Agitation And Mixing Educational Unit Operations Pilot Plant

Item Number: LPK-JBJ

Introduction

This bench-scale educational pilot plant enables investigation of agitation and mixing characteristics through real-time torque, speed, and conductivity measurements, supporting power number, Reynolds number, and scale-up experiments for chemical engineering students with customizable impellers and interactive control for practical education.

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Parameter / Component	Specification
Agitation Vessel	Stainless steel construction equipped with removable baffles for flow pattern modification
Drive System	Variable speed motor with integrated control, speed range: 0–1000 RPM
Impeller Options	Standard configurations include Flat-Blade Turbine, Pitched-Blade Turbine, and Anchor types
Instrumentation	Real-time torque/power transmitter, photoelectric speed sensor, high-precision conductivity probe, and temperature sensor
Control & Acquisition	Integrated PLC with a color touchscreen HMI; data export capability via standard interface
Frame & Mobility	Corrosion-resistant aluminum alloy profile skid with heavy-duty locking casters

Experimental Module	Measurable Parameters	Associated Academic Concepts	Reference Textbook Alignment
Agitator Power Determination	Speed (n), Power (N), Fluid density (ρ), Fluid viscosity (μ)	Power Number (N_p), Reynolds Number (Re), dimensional analysis	*Unit Operations of Chemical Engineering / Transport Processes and Unit Operations*
Mixing Time & Efficiency	Conductivity vs. time, impeller speed, baffle configuration	Blending effectiveness, concentration homogenization, tracer dynamics	*Unit Operations of Chemical Engineering*
System Characterization & Scale-Up	Impeller geometry, vessel-to-impeller ratio, baffle effects	Scale-up criteria, power-per-unit-volume, flow vs. shear characteristics	*Chemical Engineering Design / Transport Processes and Unit Operations*