

Comprehensive Multi-Modal Heat Transfer Unit Operations Pilot Plant For Engineering Training

Item Number: LPK-DMTCR



Introduction

Comprehensive multi-modal heat transfer unit operations pilot plant for engineering training. Features four heat exchanger types, multi-media switching, and three operating modes. Hands-on experience in safety, optimization, and process control. Industrial-grade design with real-time data acquisition for chemical engineering labs.

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Parameter / Module	Specification / Operational Capability	Associated Textbook Concepts & Unit Operations
Physical Dimensions	3930 mm × 2560 mm × 3900 mm (Length × Width × Height); adjustable based on laboratory space.	Plant Layout, Piping and Instrumentation Diagram (P&ID) design, Scale-up principles.
Structural Frame	Two-story carbon steel powder-coated framework, 1.2m yellow safety guardrails, 3mm checkered platform plates.	Industrial Safety Standards, Process Plant Design, Ergonomics in Unit Operations.
Heat Exchanger Types	Features 4 distinct partition-wall heat exchangers (including Plate and Tubular types).	Co-current and Counter-current Flow, Logarithmic Mean Temperature Difference (LMTD), Heat Transfer Coefficients.
Media Configurations	2 heating media and 2 cooling media circuits with manual/automated switching control.	Process Utilities, Energy Conservation, Heat Integration, Thermal Energy Balances.
Control & Acquisition	Industrial-grade sensors for temperature, pressure, flow, and level; PC-based data acquisition software.	Process Dynamics, Feedback Control Loops, Sensor Calibration, Data Logging and Analysis.
Experimental Modules	Determination of overall heat transfer coefficients (\$U\$); comparison of heat exchanger efficiencies; system startup and emergency shutdown protocols.	Steady-state and Unsteady-state Heat Conduction, Convection Heat Transfer, Fouling Factors, Film Coefficients.