

Supercritical High-Gravity Flash Evaporation Educational Unit Operations Pilot Plant

Item Number: LPK-HGDS



Introduction

Bench-scale integrated teaching system for advanced separation and mass transfer, combining supercritical high-gravity flash evaporation with heating, chemical reaction, and material collection, featuring modular design, Stainless Steel 316L construction, transparent visualization, touchscreen control, and safety systems for chemical engineering education.

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Component / Parameter	Specification / Description
Primary Structural Material	Stainless Steel 316L and High-Borosilicate Glass
High-Gravity Device	Motor-driven with magnetic coupling for leak-free, high-shear mixing
Control Interface	15.6-inch industrial touchscreen with 5G/Bluetooth connectivity
Safety Mechanisms	Over-temperature and over-pressure automated shut-offs
Fluid Delivery	Integrated precision liquid metering pumps with feedback control
Material Circulation	Closed-loop collection and recycling system for sustainable chemical usage

Experimental Module	Key Educational Concepts Covered	Classic Textbook Alignment
Flash Distillation and Vapor-Liquid Equilibrium	Thermodynamic equilibrium, throttling processes, phase separation efficiency, and material balances.	<i>Unit Operations of Chemical Engineering & Transport Processes and Unit Operations</i>
High-Gravity Mass Transfer	Centrifugal separation field dynamics, mass transfer coefficients, residence time distribution, and process intensification.	<i>Chemical Engineering Design & Unit Operations of Chemical Engineering</i>
Supercritical Fluid Operations	High-pressure phase behavior, supercritical solvent properties, and thermodynamic phase envelopes.	<i>Transport Processes and Unit Operations</i>
Process Control and Automation	Closed-loop PID control, sensor calibration, real-time data acquisition, and safety interlock design.	<i>Chemical Engineering Design</i>