

multistage stainless steel fermentation system for research or production

Multistage stainless steel fermentation system is a kind of high-end equipment widely used in biofermentation experiment, pilot study and industrialized production, which is suitable for microbial fermentation, cell culture, enzyme engineering, synthetic biology and other fields.

Multistage Stainless Steel Fermentation System

The multistage stainless steel fermentation system, made from high-grade 316L stainless steel, is modular and scalable for experimental, pilot, and industrial applications. It includes seed tanks, main fermenters, and auxiliary tanks (refill, acid-base, defoamer, etc.), with capacities customizable from 10 to 5000 liters. Ideal for continuous or parallel fermentation, and independent or joint tank operation.

Main Features

1. **Flexible Multispec Combination:** Configurable fermenter volumes for process scale-up and industrialization.



2. **High-Strength Materials:** 316L stainless steel resists corrosion, organic acids, alkalis, and high temperatures.
3. **Intelligent Control:** Industrial PLC & HMI architecture enables auto sterilization, CIP/SIP cleaning, remote monitoring, recipe management, and parameter comparison.
4. **Integrated Sensing:** Real-time pH, DO, temperature, pressure, foam, and flow sensors for precise process control.
5. **High-Efficiency Mixing:** Multi-layer impellers, mechanical defoaming, high-speed and durable for long-term mixing and heat transfer.
6. **Advanced Replenishment:** Multi-channel auto-replenishment modes (constant speed, linear, exponential, growth rate, pH/DO correlation).
7. **Safety & Maintenance:** Over-temperature, water, air pressure, and sterilization safety locks; supports online CIP/SIP cleaning and sterilization.

Working Principle

1. Microbial growth control via precise temperature (30–37°C), aeration, and DO regulation for optimal metabolism.
2. Closed-loop pH/DO: PID-controlled peristaltic pumps add acid, alkali, oxygen for precise environmental control.
3. Efficient Aeration: Fine filtration and distribution for high oxygen utilization and high-density cultures.

4. Mechanical Mixing: Multi-stage paddles for uniform mixing, heat transfer, and DO efficiency, avoiding dead zones.
5. Auto Replenishment & Foam Control: Nutrient addition by growth stage, foam sensor and pump regulate foam automatically.
6. Pressure & Tail Gas Management: Condensation/filtration module treats exhaust, proportional valve stabilizes tank pressure.

Application Areas

1. **Pharmaceuticals:** Antibiotics, vaccines, recombinant proteins, microbial drug fermentation, mammalian cell culture.
2. **Biological Engineering & Research:** Metabolic engineering, strain screening, synthetic biology experiments.
3. **Food & Beverage:** Yeast, lactic/acetic acid bacteria, active cultures for beer, dairy, functional beverages.
4. **Agriculture & Environmental Protection:** Biopesticide, bacterial fertilizer, anaerobic digestion, waste treatment.
5. **Industrial Enzymes & Biofuels:** Large-scale enzyme production (amylase, protease), bioethanol/biobutanol and renewable fuels.