



BIOBOOK PARALLEL

BENCHTOP PARALLEL BIOREACTORS &
AUTOMATED SCREENING PLATFORMS

DATASHEET



GENERAL OVERVIEW

The **Vinci BioBook™ Parallel** system is a **high-throughput bioprocess platform** enabling simultaneous control of up to twelve independent bioreactors for advanced cell-culture, microbial and continuous applications.

Each reactor operates under independent PID loops for temperature, pH, DO, and feed, while all processes are monitored through a single Smart-BioFlex™ SCADA environment.

The system combines scalability, flexibility, and GMP-compliant data integrity for DoE and parallel optimization studies.

TECHNICAL SUMMARY

PARAMETER	SPECIFICATION
Model	BioBook™ Parallel – 4 / 8 / 12 reactor configurations
Configuration	Multi-vessel parallel operation with independent PID control
Working Volume Range	50 mL – 30 L (0.013 – 7.9 US gal)
Vessel Options	Glass autoclavable, 316L stainless steel, single-use polycarbonate, photobioreactor
Temperature Control Accuracy	± 0.1 °C
pH Control Accuracy	± 0.02 pH
DO Control Accuracy	± 1 % saturation
Agitation Range	30 – 2000 rpm (1 rpm resolution)
Gas Control	4–8 MFC lines (Air, O ₂ , CO ₂ , N ₂ + optional)
Software Platform	Smart-BioFlex™ SCADA v5.0, Windows 10/11
Compliance	21 CFR Part 11, GAMP 5, CE, PED 2014/68/EU
Materials	AISI 304/316L stainless steel housing; FDA & USP VI elastomers
Power Supply	100–240 V AC, single phase, 50/60 Hz
Cooling Requirement	2–4 L min ⁻¹ @ ≤ 25 °C (0.5–1.1 US gpm)
Network Integration	OPC UA, Modbus TCP, Ethernet/IP
Certification	IQ/OQ/PQ & FAT/SAT documentation available

CONTROL UNIT SPECIFICATIONS

PARAMETER	PARALLEL SYSTEM
Model Type	BioBook™ Parallel 4 / 8 / 12
Controlled Vessels	4 – 12 independent bioreactors
Dimensions (W × D × H)	750 × 550 × 650 mm (29.5 × 21.7 × 25.6 in)
Weight	45 – 68 kg (99 – 150 lb)
Housing Material	AISI 304 stainless steel chassis, powder-coated front panel
Power Consumption	Max 3.5 kVA (12 vessels)
Cooling Water Flow Rate	2–4 L min ⁻¹ recommended
Communication Ports	USB 2.0, Ethernet (10/100 Base-T), RS-485
Digital I/O	4 inputs + 4 outputs per vessel (0–10 V / 4–20 mA)
Display / HMI	15.6" touchscreen or external PC
Operating Conditions	10–35 °C, ≤ 80 % RH (non-condensing)
Noise Level	< 55 dB(A) @ 1 m (3.3 ft)

TEMPERATURE CONTROL SYSTEM

PARAMETER	SPECIFICATION
Device	Integrated thermo-chiller per reactor / shared cooling loop
Control Method	PID electronic feedback loop
Heating Medium	Water or 50 % glycol
Temperature Range	+4 °C to +80 °C (39–176 °F)
Precision	± 0.1 °C
Cooling Capacity	250 W @ 25 °C ambient
Heating Power	600 W (≤10 L) / 1.2 kW (>10 L)
Sensor Type	Pt100 Class A RTD
Alternative Method	Heating blanket or cooling finger

AGITATION SYSTEM

PARAMETER	SPECIFICATION
Motor Type	Brushless DC or magnetic coupling (seal-free)
Power Output	200 W
Speed Range	30–2000 rpm (1 rpm resolution)
Torque	Max 2 N·m (1.48 lbf·ft)
Impeller Options	Rushton, marine, axial, low-shear / custom
Baffles	2–4 removable baffles for enhanced mixing

GAS CONTROL AND AERATION

PARAMETER	SPECIFICATION
Gas Lines	4 standard (Air, O ₂ , N ₂ , CO ₂) + 4 optional
Flow Control	Thermal MFC or manual rotameters
Flow Range	0.002 – 20 L min ⁻¹ (0.00007 – 0.7 SCFM)
Accuracy (MFC)	± 1 % FS
Aeration Strategies	DO cascade, O ₂ /N ₂ enrichment, pH via CO ₂ /base
Pressure Relief	0.5 barg (7.25 psig) safety valve

LIQUID ADDITION & FEED MODULE

PARAMETER	SPECIFICATION
Integrated Pumps	4 peristaltic per vessel (expandable to 8)
Flow Range	0.05 – 200 mL min ⁻¹ (0.0008 – 3.2 US oz min ⁻¹)
Accuracy	± 2 % of setpoint
Tubing Size	0.5 – 4.8 mm ID
Reversible Flow	Yes
Control Modes	Manual, Timed, Gravimetric
Balance Compatibility	1 – 60 kg, ± 0.1 g accuracy

SENSORS AND MEASUREMENT

Parameter	Sensor Type / Range	Resolution	Notes
Temperature	Pt100 RTD (0–100 °C)	0.1 °C	Autoclavable
pH	Glass (2–12) / Optical (6.5–8.5)	0.01 pH	ISM / ARC
DO	Polarographic / Optical (0–200 %)	0.1 %	Analog / Digital
Redox (ORP)	–2000 to +2000 mV	1 mV	Optional
Foam / Level	Conductive / Capacitive	—	Antifoam control
Biomass	NIR / Capacitance	± 2 % FS	Online viable cell density
pCO	Digital ISM (0–100 %)	0.1 %	Optional
Gas Analyzer	O ₂ , CO ₂ , CH ₄ , H ₂ , EtOH	0.01 %	RQ & metabolic rate

VESSEL DESIGN, FEATURES & COMPONENTS

Type	Material	Total Volume	Volume	Pressure	Key Features
Glass Autoclavable	Borosilicate + 316L headplate	0.3–20 L (0.08–5.3 gal)	0.1–15 L (0.03–4.0)	0 – < 1 barg (0 – 14.5 psig)	Jacketed or single-wall, visual access, autoclavable
Stainless Steel Autoclavable	316L electropolished	1–30 L (0.26–7.9 gal)	0.2–25 L (0.05–6.6)	0 – 2 barg (0 – 29 psig)	CIP/SIP operation, pressure rated, long life
Single-Use Polycarbonate	γ-sterilized rigid body	0.5–10 L (0.13–2.6 gal)	0.1–8 L (0.03–2.1 gal)	Ambient (0–0.3 barg)	Pre-assembled tubing & sensors, E-beam validated
Photobioreactor	Transparent acrylic / glass tube	0.25–30 L (0.07–7.9 gal)	–	Ambient	LED illumination 380–750 nm, CO ₂ injection loop

Headplate Ports: PG13.5, 19 mm Tri-Clamp, 6 mm hose barbs

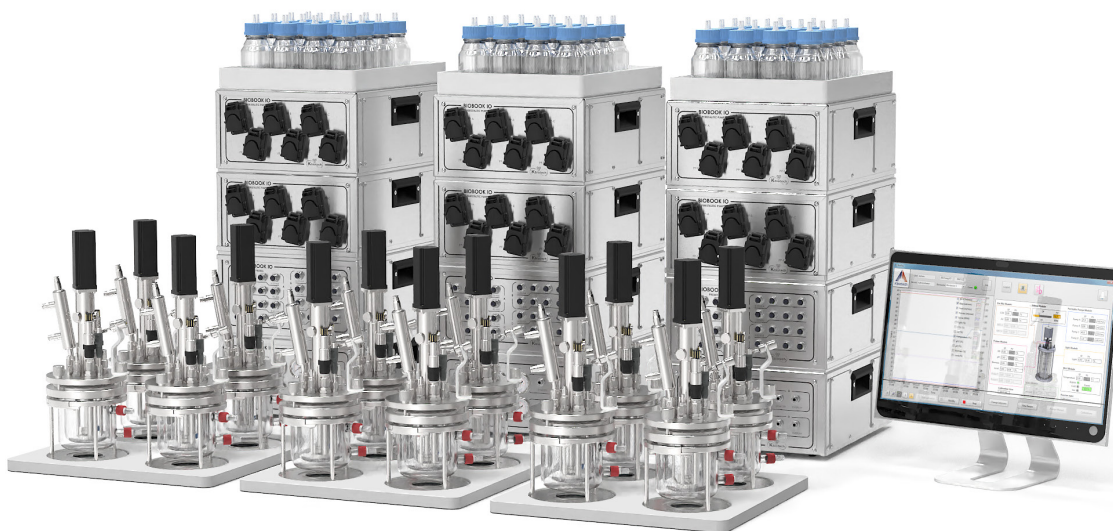
Impeller Material: 316L SS / PTFE-coated

Accessories: Baffles, condenser, SafeSampler™, perfusion port, cooling finger, load cell, optical window.

VESSEL DESIGN, FEATURES & COMPONENTS

The **Vinci bioreactor vessels** are designed for high precision, sterility, and mechanical robustness across **microbial** and **cell culture** processes.

All vessels share a common modular headplate architecture, instrumentation interface, and geometric consistency to ensure process reproducibility and scalability.



1. Construction & Materials

- **Vessel Types:** Available in borosilicate glass, 316L stainless steel, and single-use polycarbonate configurations.
- **Headplate:** Solid 316L stainless steel with precision-machined ports (PG13.5, tri-clamp, Luer, and hose-barb interfaces).
- **Sealing System:** FDA- and USP Class VI-certified EPDM or silicone O-rings, with leak-proof compression design.
- **Surface Finish:** Internal $R_a \leq 0.6 \mu\text{m}$, electropolished for enhanced cleanability and minimized microbial adhesion.
- **Operating Pressure:**
 - **Glass vessels:** 0 – < 1 barg (0 – 14.5 psig)
 - **Stainless-steel vessels:** 0 – 2 barg (0 – 29 psig)
 - **Single-use vessels:** ambient pressure
- **Temperature Rating:** -10 °C to +130 °C (depending on vessel type).
- **All wetted materials** are traceable and compliant with **FDA 21 CFR 177**.

2. Headplate Configuration

Each vessel includes a configurable **multi-port headplate** providing flexible integration of probes, gas inlets, sampling lines, and mechanical accessories.

Standard ports include:

Port Type	Quantity / Size	Function
pH / DO / spare Sensors	3 × PG13.5 mm	Autoclavable or single-use probes
Temperature Sensor	1 × M10 or Tri-Clamp ½"	Pt100 or thermowell
Gas Inlets (sparger + overlay)	2 × 6 mm hose barb	Air, O ₂ , N ₂ , CO ₂
Sampling Port	1 × Luer or aseptic connector	Manual or automated sampling
Foam / Level Probe	1 × PG13.5 mm	Conductivity or capacitance type
Feed / Base / Acid / Antifoam Lines	4 × 6 mm hose barbs	Connected to peristaltic pumps
Exhaust Filter Port	1 × 19 mm Tri-Clamp	0.2 µm sterile filter housing
Condenser Port	1 × Tri-Clamp ½"	CIP/SIP condenser connection
Optional Ports	Additional on request	Perfusion, ATF, load cell, weighing

3. Agitation & Mixing Assembly

- **Drive Type:** Top-mounted magnetic coupling or direct-shaft drive; seal-free for aseptic operation.
- **Motor:** High-torque brushless DC motor (200 W) with speed feedback.
- **Impeller Options:** Rushton turbine, marine, pitched-blade, or low-shear axial; available in 316L SS or PTFE-coated finish.
- **Shaft Design:** Single- or dual-impeller configuration; quick-release for cleaning and sterilization.
- **Baffle System:** Removable (2–4 baffles) for enhanced oxygen transfer.
- **Torque Measurement:** Optional digital module for viscosity and shear monitoring.

4. Gas Distribution & Sparging

- **Sparger Type:** Ring, L-sparger, or microsparger depending on process type.
- **Overlay Gas Line:** Optional for headspace control or CO₂/pH regulation.
- **Back-pressure Control:** Manual or automatic valve (0 – 0.5 barg).
- **Gas Filter Assemblies:** Hydrophobic 0.2 µm PTFE or PES filters with validation certificates.
- **Condensate Trap:** Integrated or external for exhaust management.

5. Heating, Cooling & Temperature Regulation

- **Glass / Steel Vessels:** Double-wall jacket for water or glycol circulation.
- **Single-Wall Option:** Electric heating blanket with integrated feedback.
- **Temperature Sensor:** Pt100 Class A RTD, autoclavable, accuracy ±0.1 °C.
- **Control Response:** Full-range regulation (5 – 80 °C) with 250 W – 1.2 kW dynamic capacity.

6. Sampling & Aseptic Connections

- **SafeSampler™** or Luer-lock manual sampling ports for sterile collection.
- **Quick-connect aseptic couplings** (CPC or equivalent) for feed, harvest, and perfusion lines.
- **Sterile tubing assemblies** pre-mounted (EPDM, silicone, or C-Flex 374).
- **All connectors** are validated to **ISO 10993** for biocompatibility.

7. Vessel Customization & Accessories

- **SafeSampler™** or Luer-lock manual sampling ports for sterile collection.
- **Quick-connect aseptic couplings** (CPC or equivalent) for feed, harvest, and perfusion lines.
- **Sterile tubing assemblies** pre-mounted (EPDM, silicone, or C-Flex 374).
- **All connectors** are validated to **ISO 10993** for biocompatibility.

Option	Description / Application
Perfusion-ready kit	Includes side port for ATF or hollow-fiber filters
Load-cell integration	Real-time gravimetric control (0–60 kg range)
CIP/SIP modules	Automated sterilization packages for steel vessels
Exhaust condensers	Stainless or borosilicate with drain and vent
Cooling finger	Additional temperature control for exothermic processes
Sampling manifolds	Multi-line distribution systems with aseptic valves
Lighting / optical access	Transparent window insert or LED backlight (optional)

8. Traceability & Certification

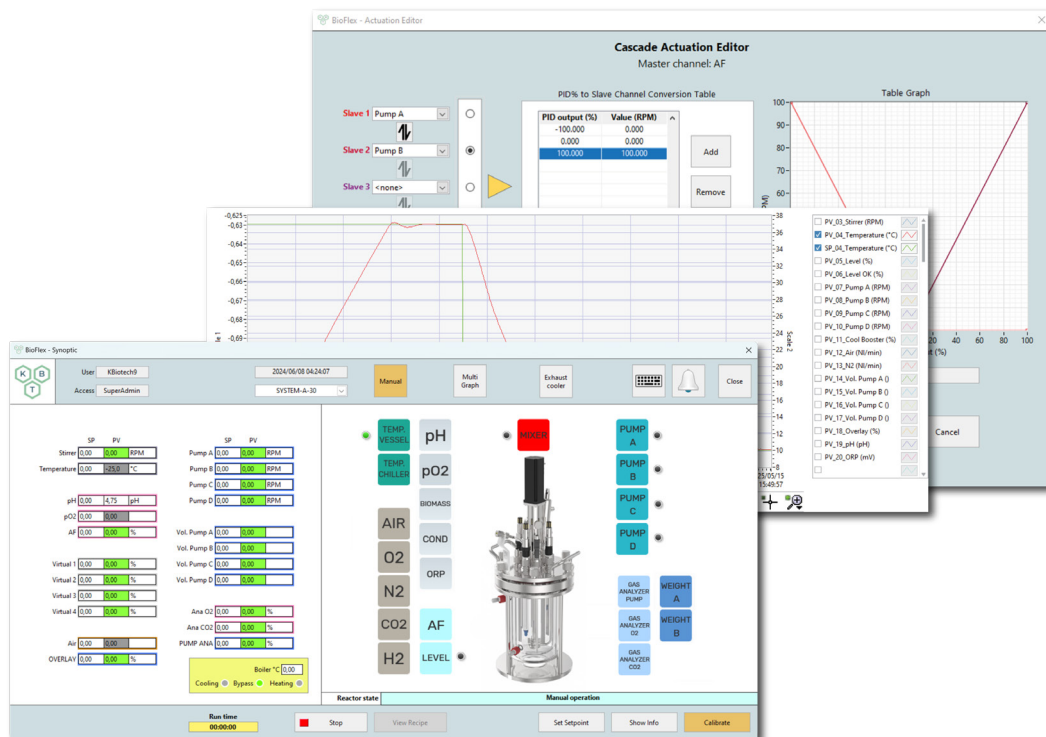
- Each vessel supplied with **EN 10204 3.1 material certificates** for metallic components.
- **Calibration certificates** for sensors and temperature probes.
- **IQ/OQ documentation** available for GMP validation.
- **E-beam or autoclave sterilization records** provided per batch for single-use and reusable vessels

PERFORMANCE AND QUALIFICATION PARAMETERS

PARAMETER	SPECIFICATION
Temperature stability	± 0.1 °C steady-state
pH control accuracy	± 0.02 pH
DO control accuracy	± 1 % saturation
Agitation reproducibility	± 1 rpm
Gas flow repeatability	± 1 % FS
Sensor calibration ₉₀	Factory pre-calibrated; annual verification recommended
DO sensor response (t ₉₀)	< 30 s
pH drift (24 h)	< 0.02 pH
Software compliance	21 CFR Part 11 / GAMP 5 validated

BIOFLEX™ SCADA SOFTWARE

Bioflex™ SCADA is an advanced supervisory and data acquisition platform developed by **KBiotech** for comprehensive monitoring, control, and documentation of bioprocesses. It provides full regulatory compliance with **GMP** and **21 CFR Part 11**, offering secure data management, process automation, and integration with analytical and manufacturing systems. Designed for flexibility and scalability, Bioflex™ enables seamless control of single or parallel bioreactor systems, ensuring precise, traceable, and reproducible operation in research and production environments.



Feature	Description
Platform	Windows 10/11, single-unit or multi-user network license; local or remote server installation supported.
Control Modes	Batch, Fed-batch, Perfusion, Continuous, and DoE (Design of Experiments) execution.
Advanced Controllers	pH-STAT, DO-STAT, Turbido-stat, Exponential Feed, Level control, Antifoam control, Temperature cascade.
Parallel Control	Up to 24 bioreactors (independent or linked) via Ethernet or OPC network; synchronized data logging across all units.
Automation Tools	Configurable process sequences, recipe-based operation, time/event triggers, and alarm scripting.
Data Acquisition	1 Hz sampling rate; continuous data logging with timestamped trend visualization; CSV, Excel, or PDF export.
Compliance	21 CFR Part 11 compliant (electronic records, audit trail, e-signatures, user access control); GAMP 5 category software validation.
Connectivity	OPC UA, Modbus TCP, Ethernet/IP, Profibus (optional) for third-party integration (e.g., analyzers, balances, pumps).
Data Management	SQL-based encrypted database with secure access levels (Admin / Engineer / Operator); automatic audit trail for every change.
Cybersecurity	User authentication, encrypted communication (TLS), firewall configuration, password policy, and auto logout.

Feature	Description
User Interface	Intuitive dashboard with customizable process displays, real-time charts, alarm overview, and recipe editor.
DoE Tools	Integrated statistical module for experimental design, parameter variation, and automated execution of DoE matrices.
PAT Integration	Compatible with biomass, off-gas, pCO ₂ , and glucose sensors for Process Analytical Technology feedback loops.
Backup & Restore	Automated or manual backups to local or cloud storage; full system restore capability.
Reporting	Customizable batch reports including process data, alarms, and audit logs (PDF / Excel).
Remote Access	Secure browser or VPN-based remote control via PC or tablet; real-time supervision and alarm notification.
LIMS / MES Integration	Data export via OPC UA or API for connection with laboratory and manufacturing execution systems.
Languages	Multi-language interface (English, Italian, German, French, Spanish).
Service Tools	Built-in diagnostic console, remote support module, and firmware update management.

UTILITY & INSTALLATION REQUIREMENTS

Utility	Specification
Electrical supply	230 V AC, single phase, 10 A
Cooling water	2–4 L min ⁻¹ (0.5–1.1 US gpm) @ ≤ 25 °C (77 °F)
Compressed air	3–6 barg (44–87 psig) clean, oil-free
Drain connection	Ø10 mm hose barb
Exhaust connection	6 mm hose barb
Ambient temperature	10–35 °C (50–95 °F)
Humidity	≤ 80 % RH (non-condensing)
Noise emission	< 55 dB(A) @ 1 m
Installation clearance	≥ 0.5 m (20 in) on all sides

ENVIRONMENTAL CONSIDERATIONS

- Designed for 24/7 continuous operation with low energy consumption
- RoHS-compliant components and materials
- Minimal water use (≤ 4 L min⁻¹)
- Modular construction for long lifecycle and recyclability
- Compliant with EU WEEE Directive 2012/19/EU

APPLICATIONS

- Mammalian, insect, and stem cell culture
- Microbial fermentation (E. coli, yeast, fungi, algae)
- Process optimization and DoE screening
- Biopharmaceutical R&D (vaccines, mAbs, mRNA, biosimilars)
- Industrial biotech (enzymes, biofuels, bioplastics)
- Food and Agritech (precision fermentation, cellular meat)

Model Code	Configuration	Vessel Type	Range	Notes
BB-P-4	Parallel System – 4 Reactors	Glass / Steel / Single-Use / Photo	0.05–30 L	Entry-level 4-reactor unit
BB-P-8	Parallel System – 8 Reactors	Glass / Steel / Single-Use / Photo	0.05–30 L	Mid-throughput configuration
BB-P-12	Parallel System – 12 Reactors	Glass / Steel / Single-Use / Photo	0.05–30 L	High-throughput configuration
BB-TH-80	Thermo-Chiller Module	Jacketed vessels ≤ 30 L	+4 – +80 °C	
BB-SCADA-FX	Smart-BioFlex™ SCADA License	—	—	21 CFR Part 11 compliant