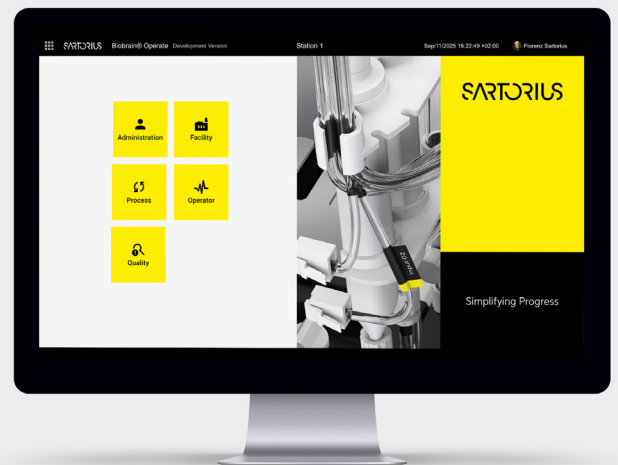


Biobrain® Operate Powered by Tulip

MES Reimagined for Single-Use Bioprocessing



Product Information

Biobrain® Operate powered by Tulip is the first manufacturing execution system (MES) built specifically for Sartorius bioprocess equipment and single-use bioprocessing.

Built on Tulip's cloud-based, no-code platform, it digitizes standard operating procedures (SOPs), electronic batch records (eBRs), and other critical bioprocessing workflows to reduce recurring human errors, streamline QA reviews, accelerate operator onboarding, and ensure consistent, paper-free execution across pilot- and commercial-scale manufacturing. Applications are delivered with pre-configured, fully adaptable content based on Sartorius process expertise and can be tailored to process-specific needs, support multiple vendors, and integrate with existing systems.

Features and Benefits

- **Pre-configured MES apps:**
Accelerate time-to-value with fit-for-purpose workflows.
- **No-code configuration:**
Quickly adapt apps to evolving process needs.
- **Real-time data capture:**
Improve traceability, cut errors, and speed up reviews.
- **Centralized, digital records:**
Simplify audits and eliminate paper.

Introduction

Relevant Applications

- GMP manufacturing (pilot | commercial)
- Analytical & quality control (sample preparation | management)

Relevant Process Steps

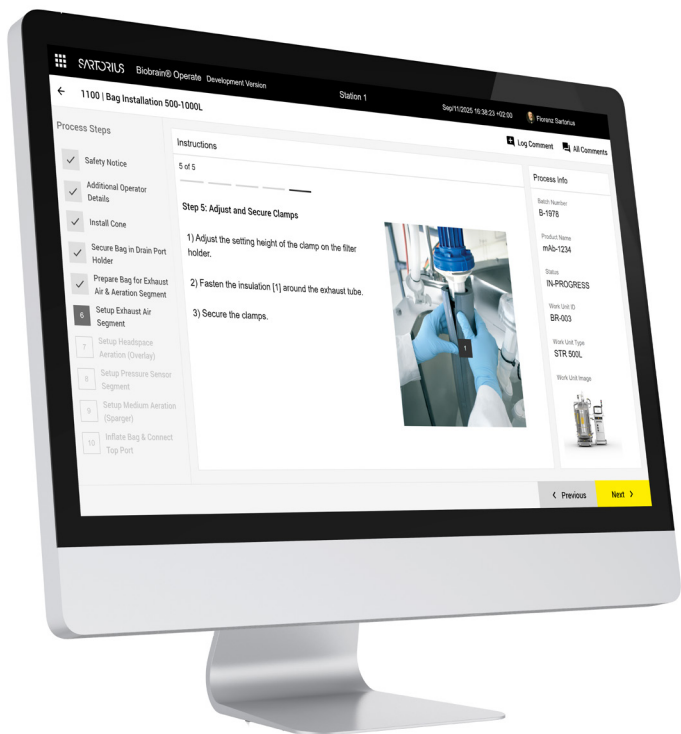
- Cell culture (seed train | production)
- Clarification | harvest
- Process chromatography
- Process filtration
- Final filling
- Media | buffer preparation
- Process analytical technology (PAT) (sensors | analyzers)

Applications

Biobrain® Operate powered by Tulip supports critical workflows across biopharmaceutical manufacturing and quality operations by enabling digital execution, visibility, and traceability at every step of the process. Designed specifically for Sartorius process equipment and single-use bioprocessing, Biobrain® Operate empowers operators, process engineers, and quality teams with intuitive, no-code applications that drive consistency, reduce manual errors, and streamline compliance.

While the following applications are provided off the shelf, they are fully configurable and can be extended to support additional use cases based on process-specific needs:

- **Electronic SOPs (eSOPs):** Enables users to follow clear, step-by-step digital standard operating procedures (SOPs) with embedded checklists, sign-offs, and in-process deviation capture, ensuring consistent execution and reducing errors through real-time guidance.
- **Master Batch Record Configurator (MBR):** Allows process experts to design and manage digital production blueprints that define SOP sequences, raw materials, equipment, and process parameters—ensuring standardization, repeatability, and readiness for execution.
- **Electronic Batch Records (eBRs):** Empowers teams to capture process actions, data, and electronic signatures in real time, enabling seamless batch review, traceability, and compliance with regulatory requirements.
- **Electronic Logbooks (eLogbooks):** Provides users with a structured, digital method for logging equipment usage, cleaning, and maintenance activities. This improves data integrity, audit readiness, and equipment lifecycle tracking.
- **Dashboards:** Gives users real-time visibility into production metrics, batch status, equipment performance, and operator activity. Enables process experts to monitor KPIs, quality teams to identify deviations or bottlenecks, and operators to track progress and stay aligned with production goals, all from a centralized interface.



Technical Specifications

Biobrain® Operate is powered by the Tulip platform, a no-code, cloud-based system designed to digitize and streamline biomanufacturing operations.

The following outlines the technical requirements and capabilities essential for optimal performance:

Supported Operating Systems

- **Microsoft™ Windows™:** Windows™ 10 (64-bit) and Windows™ 11 are supported. Tulip recommends Windows™ 11 for optimal compatibility and performance.
- **macOS:** macOS 11 (Big Sur) and later versions are compatible.
- **Linux:** Systems with Intel® N100 or equivalent CPUs. Optimal performance is achieved with Intel i3 or AMD Ryzen 5 equivalents or greater, and at least 8 GB RAM.
- **Android:** Devices running Android OS 6.0 or higher. Note that tablets may lack the hardware requirements for complex applications.
- **iOS | iPadOS:** iPads 10th generation and above are supported.

Recommended Hardware Specifications

- **Processor:** Dual-core 11th Gen Intel® Core™ i3 or equivalent.
- **Memory (RAM):** Minimum of 8 GB.
- **Storage:** At least 256 GB hard drive.
- **Peripherals:** Two or more USB ports, integrated or external camera.
- **Display:** Touchscreen devices are recommended, as many Tulip applications are optimized for touch interaction.

Network and Integration

- **Connectivity:** Stable internet connection for cloud-based operations.
- **Device Integration:** Supports integration with various devices, including barcode scanners, scales, and sensors, through USB or network connections.
- **APIs and Connectors:** Tulip provides RESTful APIs and connectors for integration with existing systems and equipment.

Compliance and Data Integrity

- **Audit Trails:** Comprehensive audit trails for all records, including electronic signatures, ensuring compliance with regulatory standards.
- **Data Security:** Role-based access control and secure data storage to protect sensitive information.
- **GxP Compliance:** Designed to meet good manufacturing practice (GMP) requirements, supporting ALCOA principles (attributable, legible, contemporaneous, original, accurate). See gxp-docs.tulip.co for more information.

For more detailed information on Tulip's technical specifications and system requirements, please refer to the official Tulip documentation: [Tulip Support - Recommended Devices](#)

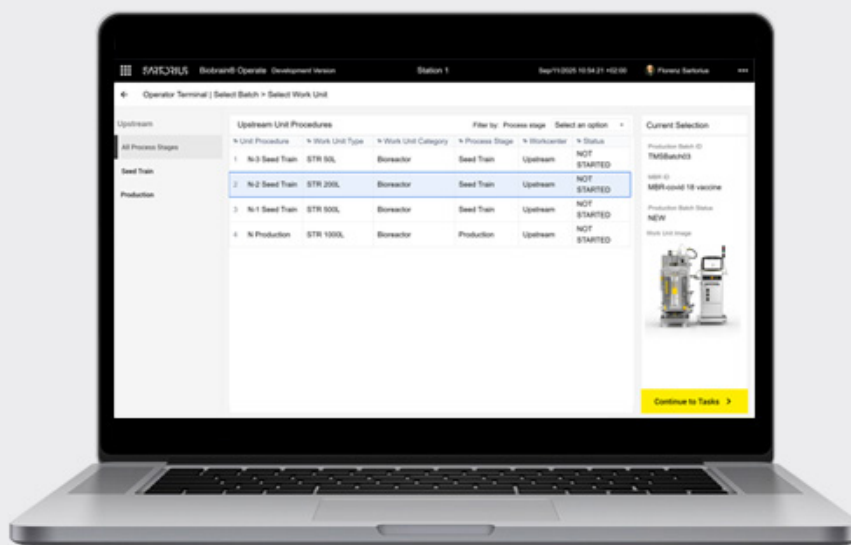
To ensure a streamlined deployment and rapid time-to-value, Biobrain® Operate powered by Tulip is delivered with all foundational components required to support compliant, scalable operations in biomanufacturing environments. The standard delivery package includes platform access, application content, and comprehensive guidance to support configuration, validation, and integration within your digital ecosystem.

The standard delivery includes:

- **Tulip Enterprise GxP licenses**, providing access to a validated, compliant-ready instance of the Tulip platform. Upon purchase, a dedicated cloud instance is provisioned on Tulip.co (e.g., your-account.tulip.co), accessible via any web browser. Customers are guided to establish governance by assigning account owners, defining user roles, and configuring permissions.
- **Access to the Tulip App Building Platform**, enabling users to configure and build their own applications or modify Biobrain® Operate apps without restrictions. This no-code development environment allows process engineers, IT, and other authorized users to rapidly adapt apps to evolving operational needs.
- **Tulip App Player**, which provides the runtime environment for executing applications on the shop floor. The Player supports real-time interaction with operators, integrates with devices and systems, and ensures seamless execution of digital workflows.
- **Comprehensive documentation** to support instance setup, deployment, compliance, and integration, available at support.tulip.co.
- **Biobrain® Operate Applications**, transferred to the Tulip instance post-activation. Each app is delivered with documentation covering usage, configuration, data structure, integration points, and validation support assets.

Ordering Information

Item	Description	Order Number
Tulip Subscription - Enterprise GxP	<p>This annual subscription provides access to a validated, compliant-ready (GxP) version of the Tulip Frontline Operations Platform, specifically designed for use in regulated environments such as pharmaceuticals, biotechnology, and medical devices.</p> <p>Includes:</p> <ul style="list-style-type: none"> ▪ 21 CFR Part 11 Compliance: Full support for electronic records and signatures, with audit trails, user access controls, and versioning. ▪ Validated Environment: Delivered and maintained under Tulip's Computer System Validation (CSV) framework, ensuring consistent adherence to GxP requirements. ▪ Change Management and Audit Readiness: Tools and controls to manage changes, maintain traceability, and support audit documentation. ▪ Secure Hosting: Available in GxP-qualified cloud infrastructure with strict controls over data access, retention, and integrity. ▪ Support & Documentation: Includes a validation documentation package, periodic re-validation, and dedicated compliance support. 	SLABO000001
Biobrain® Operate App eSOP	<p>Biobrain® Operate Applications are pre-built application templates designed to accelerate operational efficiency across core bioprocess workflows.</p> <p>Standard delivery includes access to applications along with comprehensive documentation. This includes usage descriptions, configuration guidance, app structure overviews, table references, and integration points.</p>	SLABO000002
Biobrain® Operate App eLogbook		SLABO000003
Biobrain® Operate App MBR		SLABO000004
Biobrain® Operate App Dashboard		SLABO000005
Biobrian® Operate App eBR		SLABO000006
Biobrain® Operate App Other		SLABO000007



Peripherals and Accessories

Item	Description	Order Number
Biobrain® Operate App Maintenance & Support	<p>Maintenance and support plan providing regular updates, performance enhancements, bug fixes, and expert technical support for Biobrain® Operate Applications. Includes compatibility updates and access to Sartorius support channels within defined service levels.</p> <p>The support plan includes:</p> <ul style="list-style-type: none"> ▪ Access to regular application updates, bug fixes, performance enhancements, and compatibility adjustments aligned with platform or infrastructure changes ▪ Access to expert support for issue resolution, usage guidance, and minor configuration assistance <p>Support is delivered through designated Sartorius support channels and adheres to defined service levels. This support plan helps maintain application stability and ensures that your digital workflows remain aligned with evolving operational requirements throughout the support period.</p>	BOS0001
Biobrain® Operate App Configuration	<p>To support seamless adoption and alignment with site-specific workflows, Sartorius offers configuration services for Biobrain® Operate applications. These services adapt standard applications to meet customer-specific operational, data, and process requirements.</p> <p>Services are quoted at an hourly rate, scoped per application, and typically managed under a defined Statement of Work (SOW).</p>	BOS0002
Biobrian® Operate Integration Consulting	<p>Expert services to support the integration of Biobrain® Operate Applications into existing automation systems and infrastructure. These services aim to enhance operational efficiency, reduce manual interventions, and improve overall productivity.</p> <p>Services are quoted at an hourly rate and managed under a defined SOW.</p>	BOS0003
Biobrain® Operate Training On-Site	<p>Comprehensive on-site training sessions are designed to equip customer teams with the knowledge and confidence to effectively use Biobrain® Operate Applications. Training is hands-on and tailored to real-world use cases.</p> <p>Standard delivery includes up to 16 hours of on-site support, with options to extend as needed. Travel costs are not included and will be quoted separately.</p>	BOT0001
Biobrain® Operate Training Web	<p>Comprehensive remote training sessions are designed to equip customer teams with the knowledge and confidence to effectively use Biobrain® Operate Applications. Training is delivered virtually via video conferencing tools and tailored to actual user roles and workflows.</p> <p>Standard delivery includes up to 16 hours of live remote training, with options to extend based on team needs.</p>	BOT0002
Tulip Edge IO	<p>Tulip Edge IO devices are standard edge computing devices that facilitate communication and data exchange between various IoT devices and the Tulip Cloud for generalized IoT applications. They act as an interface for capturing real-time data from various sensors and equipment on the shop floor.</p> <p>Note: Tulip hardware requires an active Tulip subscription in order to use the Tulip platform.</p> <p>For technical specifications, please see: https://support.tulip.co/docs/edge-io</p>	BOH0001
Tulip Edge MC	<p>Tulip Edge MC devices are low-cost, low-profile, edge computing devices designed for advanced computing tasks at the edge (e.g., data analysis, machine learning, and predictive maintenance).</p> <p>Note: Tulip hardware requires an active Tulip subscription in order to use the Tulip platform.</p> <p>For technical specifications, please see: https://support.tulip.co/docs/edgemc</p>	BOH0002

For more information about Biobrain® Operate powered by Tulip, visit Sartorius.com or Tulip.co

Germany

Sartorius Stedim Biotech GmbH
August-Spindler-Strasse 11
37079 Goettingen
Phone +49 551 308 0

USA

Sartorius Stedim North America Inc.
565 Johnson Avenue
Bohemia, NY 11716
Toll-Free +1 800 368 7178



For more information, visit

[sartorius.com](https://www.sartorius.com)

©2025 Sartorius. All rights reserved. Biobrain® are registered trademarks of Sartorius or its subsidiaries.

Evo and Intel are registered or unregistered trademarks of Intel Corporation. Microsoft and Windows are registered or unregistered trademarks of Microsoft Corporation. All other third-party trademarks are the property of their respective owners.

For details on the registrations please refer to our website [sartorius.com/en/patents-and-trademarks](https://www.sartorius.com/en/patents-and-trademarks).

Last modified: 09 | 2025