Automatic Multistage Continuous Bioreactor Configuration

Vessel

Seed Bioreactor (Primary)	30L/50L/100L	5L-1000L, customizable
Production Bioreactor	300L/500L/1000L/2000L	5L-1000L, customizable
Working Volume	30%-75%	
Vessel Material	SUS316L/SUS304; smooth surface, no dead zones, easy to clean	
Surface Finish	Inner surface mirror polished, Ra≤0.4μm; Outer surface mirror polished, Ra≤0.6μm	
Bioreactor inlets	Vessel Lid: Flame inoculation port (quick-open); four-in-one feed inlet (nutrient feed, antifoam, acid, alkali); off-gas port; sight glass port with LED light source Vessel Body: Sampling port; pH/DO and temperature ports; air inlet; discharge outlet; jacket water inlet and drain	

	Liquid Level View: Long-strip liquid level sight glass inside the vessel
Air inlet	air inlet Mode: Deep aeration; air inlet pipe enters from the upper side wall of the vessel; internal air pipe is detachable Gas Distribution: Equipped with gas sparger for uniform gas distribution without dead zones; easy to clean; meets high aerobic demand Backflow Protection: Equipped with non-return device to prevent material back-suction and contamination of inlet filter
Discharge	The bioreactor is equipped with a bottom drain outlet featuring a sanitary, dead-zone-free design. It is easy to clean, supports repeated sterilization, and allows complete discharge of the culture broth from the vessel.
Sampling	A flush-mounted, dead-zone-free sterile sampling valve assembly is adopted, enabling multiple in-situ sterile sampling without compromising process sterility.

Agitation System

Agitation Type	The bioreactor is equipped with 3-stage, 6-blade impellers, with adjustable installation height. A mechanical defoaming impeller is also provided to effectively control foam formation during operation. The impeller type and configuration can be customized.

Control System

Hardware Configuration	Siemens PLC + 15-inch LCD touch screen
Control Software	Dedicated fermentation control software (independent intellectual property)
	Real-time and historical curves; supports 24-hour continuous monitoring and control
	Integrated fermentation process analysis software
Automatic Sterilization	Sterilization Mode: In-vessel steam sterilization; sterilization timing; over-temperature and over-pressure alarms Post-Sterilization Control: Automatic pressure holding and temperature control after sterilization to ensure sterility Filter Sterilization: Independent filter sterilization; set sterilization temperature and time; automatic drying after sterilization Sterilization Validation: Equipped with cold spot detection

Temperature Control	Display Accuracy: 0.3% FS ±0.1 ℃ Control Accuracy: ±0.2 ℃ Sensor: WIKA Germany Control Function : Dual-direction heating and cooling control; equipped with constant-temperature water tank Data Management: Data logging, production curves, report analysis, remote data transmission
pH	Display Accuracy: 0.01 pH; measurement range: 0-12 pH Sensor: METTLER (Germany) / HAMILTON Control Function: Dual-direction acid and alkali addition; digital calibration Data Management: Data logging, production curves, report analysis, remote data transmission
DO	Display Accuracy: 0.1%; range: 0-200% Sensor: METTLER (Germany) / HAMILTON Control Function: Cascade control; linked control with agitation speed and aeration Data Management: Data logging, production curves, report analysis, remote data transmission
Agitation Speed	Speed Range: 0-800 rpm, customizable Data Management: Data logging, production curves, report analysis, remote data transmission
Gas Flow	Control Function: Mass flow controller for automatic inlet gas control (maximum aeration up to 2.0 vvm; continuously adjustable according to process requirements) Flow Meter: Vögtlin (Switzerland)/YOKOGAWA (Japan)
Pressure	Display Accuracy: 0.01 bar; range: 0-3 bar Sensor: BD (Germany) Control Function: Digital setpoint control for vessel pressure regulation Data Management: Data logging, production curves, report analysis, remote data transmission
Feeding	Control Mode: Automatic control Programmed Feeding: Time-based programmed feeding with adjustable variable speed Batch Feeding: Set feed rate, single batch volume, and feeding cycle Programmed Flow Feeding: Pre-set batch volume; multi-batch variable flow feeding based on time profile
Peristaltic Pumps	Quantity: Four units: acid addition, alkali addition, antifoam, and feeding