

Bench scale and Pilot plant steam-in-place bioreactor systems

Applikon's concept of modularity (using standard modules to customize the functions of the bioreactor) is extended to the stainless steel pilot plant bioreactors as well. For scale up purposes the range of the Bio Bench and Pilot Systems, designed and built to the latest standards on hygienic processing and cGMP and GAMP validation requirements, complements the laboratory scale bioreactor systems. Scale-up from laboratory scale to pilot plant and small scale production is simplified by the consistent bioreactor design and the scalable control solutions. All systems are designed to be cleaned-in-place. Applikon offers CIP systems ranging from fully manual control to fully automated. Standardized bioreactor systems are available up to 140 liter total volume and custom build units can be supplied up to 2000 liter total volume.

Features

- Easy to clean mirror polished external finish
- Electropolished finish of all parts in contact with the culture ($Ra = 0.4 \mu m$) to allow efficient clean-in-place
- Modular design allows easy adaptation to changing process demands
- Magnetically coupled agitator for peace of mind
- cGMP compliant design simplifies validation
- Compact design reduces floor space needed
- Open frame construction gives easy access for maintenance and operation

Applications

- Scale-up studies
- Medium optimization
- Process optimization
- Small scale production
- Microbial and Cell culture
- Batch, Fed-Batch, Perfusion and Continuous cultivation



Specifications

	Total volume (liter)	Working volume (liter)	Minimum working volume (liter)	Aspect ratio total volume	Aspect ratio working volume
7 liter Bio Bench	7	5	2	2.2	1.5
15 liter Bio Bench	15	10	4	2.1	1.4
20 liter Bio Bench	20	15	4	3.0	2.2
30 liter Bio Bench	30	22.5	7	2.0	1.6
30 liter Pilot Cell	30	20	7.5	1.5	1.0
60 liter Pilot Cell	60	40	10	1.5	1.0
130 liter Pilot Cell	130	100	28	1.5	1.0
20 liter Pilot Microbial	20	15	4	3.0	2.2
40 liter Pilot Microbial	40	30	7.5	3.0	2.2
70 liter Pilot Microbial	70	50	10	3.0	2.2
140 liter Pilot Microbial	140	100	20	3.0	2.2
Custom build bioreactor systems are available up to 2000 liter total volume					
Drive system	Direct drive, magnetically coupled, optional mechanical seal, bottom or top mounted agitator for microbial cultures and top mounted for cell culture systems				
Maximum agitator tipspeed (m/s)	5 m/s for microbial cultures and 1 m/s for cell cultures				
Impellers	Rushton and marine with outside diameters 0.33 – 0.5 vessel diameter				
Gas sparger	Porous sparger or Ring-type sparger				
Gas overlay	Optional gas overlay line				
Exhaust gas	Water cooled exhaust gas condenser with internal spiral and/or jacketed				
Sampling	Optional resterilizable sample system in DN25 port in lower side wall				
Draining	Resterilizable bottom mounted bellows drain				
Additions	Sterilizable additions (push valves) and resterilizable addition ports				
pH	Measurement: 12 mm classic pH sensor in DN25 port in lower side wall Control: via acid pump or CO ₂ gas (rotameter or MFC) in combination with alkali pump				
DO₂	Measurement: 12 mm polarographic DO ₂ sensor in DN25 port in lower side wall Control: via a combination of N ₂ , Air, O ₂ (Rotameter or MFC) and agitation or nutrient addition pump				
Temperature	Measurement: Pt-100 sensor in in DN25 port in lower side wall Cultivation control: cooling and heating jacket via bioreactor wall				
Foam	Measurement: Height adjustable conductivity based foam sensor Control: Anti foam addition pump				
Level	Measurement: Height adjustable conductivity based level sensor or loadcells in bioreactor frame Control: pump for liquid addition or removal				

