SYSBIOTECH

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Sysbiotech lab-scale bioreactors

Sysbiotech laboratory scale fermenters/bioreactors were developed with particular focus on the quality and multifunctionality. They are available in volumes from 250 ml to 10 L, can be made of autoclavable glass or single-use plastic, and for working with bacterial or cell cultures. Regardless of volume, every bioreactor can be easily validated according to cGMP standards.

Special controller design allows you to control one or two cultural vessels at once in series or in parallel which helps to save space in your laboratory and simplifies operation.

Culture vessels are available in broad range of volumes that will fit into your ever-changing needs (total volumes listed):

- 250 ml
- 500 ml
- 1,5 L
- 2 L
- 3 L
- 7 L
- 10 L

Culture vessel of every volume can be supplied with universal components such as: sterile sampling system, condenser, spin-filter, temperature, level, pH, pO_2, Redox, turbidity sensors or magneticdrive.

Temperature control

Sysbiotech lab-scale fermenters allow four ways to control temperature inside culture vessel, every one of each with its benefits:
Temperature control in small volumes (250 ml and 500 ml) is performed using a special **heating plate** located at vessel's bottom. This way of temperature control combines low cost with even temperature distribution in culture vessel.

In 1,5L-3L culture vessels and in budget solutions temperature is controlled via the **hollow heating tube**, placed inside culture vessel. Water or other heat carrier is fed into the heating tube, which allows not only heating but also cooling of cultural liquid for more precise temperature control.

Plastic single-use vessels are supplied with **electrical heating pad** for temperature control. Thanks to its high effectiveness, electrical heating pad maintains the temperature in culture vessel and reacts fast to any changes in it.

For large volume vessels up to 10 L and in cases when fermentation process is sensitive to changes in temperature **double jacket** is used. Because the heat transfer is going on the entire area of contact between the culture fluid and the vessel walls, this method allows controlling the temperature quickly and accurately.

Vessel head plate and sensors

A distinctive feature of Sysbiotech fermenters is a state-of-art head plate design. Head plate for every culture vessel volume is made from electropolished 316L stainless steel and has 12 ports of equal diameter, arranged in a circle. In every universal port each of these components may be located:

- Foam sensor port
- Condenser port
- Additives supply port
- Surface of deep aeration port
- Sampling port
- Port for temperature, pH, pO_2 and Redox sensors
- Gas supply port for O_2, CO_2, $N_2$and NH_3 supply for surface or sparger aeration
- Removable septum ports
- Spare port

Also thanks to the special ports now it is possible to use pH and DO sensors of the same length in culture vessels of different sizes. Due to the special side ports, you can install standard sensors even on the smallest vessels.

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Agitation system

In the center of the lid port for agitation system is located. Drive is universal for every vessel volume and allows mixing on high speeds up to 2.000 RPM as well as at the lowest possible speeds without jumps.

Due to its special design, drive requires no maintenance and easy coupling mechanism allows installing and removing the motor without use of special tools.

Sealing of the motor can be mechanical or magnetic. In both cases, totally aseptic operation is guaranteed.

Several impeller types can be installed: Rushton impellers, Marine impellers, or axial impellers with flow direction up or down.

Aeration

Depending on your tasks, Sysbiotech fermenters can have a gas mixing station with max. five gases (air, O_2, CO_2, N_2 or NH_3). Aeration control can be performed manually using flowmeters or automatically through the control system by means of solenoid valves or mass flow controllers. This achieves the maximum precision in dosing gas mixture.

Outlet gases are cooling from the moisture in the condenser, and then pass through the output filter.
In order to control the concentration of exhaust gases O_2 / CO_2 gas analyzer can be installed.

Peristaltic pumps

You can install an unlimited number of peristaltic pumps which can be used for additive feed to control pH with acids and alkali, defoaming and pumping of biomass using perfusion system. All peristaltic pumps are integrated into the C-Bio control system, which allows you to set their own operation mode for more accurate dosing of agents.

Control system

Regardless of the culture vessel volume, all Sysbiotech fermenter are equipped with an industrial type control system. Its configuration allows you to simultaneously monitor 16 analog parameters (such as pH, pO_2, temperature) and 32 digital (peristaltic pumps, flowmeters, the motor). The controller can be connected to one or two of the culture vessel and the same time and independently of each other.

- Two rotameters and / or two mass flow controllers on the front panel
- Four peristaltic pumps on the side walls
- Equipment for measurement and control of up to 6 parameters (temperature, pH, pO_2 , Redox, foam, level sensors)
- Eight rotameters and / or four mass flow controllers on the front panel
- Eight peristaltic pumps on the side walls
- Equipment for measurement and control of up to 28 parameters
- Any equipment for analyzing status of cells, optical density or the analysis of gases.

All collected data is processed by the system and is put together in C-Bio software.

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C-Bio software

In the basis of C-Bio software lies the LabWindows platform. Thanks to it, C-Bio software can be installed on any computer running Windows XP or Windows 7, and by ***remote access*** can also be carried on any device running Android operation system.

Built-in Wi-Fi module allows you to observe and control your fermentation process remotely from anywhere in the world with your login and password.

C-Bio software has a simple and intuitive interface that provides quick access to all the controllers and data which allows you to calibrate sensors, assign alarms and create mini-programs called ***sequences*** without any special programming knowledge. By using the ***sequences,*** it is possible to create your own program of cultivation, which will take into account all the important parts of your process.

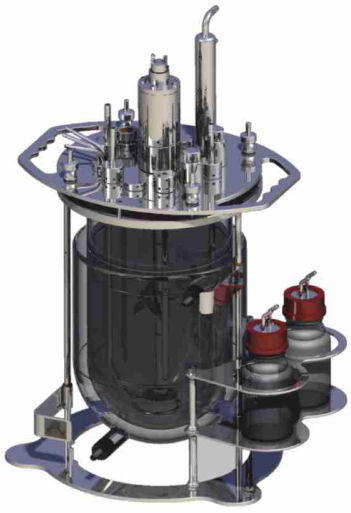
All fermentation data is collected and saved in separate ***electronic records*** that demonstrate the value and dynamics of each parameter being measured in a certain period of time. This makes possible to compare the parameters of several previous fermentations on one screen. All collected data can be easily exported to an external USB-drive or hard drive.

The system is controlled via the all-in-one PC with a touch screen, keyboard and mouse. All-in-one PC is placed on a fixed support plate and connected to the main module over the Ethernet, providing direct access to all functions of the software.

C-Bio control system ***multiple levels of user access***, all of which makes it possible to use certain functions.

Operator has an access to the following functions:

- Working with controllers
- Calibration of DO and pH controllers
- Stop and start of sequences
- Change the description of sequences
- View content and status of sequences
- Change the list of entries in the log sequences
- View alarms and events
- Change the available log entries
- Stop and start the batch
- Stop and start of profiles
- View the list of log files
- View the list of digital outputs
- Working with trends
- Performing an emergency stop



Engineer, in addition to all the functions:

- Change the controllers configuration
- Calibrate all controllers
- Change the sequences
- Create a new profiles
- Change the alarms log
- Backup and restore the database system
- Change the system configuration
- Change the function of system maintenance
- Change the calculation page

The system **Administrator**, in addition to all the functions of the Engineer can edit and change any user's password.

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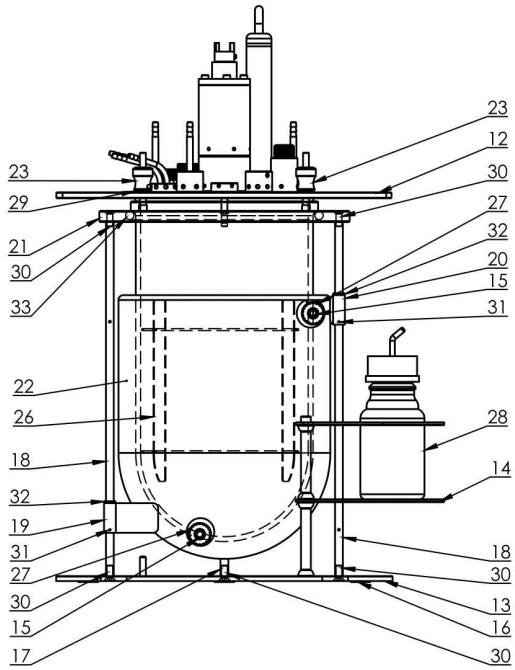

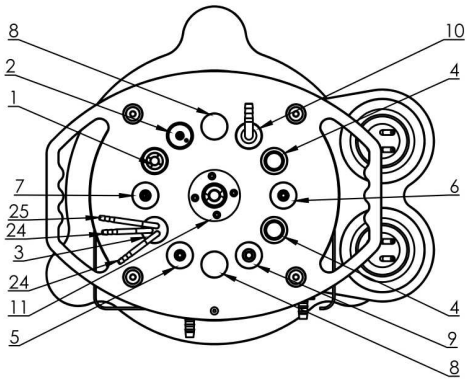

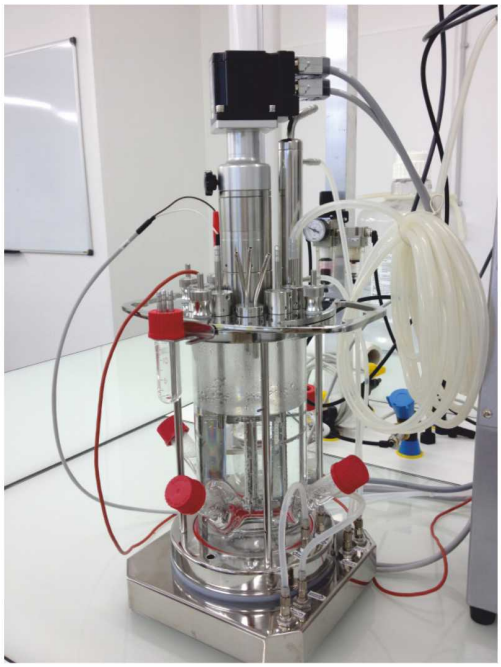

1	Septum port
2	Foam sensor port
3	Additions port
4	DO/Redox sensor port
5	Inoculation port
6	Surface/sparger aeration port
7	Sampling port
8	Port plug
9	Temperature sensor port
10	Condensor
11	Mixing mechanism
12	Top plate assembly
13	Vessel bottom plate
14	Addition bottles hoder
15	PTFE gasket
16	Vessel base
17	Vessel holder tubes
18	
19	Protection for jacked bottom flange
20	Protection for jacked top flange
21	Top vessel base
22	Vessel with jacket
23	Vessel cover locks
24	Addition tubes
25	
26	Vessel baffles
27	Vessel jacked flangesp
28	pH control vessels
29	Vessels lid washers
30	Flat screw for vessel fixation
31	Flexible connections
32	O-rings
33	Vessel lid o-ring