Digitalize Your Bioprocess Control Training with BIOSTAT® T

turning science into solutions
Virtual Bioreactor Training Tool

The BIOSTAT® T is an interactive software training tool for biological processes and ideal for the education of students and operators in bioprocess control. It enables users to learn about bioprocess engineering and to practice with menu navigation and control of a bioreactor prior to operating an actual bioreactor.

- **Integrative Learning**
  
  Theoretical principles of bioprocess engineering can immediately be applied and verified by using the BIOSTAT® T, ensuring that the principles are really understood and consolidated in the long term.

- **Close to Reality**
  
  The BIOSTAT® T is based on the human machine interface of real bioreactors and contains real cultivation data. As a result, users of the software can be trained realistically ensuring that they are ideally prepared for the actual operation of a bioreactor.

- **Quality in Hands-On Operation**
  
  Users of the BIOSTAT® T can be introduced to the operation of a bioreactor completely virtually. This enables them to achieve high quality results when using a bioreactor in real life from the very beginning.

- **Time and Cost Saving**
  
  The virtual bioreactor training tool is free-to-use and requires only a computer to be used. Virtual bioprocess control trainings allow the risk mitigation of human error and the prevention of batch losses. Time- and cost-intensive activities can be minimized as using the BIOSTAT® T does not require any laboratory clean-ups or procurements of microorganisms, cell cultures or corresponding feed media.
Sartorius Stedim Biotech has developed two different versions of the BIOSTAT® T: The BIOSTAT® T Yeast and the BIOSTAT® T CHO. This allows students and operators to be trained according to their individual level of knowledge, experience and individually relevant application.

The BIOSTAT® T Yeast let's you perform a guided cultivation of *Saccharomyces Cerevisiae*. It is the ideal software tool to prepare trainees for their first hands-on experience with a bioreactor. BIOSTAT® T Yeast menu navigation and basics of bioprocess control can be familiarized with using guided training scenarios.
The BIOSTAT® T CHO is perfectly suited for a supervised introduction of trainees to basic and advanced strategies of running a cell culture process in an industrial single-use bioreactor. By using this software version, you can gain insights into the characteristics of a Chinese hamster ovary (CHO) cell cultivation, allowing you to achieve initial success with a later hands-on cultivation of CHO cells.
BIOSTAT® T Yeast

The yeast version of BIOSTAT® T offers users the possibility to choose between three different training scenarios and is consequently suitable for self-learning. The training scenarios rest on the data of real Saccharomyces Cerevisiae cultivations, whereby complex configuration options of the virtual bioreactor have been deliberately restricted. All in all, this enables beginners to learn the basics of bioprocess control in a joyful and realistic way.

Guided Training Scenarios

Use the guided training scenarios to learn about the basics of batch, fed-batch and $k_{La}$-value experiments step by step.

Free Training Scenarios

Apply your key learnings from the guided training scenarios by operating the free, unguided training scenarios of batch, fed-batch and $k_{La}$-value experiments.

Batch Experiment
Optimize the production of ethanol by choosing the best process time for switching between aerobic and anaerobic condition.

Fed-Batch Experiment
Maximize the total cell mass by choosing the best feed rate profile and glucose concentration.

Free $k_{La}$-Value Experiment
Conduct a series of experiments and data evaluation to experience the effect of stirrer speed and air flow on the $k_{La}$-value.
Practical User Interface

The user interface and functions of the BIOSTAT® T Yeast are designed according to the human machine interface of a real 20 L stainless steel bioreactor.

Developed for Use Within Training Sessions

The training scenarios of batch and fed-batch cultivation run at an accelerated speed. You can integrate the BIOSTAT® T Yeast easily into your training concept since each training scenario can be completed in less than 90 minutes.
The BIOSTAT® T CHO mimics the human machine interface and functionalities of a BIOSTAT STR® 200 L single-use bioreactor. The training tool is based on actual cell culture batch data that were collected under normal process conditions. This database enables the software to derive cell growth curves for the mentioned process conditions algorithmically. Users have to control the process conditions to determine the optimal parameters for cell growth and antibody yields utilizing the broad variety of software features.

Running Mode and Time Acceleration

Select a desired acceleration factor to start a new cultivation process in default mode or choose between five different training scenarios to explore the corresponding contents.

Configuration and Operation of Various Controllers

Determine parameters and set points of multiple controllers with the possibility to decide whether the controller should run in off, auto, manual or profile mode.

Virtual Inoculation and Sampling

Inoculate your virtual bioreactor to initiate the cultivation process. Subsequently, start to draw samples in continuous sequences and analyze the data in order to perform your process control strategies.
Three Options to Analyze Your Cultivation Data

Use the software’s Trend, Offline data table and MFCS-History feature to evaluate your cultivation progress on the basis of different types of data, from preselected parameters to sample data up to conflated historical data.

| Process time | X | Y | Z | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
| 00:50:59     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Date          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Time          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

All Calibration Functions of a Real Bioreactor

Calibrate the probes, pumps and totalizers of your virtual bioreactor to ensure high accuracy during your cultivation processes – like in reality.
Ready To Take The Next Step

After successfully accomplishing your virtual training with BIOSTAT® T you have acquired the knowledge and skills to start your cultivation in a real BIOSTAT® bioreactor.

BIOSTAT® A

BIOSTAT® A is the ideal bioreactor for a professional start to controlled cultivation. It is an easy-to-use bioreactor designed for beginners in fermentation. BIOSTAT® A features industrial technology as well as operation via smartphone and tablet.

A simplified user interface allows straight-forward application of process controls learned by using the BIOSTAT® T Yeast. Skip operational explanations and jump right into inoculating a real batch or fed-batch cultivation.
BIOSTAT STR®

Virtual training with the BIOSTAT® T CHO facilitates you to easily start operating a BIOSTAT STR® single-use bioreactor for commercial manufacturing. The BIOSTAT® T CHO mimics BIOSTAT STR® control software with its user interface and process control tools.

Experiencing behavior of controllers and processes by using the BIOSTAT® T CHO reduces training time for new BIOSTAT STR® users and prevents human error. There is no faster knowledge transfer to the real world than with the BIOSTAT® T CHO.

Technical Data BIOSTAT® T

<table>
<thead>
<tr>
<th>Minimum System Requirements</th>
<th>Recommended System Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system</td>
<td></td>
</tr>
<tr>
<td>Windows® XP or newer</td>
<td>Windows® 7 or newer</td>
</tr>
<tr>
<td>Processor</td>
<td></td>
</tr>
<tr>
<td>1 GHz Dual-Core or faster</td>
<td>2.5 GHz Dual-Core or faster</td>
</tr>
<tr>
<td>RAM</td>
<td></td>
</tr>
<tr>
<td>2 GB</td>
<td>4 GB</td>
</tr>
<tr>
<td>Available hard disk space</td>
<td></td>
</tr>
<tr>
<td>1000 MB</td>
<td>1000 MB</td>
</tr>
</tbody>
</table>

For additional information and software access, please contact your local Sartorius representative or FRT.Support@Sartorius.com.
Sales and Service Contacts
For further contacts, visit www.sartorius-stedim.com

Europe

Germany
Sartorius Stedim Biotech GmbH
August-Spindler-Strasse 11
37079 Goettingen
Phone +49.551.308.0

Sartorius Stedim Systems GmbH
Robert-Bosch-Strasse 5 – 7
34302 Guxhagen
Phone +49.5665.407.0

France
Sartorius Stedim FMT S.A.S.
ZI des Paluds
Avenue de Jouques – CS 91051
13781 Aubagne Cedex
Phone +33.442.845600

Sartorius Stedim France SAS
ZI des Paluds
Avenue de Jouques – CS 71058
13781 Aubagne Cedex
Phone +33.442.845600

Austria
Sartorius Stedim Austria GmbH
Modcenterstrasse 22
1030 Vienna
Phone +43.1.7965763.18

Belgium
Sartorius Stedim Belgium N.V.
Rue Colonel Bourg 105
1030 Bruxelles
Phone +32.2.756.06.80

Hungary
Sartorius Stedim Hungária Kft.
Kaiyó u. 5
2092 Budakeszi
Phone +36.23.457.227

Italy
Sartorius Stedim Italy S.r.l.
Via dell’Antella, 76/A
50012 Antella-Bagno a Ripoli (FI)
Phone +39.055.63.40.41

Netherlands
Sartorius Stedim Netherlands B.V.
Phone +31.30.60.25.080
filtratie.nederland@sartorius-stedim.com

Poland
Sartorius Stedim Poland Sp. z o.o.
ul. Wrzesinska 70
62-025 Kostrzyn
Phone +48.61.647.38.40

Russian Federation
LLC “Sartorius Stedim RUS”
Vasilyevsky Island
5th line 70, Lit. A
199178 St. Petersburg
Phone +7.812.327.53.27

Spain
Sartorius Stedim Spain, S.A.U.
Avda. de la Industria, 32
8317 Tagelswangen
Phone +34.913.586.098

Switzerland
Sartorius Stedim Switzerland AG
Ringstrasse 24 a
8317 Tagelswangen
Phone +41.52.354.36.36

U.K.
Sartorius Stedim UK Ltd.
Longmead Business Centre
Blenheim Road, Epsom
Surrey KT19 9 QJ
Phone +44.1372.737159

Ukraine
LLC “Sartorius Stedim RUS”
Post Box 440 “B”
01001 Kiev, Ukraine
Phone +380.44.411.4918

Africa

Republic of South Africa
Sartorius South Africa (Pty) Ltd
Unit 4, Alphen Square South
853 16th Road
Midrand 1685, RSA
Phone +27.11.315.5444

Americans

USA
Sartorius Stedim North America Inc.
565 Johnson Avenue
Bohemia, NY 11716
Toll-Free +1.800.368.7178

Argentina
Sartorius Argentina S.A.
Int. A. Ávalos 4251
B1605ECS Munro
Buenos Aires
Phone +54.11.4721.0505

Brazil
Sartorius do Brasil Ltda
Avenida Senator Vergueiro 2962
São Bernardo do Campo
CEP 09600-000 - SP- Brasil
Phone +55.11.4362.8900

Mexico
Sartorius de México, S.A. de C.V.
Libramiento Norte de Tepotzotlan s/n,
Colonia Barrio Tlacateco,
Municipio de Tepotzotlan,
Estado de México,
C.P. 54605
Phone +52.55.5562.1102
leadsmex@sartorius.com

Asia | Pacific

Australia
Sartorius Stedim Australia Pty. Ltd.
Unit 5, 7-11 Rodeo Drive
Dandenong South Vic 3175
Phone +61.3.7872.1800

China
Sartorius Stedim (Shanghai)
Trading Co., Ltd.
3rd Floor, North Wing, Tower 1
No. 4560 Jinke Road
Zhangjiang Hi-Tech Park
Pudong District
Shanghai 201210, P.R. China
Phone +86.21.6878.2300

India
Sartorius Stedim India Pvt. Ltd.
#69/2-69/3, NH 48, Jakkasandra
Nelamangala Tq
562 123 Bangalore, India
Phone +91.80.4350.5250

Japan
Sartorius Stedim Japan K.K.
4th Fl., Daiwa Shinagawa North Bldg.
B-11, Kita-Shinagawa 1-chome
Shinagawa-ku, Tokyo, 140-0001 Japan
Phone +81.3.4331.4300

Malaysia
Sartorius Stedim Malaysia Sdn. Bhd.
Lot L3-E-UJ, Enterprise 4
Technology Park Malaysia
Bukit Jalil
57000 Kuala Lumpur, Malaysia
Phone +60.3.8996.0622

Singapore
Sartorius Stedim Singapore Pte. Ltd.
10 Science Park Rd
The Alpha #02-13/14
Singapore Science Park II
Singapore 117684
Phone +65.6872.3966

South Korea
Sartorius Korea Biotech Co., Ltd.
8th Floor, Solid Space B/D
PanyoYeo-Ro 220, Bundang-Gu
SeongNam-Si, GyeongGi-Do,
463-400
Phone +82.31.622.5700

Specifications subject to change without notice. Copyright Sartorius Stedim Biotech GmbH. Printed in the EU on paper bleached without chlorine.
Publication No.: SBI1572-e190703 · Order No.: 85037-561-54 · Ver. 07 | 2019