shown with triple turbines and SUS
- Here shown with customized motor adaptor for ElectroLab PCS



Aeration

within the Single-Use-Fermentor

Pores for aeration

- For bubble generations its all about material pore size and material surface properties
- Get as many of the bubbles and of the size you want
- Arrange the aeration device you know works best for your application and where you want
- Choose from hundreds of different sparger bodies

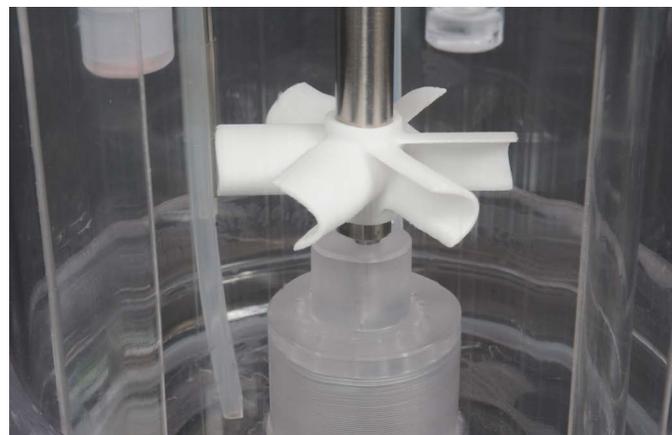
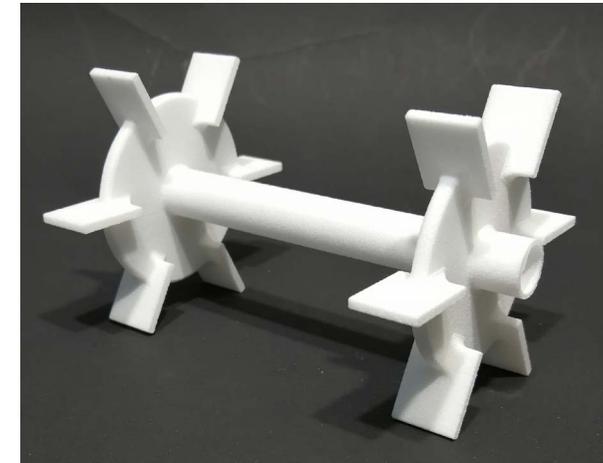


Agitation

of the Single-Use-Fermentor's

Turbines for agitation

- Rushton, Smith, Bakker is important principles
- Any drive method, number, type, size, and mix of turbine's is possible to integrate in the SUF
- Some great design newer imagined before !



Small drives for agitation

MST at bottom of BactoVessel

Magnetic-Stirrer-Table (MST) gives simplicity

Its all Plug & Play!

Magnetic-Bottom-Drive offer light weight SUF speed and power without the need of adding the somewhat heavy servo motor

Though the heavy servo motor allow turbine rotation and power to be distributed by turbines inside the media



Large drives for agitation

HPD on top of BactoVessel



Head-Plate-Drive (HPD) gives BactoVessel power and speed

Its all Plug & Play!

Head-Plate-Drive require some SUF weight / size in order to carry the somewhat heavy servo motor

Though the heavy servo motor allow turbine rotation up to 1.500 RPM and immense power to be distributed by turbines inside the media



The unique
Single-Use-Sensor's
 measure DO, pH
 and temperature

The complete **SUF family** may optional include pre-installed Single-Use-Sensor's (SUS) for DO, pH, temp and level. Mounted vertically through the head-plate.

For accurate **DO measurements** we pre-install either VisiWell or PolarWell. Use the optical or polarographic Re-Usable-Sensor supplied with your PCS.

For accurate **pH measurements** the standard PCS cabling connects with either AK9 or AS8 pre-installed pH SUS.

For **temperature measurement** use we install a non-invasive well. Just dump in the standard PCS thermo couple.



The unique
Single-Use-Sensor's
measure DO, pH
and temperature

Its all Plug & Play!

Both pH and SUW (VisiWell and/or PolarWell) is integrated along with assembling of the SUF before bagging and subsequent E-beam irradiation. Dry storage capability is 12 month on SUS components stored below 20° and with no UV light exposure.



Thermal control

Thermal electrical controlled BactoVessel

Its all Plug & Play!

- Electrical-Heating-Blanket (EHB) surrounding the 3.200 ml BactoVessel
- Shown smallest EHB cover 3.200 ml volume and turbine and SUS
- EHB covers all sizes up to 30 liter SUF



Thermal control

External thermal liquid controlled BactoVessel

For Process-Control-System (PCS) facilitating thermal control by recirculating liquids. The Re-Usable-Jacket (RUJ) heat exchanger is an efficient option for BactoVessel.

- Available for Head-Plate-Drive (HPD)
- Best possible heat transfer
- Connects to any PCS thermal control



Thermal control

Integrated thermal liquid controlled BactoVessel

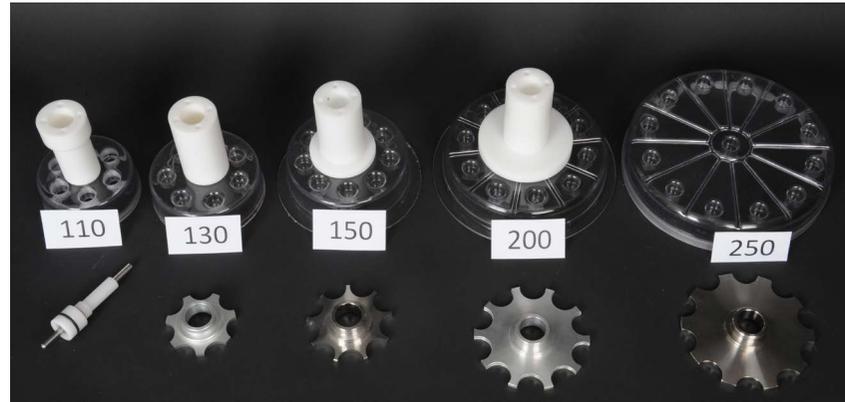
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- Best possible heat transfer
- Connects to any PCS thermal control
- Available for Head-Plate-Drive (HPD)
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Accessories for BactoVessel SUFs



Thank you for your attention



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