

FLUID MECHANICS SERIES

This modular product series is based on core fluid mechanics curriculum topics, integrating theory with innovation to facilitate comprehensive experiments. It helps students grasp fundamental concepts, principles, and equations of fluid mechanics, develop problem-solving skills, and apply fluid mechanics knowledge to engineering challenges. This foundation supports advanced studies, professional work, and research in the field.

FLUID MECHANICS

01 Fundamental Equations of Fluid Motion

- Continuity Equation
 - Energy Equation
 - Momentum Equation
- Fundamental Principle H100
 - H108 Momentum Equation Experimental Apparatus

02 Fluid Statics

- Concepts and Characteristics of Liquid Static Pressure
 - Pressure Calculation, Measurement, and Gauging
 - Vortex Surface Profile and Total Head Variation
- H201/H211 Fluid Statics Experimental Apparatus / Pressure Center
 - H105 Vortex Experimental Apparatus

03 Fundamentals of Fluid Mechanics

- Energy Equation
 - Streamlines and Pathlines
 - Laminar and Turbulent Flow, Reynolds Number
 - Flow Measurement Methods and Calculations
- H101 Bernoulli Experimental Apparatus
 - H012 Flow Field Demonstration Apparatus
 - H102 Reynolds Number Measurement Apparatus
 - H103/H104 Flow Measurement / Calibration Apparatus

04 Flow Resistance and Energy Loss

- Frictional Loss and Local Loss
- H130/H109 Flow Resistance / Local Loss Experimental Apparatus

05 Orifice, Nozzle, and Pipeline Flow

- Free Discharge from Orifice
 - Water Hammer in Pressurized Pipes
 - Cavitation Phenomenon
- H110 Orifice and Nozzle Comprehensive Experimental Apparatus
 - H106/H107 Pulsation and Water Hammer / Water Hammer Pump Experimental Apparatus
 - H210 Cavitation Experimental Apparatus

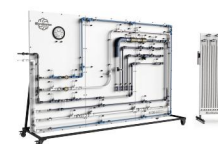
06 Pump Applications and Others

- Series and Parallel Connection of Centrifugal Pumps
 - Centrifugal Pump Performance Testing
- H265 Series and Parallel Pump Experimental Apparatus
 - H266 Programmable Centrifugal Pump Experimental Apparatus



H101 - Bernoulli Experimental Apparatus

Observes pressure distribution in a Venturi tube and verifies Bernoulli's and continuity equations.



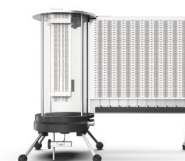
H130 - Flow Resistance Experimental Apparatus

Studies frictional and local resistance losses in pipes and the use of flow meters such as orifice plates, Venturi tubes, and Pitot tubes, including local resistance calculations.



H120 - Impulse Turbine

Investigates the working principle of impulse turbines and analyzes the relationship between inlet pressure, flow rate, torque, power, speed, and nozzle position.



H111 - INozzle and Jet Velocity Experimental Apparatus

Used to plot the horizontal jet trajectories produced by different orifice openings.



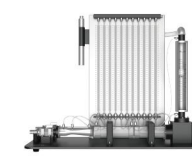
H109 - Local Loss Experimental Apparatus

Studies local head losses when fluid flows through different enlargements and sudden expansions in pipes.



H102 - Reynolds Number Apparatus

Demonstrates laminar, transitional, and turbulent flows; measures Reynolds number.



H103 - Flow Measurement Experimental Apparatus

Demonstrates and studies the working principles of various flow meters.



H104 - Flow Calibration Experimental Apparatus

Used to calculate flow rates and calibrate flow coefficients for different types of flow meters.



H105 - Vortex Experimental Apparatus

Studies the formation of forced and free vortices in water; measures vortex surface profiles and total head variation.



H106 - Pulsation and Water Hammer Experimental Apparatus

Investigates pulsating flow and water hammer phenomena in pipelines, including their causes and effects.



H107 - Water Hammer Pump Experimental Apparatus

Primarily used to study the water hammer effect and the water-lifting principle generated by it.

H100 Basic Fluid Mechanics Experiment Platform



This basic platform supports water circulation and flow control for fluid mechanics experiments. It features dual-level tanks for observing flow over various weirs and allows quantitative flow calibration. Highly expandable with modular compatibility.



H110 - Orifice and Nozzle Comprehensive Experimental Apparatus

Studies flow characteristics of various orifice shapes, measuring parameters like contraction coefficient, velocity coefficient, and flow coefficient.



H108 - Momentum Equation Apparatus

Measures impact force of water flow on plates; verifies momentum equation.



► H201 Hydrostatics Experimental Apparatus

Used to study basic physical concepts and principles in fluid statics.

1. Quantitative determination of density and specific gravity
2. Observation of capillary phenomena in tubes and between plates
3. Viscosity measurement of various liquids via falling-ball method
4. Demonstration and verification of Pascal's and Archimedes' laws
5. Stability study of boat-shaped float and determination of metacentric height
6. Verification of pressure center distribution in static fluids
7. Measurement methods for liquid level height
8. Demonstration and practice of various static pressure measurement methods
9. Calibration and operation of Bourdon pressure gauge



► H300 2.5m Open Channel Flume Apparatus

A multifunctional open-channel flume designed for demonstrating various flow phenomena. Equipped with interchangeable models such as weirs, sluice gates, bridge piers, levees, wave makers, and floodplains. Customization supported.

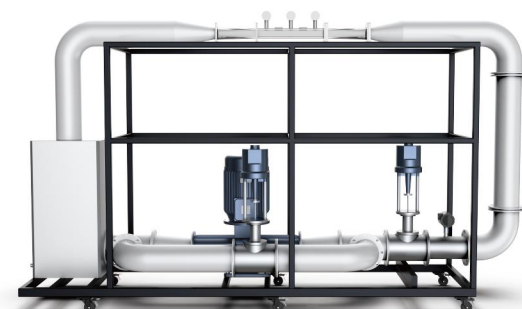
1. Influence of channel slope on flow regimes
2. Flow pattern changes over weirs
3. Flow transformation over floodplain structures
4. Flow around bridge piers
5. Flow through sluice gates
6. Flow dissipation with energy loss structures
7. Wave behavior against breakwaters



► H210 Cavitation Experimental Apparatus

Designed for cavitation studies in a Venturi model, used in Fluid Mechanics experiments.

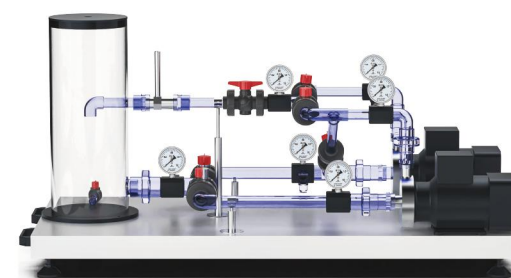
1. Study the effect of flow velocity on cavitation
2. Verify the continuity equation and observe how cavitation affects fluid characteristics
3. Measure and analyze pressure changes at the Venturi inlet and throat to determine cavitation conditions



► H501 Compact Water Tunnel Test Platform

Composed of a contraction section, test section, diffuser, axial pump, rectifier, and flow stabilizer.

1. Resistance testing of various models and specimens
2. Provides low-turbulence, constant-speed flow fields for experiments in fluid mechanics and hydraulics
3. Supports extended applications such as surface friction resistance testing with adaptable materials for related disciplines



► H265 Series and Parallel Pump Test Bench

A compact, tabletop, fully self-contained centrifugal pump system supporting three operation modes: single pump, series, and parallel operation.

1. Measure head vs. flow rate characteristics
2. Study pump behavior in series operation
3. Study pump behavior in parallel operation
4. Investigate single pump performance
5. Demonstrate cavitation phenomenon



► H266 Programmable Centrifugal Pump Test Bench

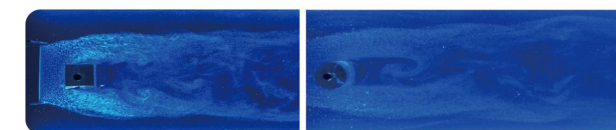
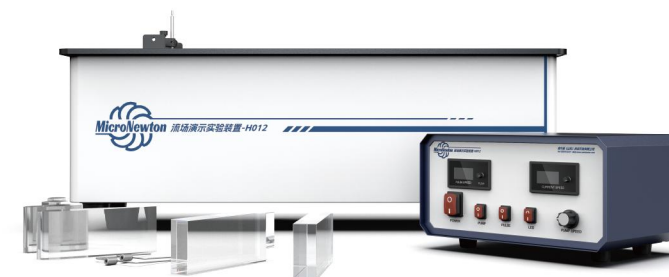
An advanced test system for both fundamental and applied turbomachinery analysis, supporting programmable control and data acquisition.

1. Analyze turbomachinery: Euler's equation, impeller velocity triangles, ideal pump curves
2. Study pump performance under varying flow rates and speeds: power consumption, efficiency
3. Explore pump selection, modeling, and similarity scaling based on known speed and dimensions
4. Identify pump operating points under different pressure conditions
5. Conduct energy-saving experiments by adjusting speed and system load
6. Design and evaluate custom impeller blade profiles for specific applications

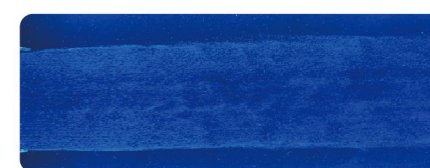
► H012 Flow Field Demonstration Apparatus

Used to demonstrate laminar, turbulent, and transitional flow states. Includes various models (airfoil, S-shape, cylinder, etc.) with expansion options, showing vortex formation and Kármán vortex street.

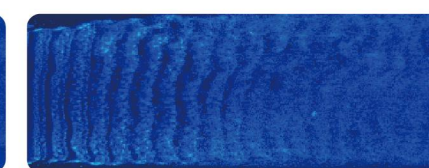
1. Visualizes 2D flow
2. Demonstrates flow around objects and streamlines
3. Shows boundary layer separation
4. Demonstrates vortex formation and Kármán vortex streets
5. Qualitatively observes velocity distribution in laminar and turbulent flows
6. Simulates airflow patterns



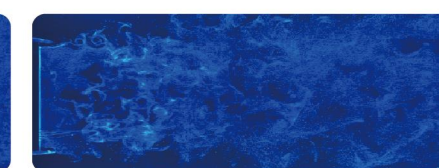
• Vortex Formation and Kármán Vortex Street Phenomenon



• Laminar Flow Phenomenon



• Transitional Flow Phenomenon



• Turbulent Flow Phenomenon