



## Digitalize Your Bioprocess Control Training with BIOSTAT® T CHO

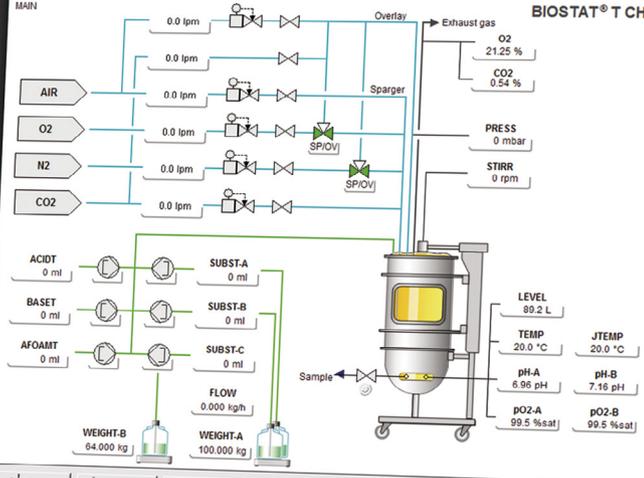




BIOSTAT™ T

sartoriusstedim  
BIOTECH

no alarm



Main Calibration Controller Trend Alarm Remote

# Virtual Bioreactor Training Tool

The BIOSTAT® T CHO is an interactive software training tool 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 CHO is based on the human machine interface of a BIOSTAT STR® 200 L single-use bioreactor 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 CHO 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

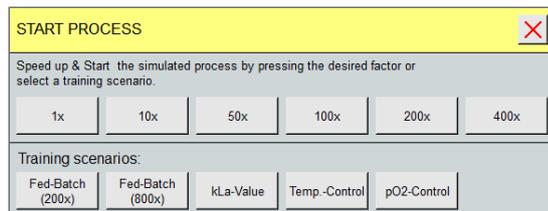
The virtual bioreactor training tool is free-to-use and requires only a computer to be used. Virtual bioprocess control trainings allow the risk mitigation of human error and the prevention of batch losses. Time- and cost-intensive activities can be minimized as using the BIOSTAT® T CHO does not require any laboratory clean-ups or procurements of microorganisms, cell cultures or corresponding feed media.

# BIOSTAT<sup>®</sup> T CHO

The BIOSTAT<sup>®</sup> T CHO mimics the human machine interface and functionalities of a BIOSTAT STR<sup>®</sup> 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.

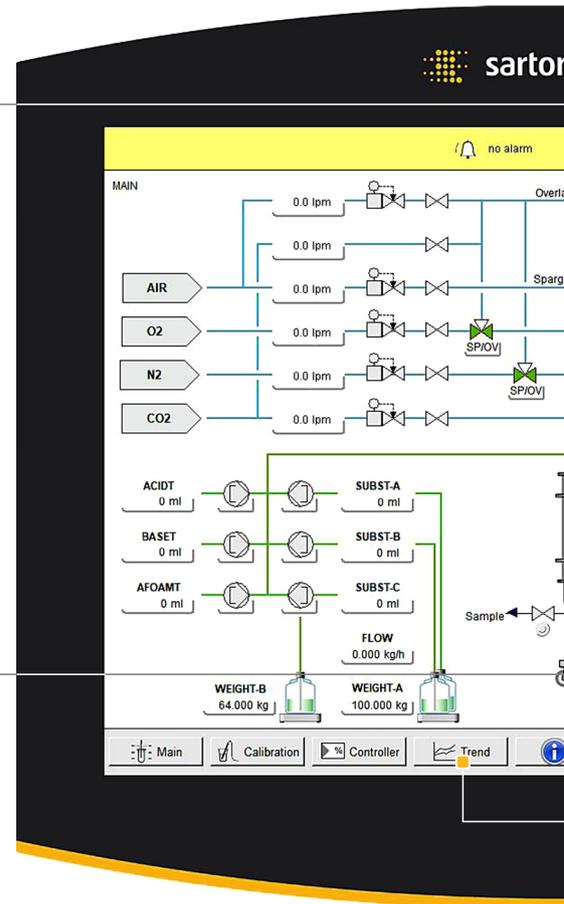
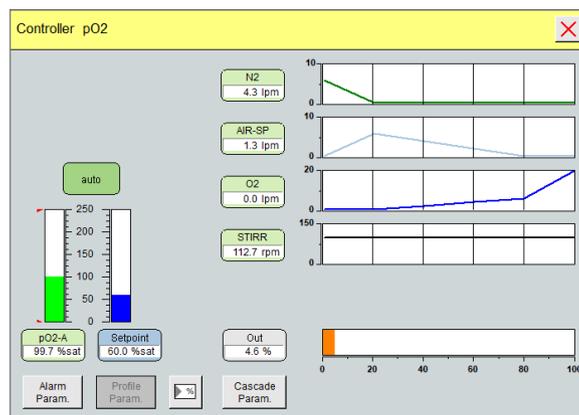
## Running Mode and Time Acceleration

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	VCD [10 <sup>6</sup> Cells/mL]	VIABILITY [%]	Glucose [g/L]	Glutamine [mmol/L]	TAA [g/L]	pH [pH]	Osmolality [mOsmol/kg]	Lactate [g/L]	Ammonium [mmol/L]	Antibody [g/L]	TCD [10 <sup>6</sup> Cells/mL]	DCD [10 <sup>6</sup> Cells/mL]
00:00:00	0.0	0.0	5.7	7.1	1.0	7.04	320	0.0	0.0	0.0	0.0	0.0
00:01:02	0.3	99.9	4.8	6.0	0.9	7.09	320	0.0	0.0	0.0	0.3	0.0
1d 14:34:22	0.9	99.9	4.6	6.0	0.9	7.19	319	0.1	0.0	0.0	0.9	0.0
3d 00:01:18	2.4	99.7	4.0	6.0	0.8	7.15	319	0.4	0.0	0.1	2.4	0.0
4d 00:01:34	4.8	99.9	7.2	5.7	1.1	7.09	341	0.5	0.1	0.1	4.8	0.0
5d 00:01:34	8.3	99.4	9.2	5.5	1.4	7.23	354	0.5	0.1	0.3	8.3	0.0
6d 00:01:34	13.4	99.9	9.8	5.2	1.6	7.06	359	0.5	0.2	0.6	13.5	0.0
7d 00:01:34	18.9	99.4	9.0	4.9	1.7	7.08	354	0.4	0.4	1.1	18.8	0.0
8d 00:01:34	22.7	99.4	7.3	4.6	1.8	7.19	345	0.4	0.6	1.7	22.9	0.2
9d 00:01:34	24.7	98.2	5.3	4.3	1.8	7.22	334	0.3	0.7	2.3	25.1	0.5
9d 17:13:02	24.6	96.0	5.6	4.1	1.9	7.15	334	0.3	0.9	2.8	25.6	1.0
10d 00:01:34	24.7	95.1	4.1	4.1	1.8	7.14	326	0.3	0.9	3.0	25.9	1.2
11d 00:01:34	23.4	91.5	4.1	3.8	1.8	7.11	326	0.2	1.1	3.8	25.7	2.2
12d 00:01:34	21.7	86.9	4.2	3.6	1.8	7.12	324	0.2	1.2	4.4	25.0	3.2
13d 00:01:34	19.7	82.2	4.2	3.4	1.7	7.24	324	0.2	1.2	5.1	23.9	4.1
14d 00:01:34	17.8	78.8	4.3	3.2	1.7	7.18	323	0.2	1.3	5.6	22.6	4.8
15d 00:01:34	16.0	75.6	4.4	3.0	1.6	7.23	323	0.1	1.3	6.2	21.2	5.2
16d 00:01:34	14.4	72.6	4.4	2.9	1.6	7.27	323	0.1	1.4	6.5	19.8	5.5
17d 00:57:02	13.0	69.9	4.3	2.8	1.6	7.13	321	0.1	1.4	7.1	18.4	5.5

**BIostat® T CHO**

Exhaust gas  
O<sub>2</sub> 21.01 %  
CO<sub>2</sub> 0.30 %

PRESS 0 mbar  
STIRR 0 rpm

LEVEL 89.3 L  
TEMP 20.0 °C  
pH-A 8.79 pH  
pO<sub>2</sub>-A 99.6 %sat

JTEMP 20.0 °C  
pH-B 8.98 pH  
pO<sub>2</sub>-B 99.6 %sat

Power !

Process time: 00:00:00  
Date: 18.07.2018  
Time: 13:33:49

Start new process  
Interrupt process  
Continue process  
Stop process

Initial reactor parameters  
Prepare inoculum  
Prepare feed media  
Load initial values  
Reset all parameters

Offline data table  
MFCS - History

Alarm Remote Shutdown

## 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.

**Calibration SUBST-B**

Mode: Totalize

SUBST-B: 0 ml

Flow: 30.00 ml/min

BIostat® T CHO

CALIBRATION

CO<sub>2</sub>-LOW Totalize

ACID Totalize  
BASE Totalize  
AMDM Totalize

WEIGHT-B Measure  
WEIGHT-A Measure

SUBST-A Totalize  
SUBST-E Totalize  
SUBST-C Totalize

pH-A Measure  
pH-A Measure  
pH-B Inactive  
pO<sub>2</sub>-B Inactive

no alarm

Start new process  
Interrupt process  
Continue process  
Stop process  
Initial reactor parameters  
Prepare inoculum  
Prepare feed media  
Load initial values  
Reset all parameters  
Offline data table  
MFCS - History

Main Calibration Controller Trend Alarm Remote Shutdown

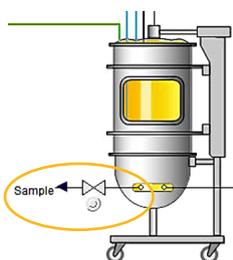
**Prepare inoculum**

Inoculation volume: 15.75 L  
1.0 - 20.0

Biomass: 20.00 10<sup>5</sup> cells/ml  
1.0 - 500.0

Reset Process time after inoculation

Inoculate



# 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.

Hands-on Training – Microbial Cultivation

Theoretical Knowledge

BIOSTAT® T CHO

Hands-on Training – Cell Cultivation

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 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 CHO

	Minimum System Requirements	Recommended System Requirements
Operating system	Windows® XP or newer	Windows® 7 or newer
Processor	1 GHz Dual-Core or faster	2.5 GHz Dual-Core or faster
RAM	2 GB	4 GB
Available hard disk space	1000 MB	1000 MB

For additional information and software access, please contact your local Sartorius representative or [FRT.Support@Sartorius.com](mailto:FRT.Support@Sartorius.com).

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