



SINGLE, PARALLEL  
AUTOCLAVABLE AND  
SUB DISPOSABLE  
BIOREACTORS



# Bio Book UP & Parallel

## Advanced Modular Bioreactors

Bioreactors series represent the latest innovations in mechanical, automation and software engineering applied to the bioprocess industry.

Industrial technologies, high-flexibility, modularity, easy upgrades and replacements, guaranteed long term spare parts availability and after-sales service distinguish Kbiotech from competition.

The BioBook UP & Parallel new generation control systems have been designed to manage from 1 single bioreactor and multiple systems in parallel. The available configurations are Single, Twin (2 bioreactors), Quad (4 bioreactors), Quadx2 (8 bioreactors), Quadx3 (12 bioreactors). Our control modules allow high flexibility and versatility, they can work either integrated with our controllers or as standalone units that can be connected to external hardware and software as



independent modules. Our universal control units can work with autoclavable and disposable interchangeable vessels in the wide range from 50ml working volume to 50L total and are fully scalable from laboratory systems to pilot and industrial plants.

Each bioreactor is monitored and controlled by the Bioflex process software which allows numerous functions dedicated to research and development, process optimization or standard production.

- 1 Modular control unit** work with a wide choice of autoclavable and disposable vessels starting at 50ml w/v up to 50L
- 2 Unique Flexibility** the modular control unit allows you to expand the system at any time
- 3 High Flexibility and Reliability** via PLC automation and BIOFLEX™ Software

- 4 Validatable systems** according to GPL and GMP standards
- 5 Service and Maintenance** with a worldwide network
- 6 Quality without compromise** certified and traceable material according to pharmaceutical standards



# ADVANCED & INTUITIVE CONTROLLER TECHNOLOGY



## TRUSTED AUTOMATION & SOFTWARE CONTROL

The whole control unit is based on PLC hardware and Scada Software. Advanced Controller features include simultaneous control and regulation of various parameters in one bioreactor solution.

### Controls for each bioreactor:

- 2 x pH
- 2 x pO<sub>2</sub>
- 2 x temperature
- 2 x level and foam
- 2 x stirrer speed
- 2 x pressure
- up to 8 x variable or fix speed pumps
- up to 8 x MFC's or rotameters
- 2 x load cells
- up to 8 x balances

\* extra inputs are available for biomass monitors, optical density, gas analyzer, pCO<sub>2</sub>, online automated samplers and others.

**Bio Book** controller technology guarantee the best performances, reliability, long term service and spare parts availability unless proprietary systems. The selection of trusted hardware components united with our background in fermentation and cell culture implemented into the **Bio Book** process control software ends up into a unique advanced bioreactor.

## Bioflex SOFTWARE

The **Bioflex** SOFTWARE can be installed on HMI or PC interface with large screens from 10" to 24". Bioflex is a powerful process control software to fully manage, control and record process parameters in single and parallel bioreactors.

### Functionalities:

- set-points configuration and modification
- P.I.D. settings
- probes and pumps calibration
- dose monitoring
- alarms setting and protection
- multi level passwords protection
- sequences programming
- batches and feeding profiles formulations
- cascade controls and exponential equations
- Online recording (memory card and USB/Ethernet output connections)
- Data Visualization with graphic, curves and profiles displays

The **Bio Book** controller and **Bioflex** SOFTWARE allow you to work in:

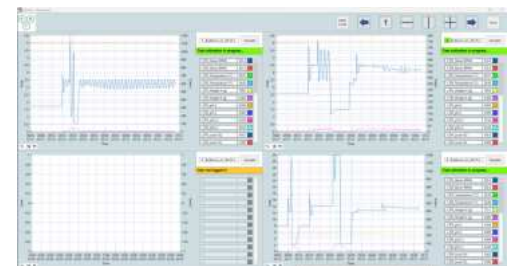
- Batch
- Feed-Batch
- Continuous mode



Connected to the Biomass probe, the Bioreactor recognizes it and is displayed on the synoptic



In the recipe edit there are two possibilities, to set the Biomass cascade, as another sensor eg. pH



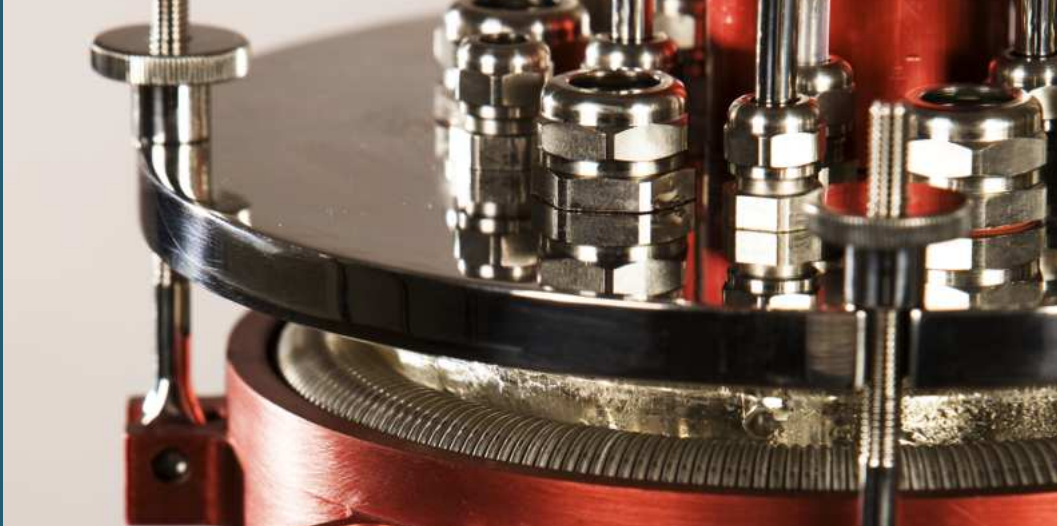
### Leading PLC:

National Instruments Crio' OPC connectivity to communicate with other hardware such as Siemens, Allen Bradley, Delta V.

### Chosen of communication device:

Canopen, Interbus, Profibus, DeviceNet, ControlNet, ModBus, RS232/485, Ethernet, USB.

# MODULAR & FLEXIBLE VESSEL CONCEPT



## SMART DESIGN

**Bio Book** is Modularity and Flexibility at the same time.

As a matter of fact, the homogeneity of our control unit and software beside the vessel's concept, offer full possibilities to work with several types of cells lines and micro-organisms without the need to modify instrument design.

Every unit is composed of:

- PLC module containing electronic elements
- Gas mixing module
- Pumps module
- Automated Tempering module with built in heater and Chiller for accurate temperature control. Simplified closed loop connections to minimize water consumption.

Each module can be replaced or exchanged at any time without the need of an expert technician

Available Vessels for Fermentation and Cell Culture:

Re-usable vessels vol.		Working min.	Working max
<b>300 ml</b>	Single wall / Jacketed	50-75 ml	200 ml
<b>500 ml</b>	Single wall / Jacketed	75-100 ml	400 ml
<b>1 L</b>	Single wall / Jacketed	0,2 L	0,8 L
<b>2 L</b>	Single wall / Jacketed	0,4 L	1,6 L
<b>3 L</b>	Single wall / Jacketed	0,5L	2,5 L
<b>5 L</b>	Single wall / Jacketed	1,0 L	4,0 L
<b>7 L</b>	Single wall / Jacketed	1,4 L	5,6 L
<b>10 L</b>	Single wall / Jacketed	2,0 L	8,0 L
<b>15 L</b>	Single wall / Jacketed	3,0 L	12,0 L
<b>20 L</b>	Single wall / Jacketed	4,0 L	16,0 L

## CONFIGURATION

Kbitech offers a wide selection of autoclavable borosilicate glass bioreactors and SUB disposable available in the range of 50mL to 20L working volum, single wall or jacketed. System concept allow you to interchange vessel's size without any limitation on the system set-up. You can benefit of our classic bioreactors selection either for Microbial fermentation and Cell cultivation. Kbitech supply multi purpose Bioreactors and Fermenters for microbial, cell cultures or other non conventional applications. Our offer include Photo-Bioreactors, Air-Lift, Gas-Lift, MBR/SBR systems. Diachrom Biotech customize bioreactors according to specific detailed requirements.

## OUR MODULES



Gas Mixing Module



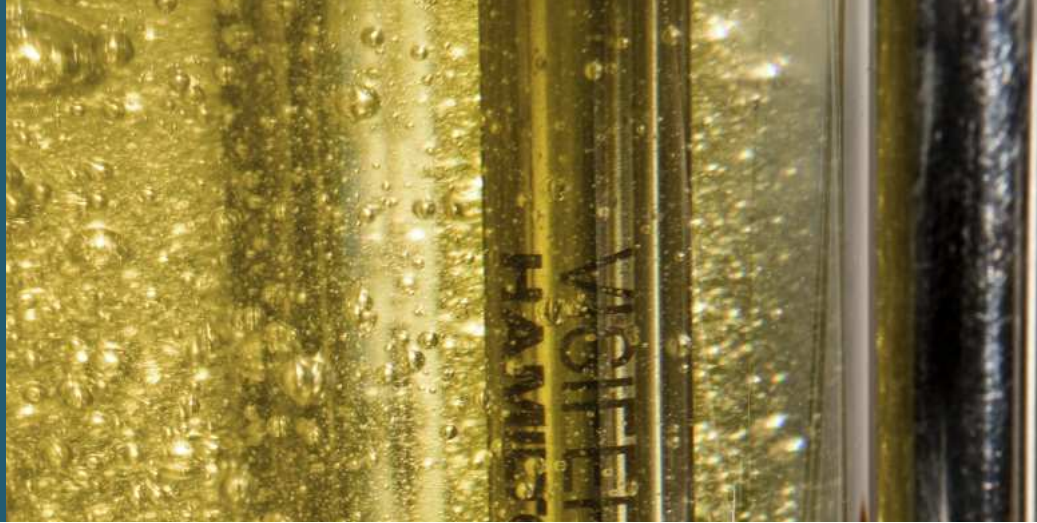
Pumps Module



Temperature regulation Module with Chiller

SUB disposable vessels vol.		Working min.	Working max
<b>500 ml</b>	Single wall / Jacketed	50-75 ml	200 ml
<b>3 L</b>	Single wall / Jacketed	0,5 L	2,5 L
<b>10 L</b>	Single wall / Jacketed	2,0 L	8,0 L
<b>30 L</b>	Single wall / Jacketed	5 L	24 L

# FEATURES & SPECIFICATIONS



## FEATURES

- Smart ARC pH and D.O. probes allow monitoring of all sensor functions making substantial advantages in bioprocess monitoring and control
- Monitoring of all sensor functions, status of the sensor quality (glass resistance, reference resistance, Checkref potential).
- Variable or fix speed peristaltic pumps, autoclavable type  
In an embodiment, the present solution provides a new and improved liquid metering pump adapted for pumping sterile fluids and/or foodstuffs.
- Choice of additional probes such as Biomass, Capacitance, dissolved pCO<sub>2</sub>, glucose / lactate probe, Gas analyzers and more.

## TECHNICAL DATA

### Power supply

110 – 240 (±10 %) V, 50/60 Hz, 10 A, Single Phase

### Water supply

Quick-connect; 10 psig (0.69 barg)

### Communication

1 × USB, Ethernet (SCADA, IP Network)

### User Interface

Touchscreen or desktop PC

### Dimensions standard with 2 modules

(W × D × H)  
28.0 × 25.0 × 60.0 cm  
11 × 9.85 × 23.6 inches

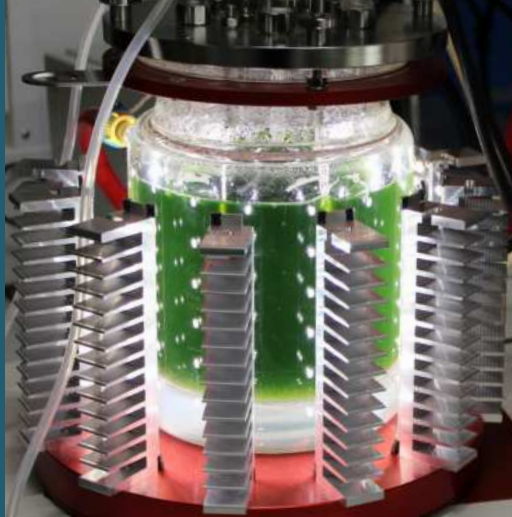
### Weight w/o 2 modules

40.8 kg / 89 Lbs

## SPECIFICATIONS

<b>Agitation system</b>	Direct drive, mechanical or magnetically coupled drive
<b>Stirrer speed (rpm)</b>	Standard range is 1 – 2000 rpm adjustable according to required configuration either bacterial, cell culture or both
<b>Impellers</b>	Rushton, Marine, Pitched Blade, adjustable and removable type impellers. Special impellers are also available.
<b>Gas sparger</b>	Porous sparger, L-type sparger, Sinterized sparger, fixed or removable type
<b>Gas overlay</b>	Included as standard feature
<b>Gas mixing</b>	Standard set-up include Air, O <sub>2</sub> , CO <sub>2</sub> and N <sub>2</sub> gas mixing station, our unit can hold up to 8 gasses. Standard set-up include Flowmeters with on/off automatic solenoid valve for gas flow regulation or Massflow controllers for automatic gas flow control and data recording
<b>Exhaust gas</b>	Water cooled exhaust gas Condenser
<b>Sampling</b>	Sanitary sampling system with Fixed height or Height adjustable sampling pipe including contained sample bottles available with various volumes
<b>Harvesting</b>	Sanitary Drain pipe or Dip tube Fixed height or Height adjustable
<b>Liquid additions</b>	Triple or single inlet ports for chemicals additions (optional micro liquid injectors)
<b>pH</b>	Optical or classic pH sensor, 12mm, 19mm or 25mm Ingold connectors, (various length). <b>SCADA Software Control:</b> via acid pump or CO <sub>2</sub> gas (Flowmeter or MFC) in combination with alkali pump and/or other actuators.
<b>DO<sub>2</sub></b>	Optical or classic DO sensor, 12mm, 19mm or 25mm Ingold connectors, (various length). <b>SCADA Software Control:</b> via or in combination with N <sub>2</sub> , Air, O <sub>2</sub> (Flowmeter or automation MFC) and agitation or nutrient addition pump or other actuators
<b>Temperature</b>	Pt-100 sensor in thermo well in top plate. <b>SCADA Software Control:</b> cooling and/or heating jacket via bioreactor wall or via internal heat exchanger, cooling via tap water or chilled water
<b>Foam</b>	Height adjustable conductivity based foam and level sensor, High/Low foam sensors are also available. <b>SCADA Software Control:</b> Anti foam addition pump or other actuators.
<b>Level</b>	Height adjustable conductivity based level sensor. <b>SCADA Software Control:</b> pump for liquid addition or removal
<b>Pressure</b>	Pressure sensor top plate mounted. <b>SCADA Software Control:</b> modulated pressure valve, combined with air inlet, Flowmeters/MFC, agitation and other actuators
<b>Weight</b>	Load cells and balances are available. <b>SCADA Software Control:</b> pump for liquid addition or removal
<b>Probes and sensors available</b>	Biomass Online probes, optical density sensors, CO <sub>2</sub> /O <sub>2</sub> /NH <sub>4</sub> /SO <sub>2</sub> gas analyser, pCO <sub>2</sub> sensor, conductivity, methanol/ethanol analyzers, Automated samplers PLC and SCADA Software Control integrations, OPC compliance.
<b>Photo-Bioreactors</b>	Special accessories for photo syntetic and photo trophic microorganisms, variable LED light set and other .

# KBIOTECH SPECIAL CONFIGURATIONS



## PHOTO BIOREACTORS & AIR LIFT

- **Photo bioreactors**
- **Air-lift**
- **Gas-lift**
- **MBR-SBR**  
3, 5, 7, 10, 15, 20 litres  
total volume available

Kbiotech Photobioreactors

**Bio -PBR**, can contain and grow algae, cyanobacteria and other photosynthetic organisms under heterotrophic and mixotrophic conditions. Our PBR system is a controllable environment in which to grow algae, and where the supply of light, nutrients, carbon dioxide, air, and temperature can be controlled and regulated.

Kbiotech experiences applied to airlift / gaslift reactors geometry improved hydrodynamic variables like gas velocity and physical properties of the fluids. In fact, the geometry of the reactor has a strong influence on the hydrodynamics and this factor is a source of difficulty in comparing different results. Major advantages of the Kbiotech solution were founded in gas hold-up, liquid circulating velocity, heat transfer, mass transfer and dispersion coefficients. SBR sequential batch reactors are industrial processes for the treatment of wastewater. SBR reactors treat waste water such as sewage or output from anaerobic digesters or mechanical biological treatment facilities in batches. Oxygen is bubbled through the waste water to reduce biochemical oxygen demand (BOD) and chemical oxygen demand (COD) to make suitable for discharge into sewers or for use on land.

## PARALLEL BIOREACTORS

- **TWIN-BENCH**  
1 tower, 2 vessel
- **QUAD-BENCH**  
1 tower, 4 vessel
- **MULTI-BENCH**  
1 tower, 6-8-12 or more vessel
- **RE-USABLE DISPOSABLE VESSELS**  
from 50ml w/v to 50 Liters.

Kbiotech as new generation of parallel bioreactors offers advanced controller functionalities designed for meeting demanding requirements in both research and process development as well as for media optimization and screening studies.

**Bio Book** Parallel Bioreactor

Systems can be used for microbial and cell cultivation applications in research and development allow for advanced screening of bacteria, yeasts, fungi, Cell Culture, Stem Cell, Biofuels and Phototrophic organisms.

Our systems guarantee high precision monitoring and control for each bioreactor with a trusted parallel hardware and software PLC based which result in high information output and easy comparative analysis.



## MINI BIOREACTORS

- **1000 ml total volume**  
(200ml - 800ml working volume)
- **500 ml total volume**  
(100ml - 400ml working volume)
- **250 ml total volume**  
(50ml - 200ml working volume)

Kbiotech has a policy of constant and never ending progresses for bioprocess equipment's. The target is to improve fermentation, cell culture and renewable processes for the best efficiency, quality and economy.

Following the development full range of Bioreactors from Laboratory to Production Plants with the latest technologies and components available on the market .



# Bio Book UP & Parallel

Unique technical features

- 1 Bioflex fully automated process control software**  
for single and parallel bioreactors operations, capable of handling up to 24 bioreactors simultaneously
- 2 Bio Book Advanced Controller**  
Modularity, Flexibility and Expandability  
Parallel Bioreactors TWIN-QUAD-MULTI  
up to 12 units working in parallel online
- 3 Interchangeable Re-usable and Disposable Vessels**  
Single jacket, Double Jacketed, Disposable  
vessels available range 50mL - 20L w/v
- 4 Easy Load Pumps Module**  
Up to 8 pumps fix or variable speed  
for each bioreactor, precision dosing pumps
- 5 Gas Mixing Module**  
Up to 8 Rotameters or Mass flow controllers for each bioreactor. Parallel compact system for disposable and reusable mini bioreactors with working volumes from 50ml to 1000ml for advanced screening and bioprocess development
- 6 Thermo-Chiller Module**  
Automated temperature control module with chilling mode, all fluidics are properly isolated as by international safety standards



## **Kbiotech**

and his partners design and realise machineries for the pharmaceutical industry. Our firm's develop guideline is based on research and project of new solutions in full compliance with the quality and safety rules.

With a worldwide distribution network Kbiotech guarantees full local support and after-sales services.

The production catalogue includes over 100 machine models and a line of accessories and complements according to current GMP and FDA rules.

Our production line includes:

**Bioreactors & Fermenters**

**Filtration Units**

**Sanitary Tanks**

**Sterilizing & Depyrogenizing Units**

**Automation & Software**

**Fornitures & Accessories**

**Turnkey Projects**



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