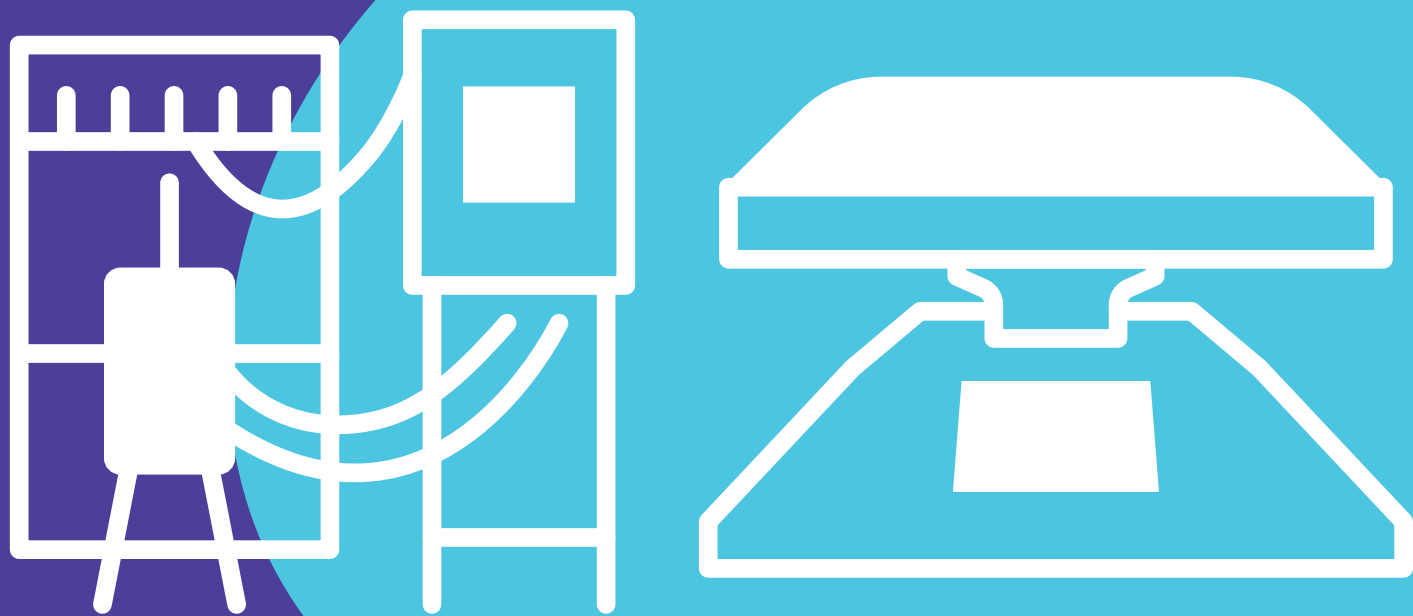




Bioreactor Series

Product Catalog 2022 Ver.00



CATALOG

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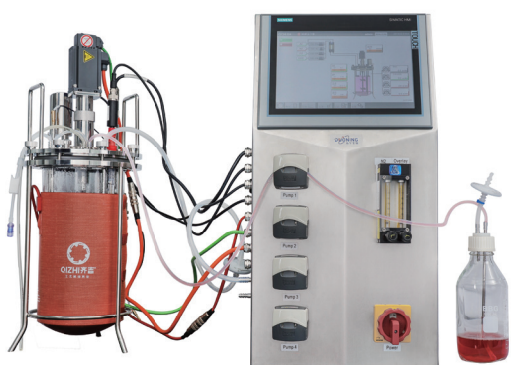
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Suspension Cell Culture Solutions

BA series fermentation tanks, DuoWave rocking bioreactor and Duocubactor single-use bioreactor system can be used for the culture of most suspension cells (such as CHO, 293, BHK), providing a one-stop production line layout for stable process scale-up. The press blade used is a stirring blade with low shear force suitable for cell culture, which could minimize the cell damage during the culture and mix them gently. The control of pH, DO and temperature is achieved with PID to ensure a stable culture condition. In addition to that, an audit track and batch report automatic generation function is also provided, meeting the current standards in bio-pharmaceutical industry. These solutions are widely used in the pharmaceutical enterprises and scientific research institutions.



Glass Tanks for Research

Micro Parallel Bioreactor System

Product Description

Micro parallel bioreactor system is designed for the high density culture of suspension cells with a total volume of 500mL and working volume from 100 to 350mL. The temperature, stirring, pH, DO and other parameters during the culture can be measured and tested in real time for analysis and calculation.

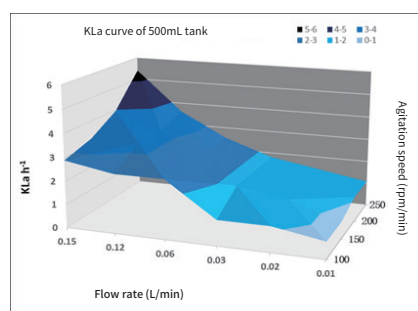
Product Features

- Used for DOE experiment and optimization of cell culture process and media components
- A small footprint for easy operation and available with 6 positions, 12 positions, 18 positions and 24 positions
- Liner scale-up is possible with 500mL, 1L, 3L, 7L and 15L glass tanks and stainless steel tanks
- Remote monitoring is possible with a computer running in WINCC operating system
- The data of multiple parallel tanks can be integrated in one chart online for convenient data analysis

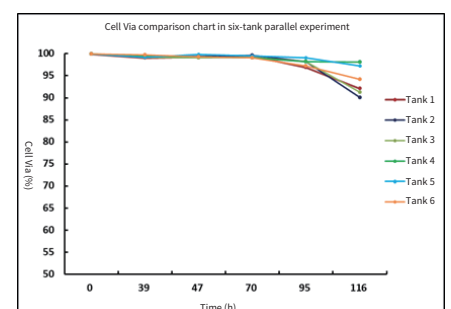
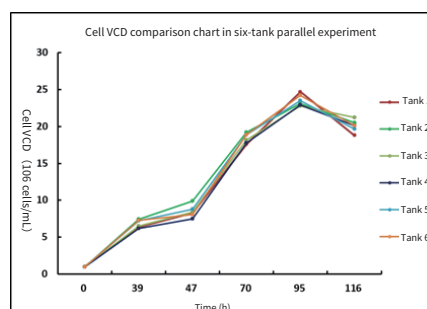
Product Parameters

Items	Parameters
Tank volume	500mL
Temperature	A silicone pad and a heating jacket are provided with the PID control with a control accuracy up to $\pm 0.1^{\circ}\text{C}$
Gas	For submerged vent, 3 automatic adjusting mass flow meters are provide, with an adjustable range of 0-100mL/min for AIR and O_2 , and 0-50mL/min for CO_2
Air vent mode	Bubble venting loop
DO electrode	Hamilton optical digital electrode (dissolved oxygen control range: 0~200%; resolution: 0.1%; control accuracy: $\pm 3\%$)
pH electrode	Mettler-Toledo gel electrode (range: 2.0~12.0; resolution: 0.01pH; control accuracy: $\pm 0.05\text{pH}$)
Peristaltic pump	2-4 peristaltic pumps can be configured and the feeding time can be preset with a custom program
Flow	The flow rate depends on the pipe diameter with a accuracy within 5%
Stirring	Qizhi magnetic stirrer equipped with a stepping motor from Nanotec. Stirring range: speed 0~300rpm, $\pm 1\text{rpm}$
Stirring blade	Blade angle, blade form and blade diameter are optional

Case sharing



Kla scale-up data



Parallel experiment case

BA Series Glass Bioreactor System

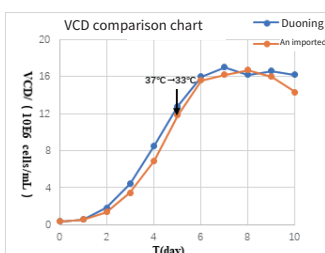
Product Description

- Widely applicable: it is applicable for the suspension and adherent culture of microbes, animal cells and insect cells;
- Accurate control: the DO, pH, temperature, liquid level, speed and other parameters can be controlled precisely;
- Consistency: consistent glass tanks, blades, control parameters could provide a basis for parallel experiments;
- User-friendly software design: user-friendly interactive software is easy for beginners to master it quickly and makes online or offline configuration of parameters possible to generate formula and recall them directly for use; SCADA could also be connected;
- Complete audit tracking function and easy to use: the content audited and tracked could be stored on the hard disk of the computer automatically, preventing losing, and could be recalled for easy checking;
- Regulatory requirements: compliance with GMP and FDA 21 CFR Part 11;
- Brand of accessories: all the system are made by Siemens; the main parts and accessories of bioreactors are from the imported premium brands.

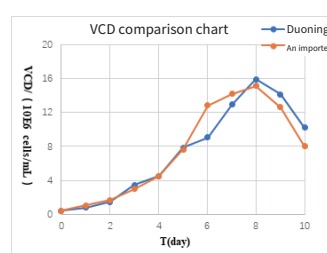
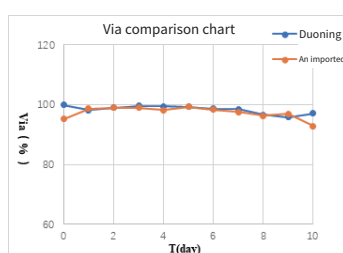
Product Parameters

Items	Parameters
Tank volume	1L, 3L, 7L, 15L
Temperature	Automatic control (electric heating blanket) (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	Automatic control of rotor flow meter for air, nitrogen, carbon dioxide and oxygen
Air vent mode	L tube big bubble vent (other vent mode is optional)
DO electrode	Mettler/Hamilton optical digital electrode (display range: 0- 200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler/Hamilton digital electrode (display range: 2-12, resolution: 0.01 pH; control accuracy: ± 0.02)
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Automatic control (display range: 0-800rpm; resolution: 1rpm; control accuracy: $\pm 1\text{rpm}$)
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)
Cooling	Supporting stainless steel ferrules for cold water solenoid valve (optional)

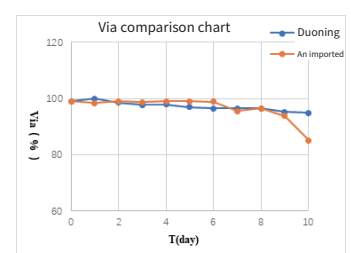
Case sharing



CHO cell application case



293 cell application case



For Single-Use Production

DuoWave Rocking Bioreactor System

Product Description

DUO Wave bioreactor system is equipped with a WAVE cell culture bag developed by Duoning, which could feedback and control the culture temperature, pH, dissolved oxygen, weight and other parameters automatically on a heatable swing platform precisely controlled. With the support of a stable and reliable smart PID, more accurate WAVE temperature control, more stable swing, reduced shear force and foam generation, as well as more stable DO and pH control would be achieved to lay a foundation for fully automatic weighing perfusion culture, thus achieving the automatic and precise control of cell culture.

Product Features

- The cell contacting materials are made of medical grade PE, EVOH plastics and silicone tubes which are safe and non-toxic to guarantee the cell viability and product safety. The surface of the device is made of 304 stainless steel which wouldn't accumulate dirt and meet the GMP production requirements.
- An optical dissolved oxygen sensor is also equipped. For pH, DO and temperature, their resolution and control accuracy are 0.01 and ± 0.02 , 0.1% and 2% and 0.1°C and $\pm 0.5^\circ\text{C}$, respectively; the swing speed ranges from 0 to 60rpm with a control accuracy of 1rpm.
- Recording, export, remote collection of data from a computer are supported and remote monitoring through the LAN and internet is possible.



Ordering information

Name	Model	Working volume	Function	After-sales
DUO Wave Bioreactor System	SUB-3L	Actual volume used: 1.5 L	Applicable for the production and study of animal cell culture	One year of warranty
	SUB-10L	Actual volume used: 5 L		One year of warranty
	SUB-20L	Actual volume used: 10 L		One year of warranty
	SUB-22L	Actual volume used: 11 L		One year of warranty
	SUB-50L	Actual volume used: 25 L		One year of warranty

Duocubacto Single-use Bioreactor System

Product Description

Duocubactor bioreactor system is built with more than ten years' experiences of Duoning and Qizhi in the design of bioreactor systems and based on the advantages and disadvantages of single-use bioreactors manufactured at home and abroad. Combined with the single-use 3D cell culture bag, the 50 L to 2000 L scalable bioreactor system could control and adjust the temperature, pH, dissolved oxygen, weight and pressure in real time.

Product Features

- The cell contacting materials are made of medical grade PE, EVOH plastics and silicone tubes which are safe and non-toxic to guarantee the cell viability and product safety.
- All the contracting materials have passed the single-use system related verification of cFDA, satisfying USP standards
- The surface of the device is made of 304 stainless steel which wouldn't accumulate dirt and meet the GMP production requirements
- The device is powered by the PLC and WINCC systems from Siemens for easy connection of various SCADA data management systems and recording and export of all data, meeting the audit tracking requirement in cGMP

Product Parameters

Items	Parameters
Film	DuoFilm 7-layer laminated film is used, with the liquid contact layer made of ULDPE and the outer layer of Pa. And its biocompatibility meet the relevant USP standards
Stainless steel tank and electric cabinet	Made of 304 stainless steel for easy cleaning and with a waterproofing grade up to IP63
DO electrode	Hamilton or Mettler optical digital electrode (measurement range: 0- 300%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Hamilton or Mettler digital pH electrode (measurement range: 3-11 pH; resolution: 0.01 pH; control accuracy: ± 0.02 pH)
Temperature electrode	Jumo PT100 temperature electrode (measurement range: 0-150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Jacket circulating water	LAUDA circulating water thermostat (control range: RT $\pm 20^\circ\text{C}$; control accuracy: $\pm 0.2^\circ\text{C}$)
Load cell	Mettler load cells with an accuracy of 3% used at four feet
Pressure sensor	Pendo or Jumo pressure sensor (resolution: 10 Pa; control accuracy: $\pm 2\%$)
Gas	3 gas outlets provided in default (customizable) 1 outlet for underlying vent with small bubbles (1mm distributed aperture, 0.05 vvm for oxygen, 0.05 vvm for air, 0.025 vvm for carbon dioxide); 1 outlet for underlying vent with micro bubbles (50um distributed aperture, 0.025 vvm for oxygen); 1 outlet for surface vent (0.05 vvm for oxygen, 0.05 vvm for air); all the outlets are equipped with a Vogtlin thermodynamic mass flow meter
Stirring	A servo stirring system works in combination with a single-use magnetic stirrer at the bottom (speed range: 0-300rpm; control accuracy: ± 2 rpm)
Heating of exhaust gas	2 exhaust filter heaters are equipped and adjusted with PID, and the temperature can be adjusted with a control range of $\pm 0.5^\circ\text{C}$
PLC	Siemens 1200 series PLC
Operating system	The device is powered by the Siemens WINCC system for easy connection of various SCADA data management systems and recording and export of all data, meeting the audit tracking requirement in cGMP

For production with stainless steel devices

BA Series Stainless Steel Bioreactor System

Product Description

Design concept: the system is designed in a way satisfying the technical requirements of modern bioreactors and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations. The system is built in an open frame including all the piping, supply system and separate vertical tanks.

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Product Features

- Made with lead-edge technologies
- Available in various sizes
- Highly customizable
- With wide coverage, more user-friendly design and strong traceability for stable using

Application scope

This bioreactor system is applicable for the culture of animal cells, including the large scale production of adherent and suspension animal cells.

Product Parameters

Items	Parameters
Tank volume	20L、30L、40L、50L、75L、100L、150L、200L、300L、500L、1000L、2000L、3000L、5000L
Temperature	Automatic control (jacket heating) (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	Automatic control of thermal mass flow meter for air, carbon dioxide and oxygen, and control of rotor flow meter for nitrogen
Air vent mode	Loop vent with big bubbles (other vent mode is optional)
DO electrode	Mettler/Hamilton optical digital electrode (display range: 0- 200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler/Hamilton digital electrode (display range: 2-12, resolution: 0.01 pH; control accuracy: ± 0.02), can be calibrated online
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Siemens servo motor for automatic association control (display range: 0~1000rpm (can be adjusted in accordance with the tank size), resolution: 1rpm , control accuracy: $\pm 1\text{rpm}$ (can be adjusted in accordance with the tank size))
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)
Weighing	Mettler weighing module

Duolysis Cell Retention System

Product Description

Duolysis Cell Retention System is a cell retention system with a hollow fiber column. Designed with the tangential flow micro porous filtration principle of hollow fiber column, the simple structured, long life and consumables affordable system can be used for medium perfusion or harvest without cell loss.

Product Features

- Safety

The cell contacting materials are made of 316L stainless steel, medical grade Teflon and medical grade silicone tube which are safe and non-toxic to guarantee the cell viability and product safety, meeting GMP requirements. The surface of the device is made of 304 stainless steel which wouldn't accumulate dirt and meet the GMP production requirements. The hollow fiber column used is a medical grade product and meets the requirements of cGMP.

- Automation

With weight linked and balance connected to keep the pump-in and pump-out liquid constant for perfusion, with an accuracy up to 1%-3%;

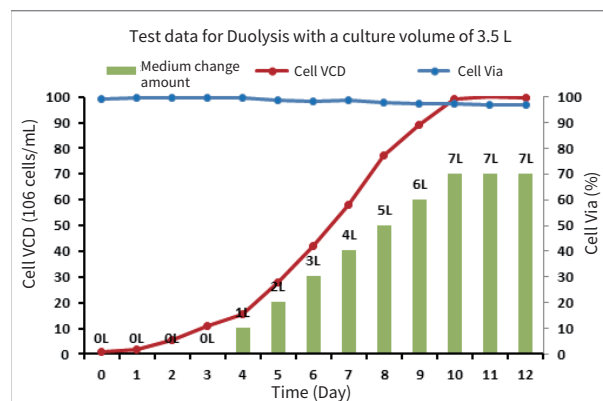
- The device is connected with a peristaltic pump and equipped with a Watson-marlow 3 series peristaltic pump head to measure the pump-in and pump-out liquid for perfusion, with an accuracy up to 1%-3%;

- Innovative: the Teflon bellows reciprocating cross flow pump developed by Duoning is driven by an electric drive pusher. The cell fluid goes in and out of the system from bottom to avoid the condition occurring on a diaphragm pump in which the cells sink into the diaphragm and cannot be returned.

- Low shear force: the liquid is transferred with a reciprocating cross flow pump with low shear force to minimize the effect of shear forces on cells.

- Low cost: the consumable material used for cross flow pump is the bellows made of medical grade Teflon, whose service life can reach 10 times of imported consumable materials made of ATF silicone membrane, and the cost is low.

- High compatibility: the maximum flow rate of the designed bellows is up to 2L/min and the volume range of perfusion is wide.



Adherent Cell Culture Solutions

The Duoning & Qizhi bioreactor system is designed in a way satisfying the technical requirements of modern bioreactors and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations. Used with experienced microcarrier culture techniques, BC series fermentation tanks with proven process and available in various size can be used for the culture of most ardent cells, such as VERO, CHO and 293T. When use in combination with the bubble-free vent technology, the dissolved oxygen can be guaranteed and effect of crushed bubbles on the microcarrier can be avoided. Except that, the system is applicable for the microcarrier cell culture used in the industry currently.



BC Series Glass Bioreactor System

Product Description

Application scope: this bioreactor system is applicable for the culture of animal cells, including the laboratory culture of adherent and suspension animal cells. Design concept: the system is designed in a way satisfying the technical requirements of modern bioreactors and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations.

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, the none stainless steel parts are made of borosilicate, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Product Parameters

Items	Parameters
Tank volume	1L, 3L, 7L, 15L
Temperature	Automatic control (electric heating blanket) (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^{\circ}\text{C}$)
Gas	Automatic control of thermal mass flow meter for air, carbon dioxide and oxygen, and control of rotor flow meter for nitrogen
Air vent mode	Bubble-free device (a patent of Qizhi) is compatible with the microcarrier culture of adherent cell (other vent modes optional)
DO electrode	Mettler/Hamilton optical digital electrode (display range: 0- 200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler/Hamilton digital electrode (display range: 2-12, resolution: 0.01 pH; control accuracy: ± 0.02)
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Automatic control (display range: 0-800rpm; resolution: 1rpm; control accuracy: $\pm 1\text{rpm}$)
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)



Glass Tanks for Research

EC Series Glass Bioreactor System

Product Description

Application scope: this bioreactor system is applicable for the culture of animal cells, including the laboratory culture of adherent and suspension animal cells. Design concept: the system is designed in a way satisfying the technical requirements of modern bioreactors and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations.

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, the none stainless steel parts are made of borosilicate glass, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Product Parameters

Items	Parameters
Tank volume	1L, 3L, 7L, 14L
Temperature	Silicon electric heating element with Do-temperature electrode (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	Rotor flow meter is adjustable in the range of 0-10L/min, and the gas mixing control of 2-4 channels of air intake is possible with a high-frequency solenoid valve
Air vent mode	Loop vent with big bubbles (other vent mode is optional)
DO electrode	Hamilton optical digital electrode (dissolved oxygen control range: 0~200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler digital electrode (display range: 2.0~12.0, resolution: 0.01 pH; control accuracy: ± 0.02)
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Automatic control (display range: 0-800rpm; resolution: 1rpm; control accuracy: $\pm 1\text{rpm}$)
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)
Cooling	Supporting stainless steel ferrules for cold water solenoid valve



BC Series Stainless Steel Bioreactor (Microcarrier Culture)

Product Description

Design concept: the system is designed in a way satisfying the technical requirements of modern bioreactors and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations. The system is built in an open frame including all the piping, supply system and separate vertical tanks.

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Application scope

This bioreactor system is applicable for the culture of animal cells, including the large scale production of adherent and suspension animal cells

Product Parameters

Items	Parameters
Tank volume	20L, 30L, 40L, 50L, 75L, 100L, 150L, 200L, 300L, 500L, 1000L, 2000L, 3000L, 5000L
Temperature	Automatic control (jacket heating) (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	Automatic control of thermal mass flow meter for air, carbon dioxide and oxygen, and control of rotor flow meter for nitrogen
Air vent mode	Bubble-free device (a patent of Qizhi) is compatible with the microcarrier culture of adherent cell (other vent modes optional)
DO electrode	Mettler/Hamilton optical digital electrode (display range: 0- 200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler/Hamilton optical digital electrode (display range: 2-12, resolution: 0.01 pH; control accuracy: ± 0.02), can be calibrated online
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Siemens servo motor for automatic association control (display range: 0~1000rpm (can be adjusted in accordance with the tank size), resolution: 1rpm, control accuracy: $\pm 1\text{rpm}$ (can be adjusted in accordance with the tank size))
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)

Bacterial Culture Solutions

Duoning & Qizhi BF series fermentation tanks are available in various volumes, covering the scientific research and production fields. Among them, the multiple parallel tanks can be used for the design of parallel experiment and development of processes. BF series fermentation tanks are a kind of universal fermentation tank which provide a fully functional culture system in a compact package. With the industrial grade PLC controller and configuration software, the gas mixing ratio, pH, DO, stirring, temperature, pump feeding, defoaming and liquid level can be precisely controlled. They could meet the fermentation needs of various strains in biological medicine industry and food industry. In addition to that, many kinds of fermentation tanks are produced in the same line with stable process, which could guarantee the stable development of bio-pharmaceuticals in China.

BF Series Glass Bioreactor System

Product Description

Application scope: it is applicable for the high density fermentation of microbes with various valid volumes: 1L, 3L, 7L, 14L and 20L.

Design concept: the system is designed in a way satisfying the technical requirements of modern microbial fermentation tanks and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations.

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, the none stainless steel made parts are made of tempered borosilicate glass, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Product Parameters

Items	Parameters
Tank volume	1L, 3L, 7L, 14L
Temperature	Silicon electric heating element (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	The gas mixing control of 2-4 channels of air intake is possible with a high-frequency solenoid valve with an adjustable range of 0-10L/min
Air vent mode	Loop vent with big bubbles (other vent mode is optional)
DO electrode	Mettler/Hamilton optical digital electrode (display range: 0- 200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler/Hamilton digital electrode (display range: 2-12, resolution: 0.01 pH; control accuracy: ± 0.02)
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Automatic association control (display range: 0~1000rpm (can be adjusted in accordance with the tank size), resolution: 1rpm, control accuracy: $\pm 1\text{rpm}$ (can be adjusted in accordance with the tank size))
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)
Cooling	Supporting stainless steel ferrules for cold water solenoid valve
Weighing	Mettler weighing module (optional)

Glass Tanks for Research

EF Series Glass Bioreactor System

Product Description

Application scope: it is applicable for the high density fermentation of microbes with various valid volumes: 1L, 3L, 7L, 14L and 20L.

Design concept: the system is designed in a way satisfying the technical requirements of modern microbial fermentation tanks and provided with high-quality sanitary and industrial grade accessories to assure optimum performance and high safety of operations.

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, the none stainless steel made parts are made of tempered borosilicate glass, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Product Parameters

Items	Parameters
Tank volume	1L, 3L, 7L, 14L, 20L
Temperature	Silicon electric heating element with Do-temperature electrode (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	Adjustable with rotor flow meter in the range of 0-5L/Min
Air vent mode	Bubble-free vent, loop vent or L tube vent is optional
DO electrode	Hamilton optical digital electrode (dissolved oxygen control range: 0~200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler digital electrode (display range: 2.0~12.0, resolution: 0.01 pH; control accuracy: ± 0.02)
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Automatic association control (display range: 0~1000rpm (can be adjusted in accordance with the tank size), resolution: 1rpm, control accuracy: $\pm 1\text{rpm}$ (can be adjusted in accordance with the tank size))
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)

BF Series Stainless Steel Bioreactor System

Product Description

Application scope: the pilot scale bioreactor systems are suitable for pilot scale microbial fermentation production and research, while the ones for production are suitable for large-scale microbial fermentation production.

Design concept: the system is designed in a way satisfying the technical requirements of modern microbial fermentation tanks integrated with all the elements, and provided with high-quality sanitary accessories to assure optimum performance and high safety of operations. The system is built in an open frame including all the piping, supply system and separate vertical tanks. The supporting process piping shall be made and installed on site according to the production process requirements of customers.

Volume: 20L, 30L, 30L, 50L, 75L, 100L, 150L, 200L, 300L, 500L, 1000L, 2000L and 3000L

Selection of materials: for the part contacting medium, the stainless steel made parts all are made of SUS316L stainless steel, the none stainless steel made parts are made of tempered borosilicate glass, while the sealing parts are made of EPDM, silicone and other materials satisfying the FDA requirements; the part not contacting medium is made of SUS304 stainless steel.

Product Parameters

Items	Parameters
Tank volume	20L, 30L, 40L, 50L, 75L, 100L, 150L, 200L, 300L, 500L, 1000L, 2000L, 3000L, 5000L
Temperature	Automatic control (jacket heating) (display range: 0~150°C; resolution: 0.1°C; control accuracy: $\pm 0.2^\circ\text{C}$)
Gas	Automatic control of thermal mass flow meter for air, carbon dioxide and oxygen, and control of rotor flow meter for nitrogen
Air vent mode	Loop vent with big bubbles (other vent mode is optional)
DO electrode	Mettler/Hamilton optical digital electrode (display range: 0- 200%; resolution: 0.1%; control accuracy: $\pm 2\%$)
pH electrode	Mettler/Hamilton digital electrode (display range: 2-12, resolution: 0.01 pH; control accuracy: ± 0.02)
Peristaltic pump	2 to 4 Waston-Marlow peristaltic pumps are provided to control the feeding automatically according to different needs
Stirring	Automatic association control (display range: 0~1000rpm (can be adjusted in accordance with the tank size), resolution: 1rpm , control accuracy: $\pm 1\text{rpm}$ (can be adjusted in accordance with the tank size)
Stirring blade	Optional blade angles and sizes
Defoaming/liquid level electrode	Automatic control of liquid level and addition of antifoam (optional)
Cooling	Supporting stainless steel ferrules for cold water solenoid valve
Weighing	Mettler weighing module (optional)

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