



# Integrated Single-Use Bioreactor (S.U.B.) systems with controllers

Providing simplicity in operation

# Integrated Single-Use Bioreactor and controller systems

Our integrated single-use bioreactors are designed as complete out-of-the-box jacketed systems, each paired with our integrated controller and temperature control unit (TCU)

The Thermo Scientific™ HyPerforma™ Single-Use Bioreactor (S.U.B.) design is based on proven mixing technology. The design is ergonomically friendly, and the systems combine superior flexibility and convenience.

The complete integrated HyPerforma S.U.B. system consists of a single-use bioreactor tank, integrated with a G3Lite™ controller, and a Thermo Scientific™ HyPerforma™ S.U.B. BioProcess Container (BPC), which is available in 50, 100, and 250 L sizes with a 5:1 turndown ratio.

## Functional and scalable

The HyPerforma S.U.B. maintains traditional stirred-tank bioreactor design principles, including specific height-to-diameter ratios and an optimized impeller location. The system is specially designed for users who need rapid setup of a standard system, a feature often preferred in research and development, early process development, and clinical trial stages.

## Key advantages

- Widely accepted with more than 1,200 S.U.B.s installed
- Proven performance in batch-fed batch-perfusion (continuous) bioreactor applications with CHO, NS0, hybridoma, insect cells, PerC6, HEK293, MDCK, and Vero cell lines
- The S.U.B. works with BPCs made with the Thermo Scientific™ CX5-14 and Aegis™5-14 films. These BPCs are customized to better suite adherent cell culture applications
  - Films have been tested for leachable and extractable (L&E) properites, according to BioPhorum Operations Group (BPOG) guidelines

## Additional options

- A cable management system provides greater organization for electrical cables, tubing, and lines sets, making the unit easier to clean
- Exhaust gas vent filter heaters reduce the accumulation of condensate and help keep filters dry



# Performance at the highest level

## Ergonomic and elegant tank design

The S.U.B. is elegant in design while being functional, and it is designed to meet cGMP requirements. The S.U.B. tank provides operator ergonomics, a small footprint, and easy cleaning capabilities associated with an open-cart frame.

- Helps save precious lab space with a minimized vessel footprint
- Easy access to harvest lines with its open-frame design
- Reduces hold-up volumes with the intelligently designed tank floor

## Efficient and fast

The water jacket design allows for fast heat-up and cool-down times, reducing process cycle times. The bottom water-jacketed systems increase surface area, improving heat transfer for low-volume cultures.

- Optimal precision load cells and standard sight-volume indicators allow you to keep your processes running efficiently
- Optional brushless DC motor includes encoder feedback for improved RPM accuracy and is ground-fault circuit-interrupter (GFC)-compatible
- 3/8 in. dimpled jacket provides lowest pressure drop through the water jacket for higher-performance temperature control







## The G3Lite controller

### **G3Lite platform is self-contained and adaptable**

The Finesse™ G3Lite™ bioreactor controller is a cart-mounted, self-contained unit that can be operated singly or networked. The controller is engineered to optimize capital costs without sacrificing functionality. The G3Lite bioreactor controller leverages the latest technologies, including single-use sensors and Finesse™ TruBio™ software packages, to enable easy, reliable, and repeatable process development and cell culture optimization. The controller is designed for use with the HyPerforma S.U.B. without sacrificing the performance of either element. Its modular design allows the G3Lite controller to evolve with your process needs and integrate third-party peripherals as needed.

### **Controller functionalities**

- Integrate S.U.B. vessel and Lauda™ TCU
- Transmitters for single-use sensors, electrochemical probes, load cells, temperature sensor, Finesse™ TruTorr™ pressure sensor, and possibility to connect up to 3 weighing scales for feed control.
- 6 MFCs: 4 can connect to a micro sparger, 1 for a macro sparger, and 1 for an overlay sparger
- 4 Watson Marlow™ pumps, 3 x WM114, 1 x WM313
- Touch-screen HMI for complete process display and control

# The S.U.B. BioProcess Containers provide functionality and flexibility

BPCs for S.U.B.s will address the specific needs of your application with either standard or customized configurations. These validated BPCs are compatible with your existing Thermo Scientific™ S.U.B. standard designs and are configured for a variety of applications, while custom designs are for customer-specific applications. We will build what you need, while maintaining our quality and delivery times. Through our open architecture approach, we have qualified a variety of single-use sensors, tubing, and connectors for customer design flexibility.

## S.U.B. BPC components

- **Films**—CX 5-14 and Aegis5-14 film options available
- **Agitator assembly**—single-use impeller with a bearing-and-seal assembly linked to an external mixer drive and custom impeller for adherent cell culture applications
- **Crossflow sparger**—for efficient culturing at low volumes (20%) and drilled-hole sparger with overlay sparger for 20–100% volumes
- **Exhaust filter with heater**—for efficient exhaust management of metabolic gases
- **Integrally sealed ports**—allow for additional sensor probes and line sets







## Technical support

Knowledge-based and comprehensive

All systems are supplied with an equipment turnover package (ETP). Additional support documentation, such as a cGMP documentation package, is available upon request.

A global field-based technical support team is available for local installation and technical support, and a process development team is available for cell culture support, providing expertise on cell growth and troubleshooting.

# Integrated S.U.B. System with accessories

## Ordering information

Integrated S.U.B. Systems	Volume	Quantity	Cat. No.
<b>S.U.B. Hardware and BPCs</b>			
S.U.B. hardware unit	50 L	1	SUB0050.8100.SDI
S.U.B. BPC (CX5-14 film)	50 L	3	SH31072.01
S.U.B. BPC (Aegis5-14 film)	50 L	3	SH31073.01
S.U.B. hardware unit	100 L	1	SUB100.8200.SDI
S.U.B. BPC (CX5-14 film)	100 L	3	SH31102.01
S.U.B. BPC (Aegis5-14 film)	100 L	3	SH31103.01
S.U.B. hardware unit	250 L	1	SUB250.8300.SDI
S.U.B. BPC (CX5-14 film)	250 L	3	SH31074.01
S.U.B. BPC (Aegis5-14 film)	250 L	3	SH31075.01
<b>S.U.B. accessories</b>			
Bioreactor probe assembly with CPC AseptiQuik (nonsterile for use in autoclave)		12	SH30720.02
Heavy-duty tubing clamp		12	SV20664.01
Autoclave tray for autoclaving probe accessories		1	SV50177.01

## Auxiliary components supporting the HyPerforma S.U.B. (supplied by end user)

Product	Quantity	Cat. No.
Necessary for feed strategies, gas flow, DO, and pH control	1	Bioreactor control system
Autoclavable probe (13 mm x 13.5 PG thread with 195–235 mm insertion length)	*	DO probe
Autoclavable probe (13 mm x 13.5 PG thread with 195–235 mm insertion length)	*	pH probe
Used for fluid transfer between linesets on the containers	*	Stand-alone peristaltic pump

\* Quantity based on needs.

# Integrated solutions for bioproduction

## Single-Use Mixers (S.U.M.s)

A variety of options up to 5,000 L for both upstream and downstream applications



## Liquid- and dry-format media

We offer both custom manufacturing and a full range of chemically defined performance media and supplement products



## BioProcess Containers (BPCs)

A variety of configurations up to 2,000 L for liquid harvest, storage, and transportation



## Sera

Our sera are well known for consistent quality and reliability



## Single-Use Bioreactors (S.U.B.s)

50–2,000 L bioreactors capable of integrating with an existing control system



## Buffers and process liquids

Custom and standard buffers and process liquids, including Gibco™ Water for Injection (WFI) quality water



## Integrity testing systems

A true point-of-use integrity testing system to confirm the integrity of BPCs before use



Find out more at [thermofisher.com/sub](http://thermofisher.com/sub)

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