

Fluid Properties & Hydrostatics Bench – F9092

F
 SERIES

The Armfield Fluid Properties and Hydrostatics Bench is designed to demonstrate the properties of fluids and their behaviour under hydrostatic conditions (fluid at rest). This enables students to develop an understanding and knowledge of a wide range of fundamental principles and techniques, before studying fluids in motion.



Shown with options

Demonstration Capabilities

- ▶ The provision of practical instruction exercises demonstrating the principles of fluid mechanics, in particular:
- ▶ Understanding the properties of fluids:
- ▶ Determining the density, specific gravity and viscosity of different liquids
- ▶ Observing the effects of capillarity
- ▶ Understanding the effects of static pressure:
- ▶ Demonstrating that the free surface of a static liquid is horizontal
- ▶ Studying the effect of flow on a free surface
- ▶ Measuring changes in liquid level
- ▶ Studying the relationship between intensity of liquid pressure and depths
- ▶ Determining the position of the centre of pressure on a plane surface
- ▶ Studying the operation and application of pressure gauges and manometers:
- ▶ Using a direct reading mercury barometer (mercury not supplied)
- ▶ Measuring air and water pressure using manometers
- ▶ Comparing results obtained from various devices
- ▶ Calibrating a Bourdon-type pressure gauge using a deadweight pressure gauge calibrator
- ▶ Investigating the buoyancy force and stability of floating bodies:
- ▶ Verifying Archimedes' principle
- ▶ Determining metacentric height

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Issue: 1b

URL: <http://www.armfield.co.uk/f1>

Applications

ChE	ME	CE	IP
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Description

The equipment is mounted on a steel-framed bench fitted with castors. A variety of measuring devices is incorporated, either fastened to the back of the bench or free-standing.

Water is stored in a polythene tank situated on the lower shelf of the bench.

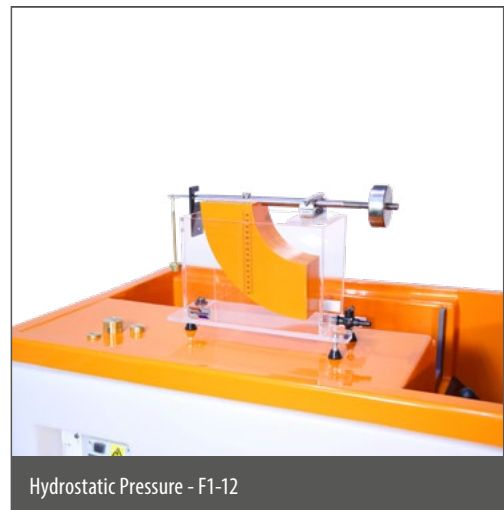
The water can be transferred by two positive displacement hand pumps, either to an elevated open storage tank connected to a number of glass tubes for free surface studies, or to a plastic sink recessed into the working surface so that benchtop experiments may be conducted without spillage. All excess water is returned to the storage tank via the sink drain.

The following experimental apparatus is included:

- ▶ Universal hydrometer and hydrometer jars
- ▶ Falling sphere viscometers
- ▶ Free surface tubes
- ▶ Hook and point gauge
- ▶ Mercury barometer (mercury not supplied)
- ▶ Bourdon gauge
- ▶ U-tube manometers
- ▶ Deadweight pressure gauge calibrator and weights
- ▶ Hydrostatic pressure apparatus
- ▶ Pascal's apparatus
- ▶ Parallel plate capillary apparatus
- ▶ Capillary tube apparatus
- ▶ Lever balance with displacement vessel, bucket and cylinder
- ▶ Metacentric height apparatus
- ▶ Measuring cylinder
- ▶ Thermometer
- ▶ Air pump
- ▶ 600ml beaker
- ▶ Stop clock



Dead Weight Pressure Gauge Calibrator - F1-11



Hydrostatic Pressure - F1-12



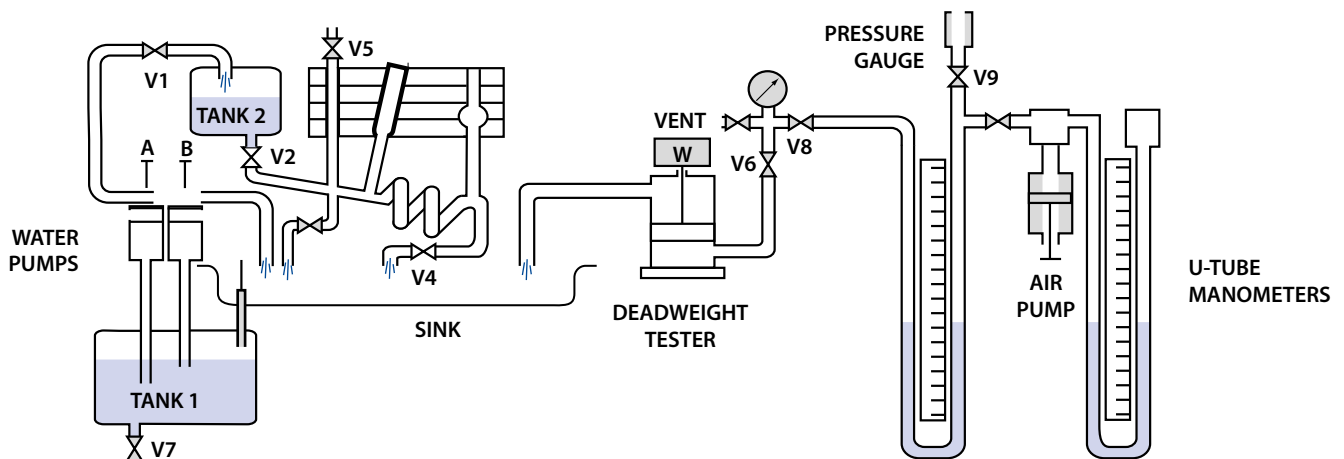
Metacentric Height - F1-14



Pascal's apparatus - F1-31

Description

Universal hydrometer:	Range 0.70-2.00 subdivided in 0.01 intervals
Falling sphere viscometer:	40mm tube diameter
Hydrostatic pressure apparatus:	Comprises counterbalanced precision quadrant pivoted on knife edges at its centre of arc
Direct reading barometer:	With compensated silvered metal scale Range 585-790mm subdivided in 1mm intervals Includes thermometer
100mm dial pressure gauge:	Range 0-200 kN/m ² (kPa) and equivalent head of water in metres
Deadweight pressure gauge calibrator:	With 2 x 0.5kg, 1kg and 2.5kg weights
Lever balance:	178mm diameter pan, hook for use in buoyancy experiments, antiparallax cursor, double scale 0-0.25kg and 0-1.00kg
Thermometer:	Range -10°C to +50°C



Pressure and liquid level experiments are conducted using a built-in pipe system shown in outline in this diagram



Demonstration of the free surface of a static liquid



Pressurising a manometer

Optional products

H12-8: Basic Portable Pressure Meter

Consequent to its hazardous nature many technicians prefer not to use mercury or its use may be prohibited in the laboratory. In any case Armfield is unable to include it in the supply with the purchase of mercury manometers due to shipping restrictions. With this in mind Armfield offers a handheld, portable, battery-operated pressure meter (H12-8), which is capable of measuring pressures of air or water from 0-2,000mBar (0-1,500mm Hg).

Requirements

Scale



Vernier calliper

Reference pressure gauge – Bourdon type

Electronic top-loading balance

Complementary Products

F1:	Hydraulics Bench and Accessories
F1-ABASIC:	Programs for F1 product range
F5:	Osborne Reynolds' Apparatus
F6:	Air Flow Studies
F1-28:	Cavitation Demonstration
F12:	Particle Drag Coefficients
F14 MkII:	Hydrogen Bubble Flow Visualisation System

Overall dimensions

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Height	1.45m
Width	1.83m
Depth	0.61m

Packed and crated shipping specifications

Volume	2.7m ³
Gross Weight	270kg

Ordering specifications

- ▶ A self-contained and mobile unit for demonstration of the properties of fluids and hydrostatics
- ▶ The equipment is mounted on a steel-framed bench fitted with castors
- ▶ The benchtop incorporates a recessed plastic sink
- ▶ A variety of measuring devices is incorporated in the unit including a universal hydrometer, range 0.70-2.00; falling sphere viscometer; hook and point gauge; hydrostatic pressure apparatus; Pascal's apparatus; double-scale lever balance with displacement vessel, bucket and cylinder; metacentric height apparatus; direct reading barometer range 585-790mm; dial pressure gauge range 0-200 kN/m² (kPa); deadweight pressure gauge calibrator with weights; thermometer range -10°C to +50°C
- ▶ These devices enable a full range of 16 experiments to be carried out, demonstrating the properties of fluids, the effects of static pressure, the operation and application of pressure gauges and manometers and the investigation of the stability of floating bodies
- ▶ A comprehensive manual is included describing how the experiments are performed as well as how to commission the equipment

Ordering codes

- ▶ F9092

Armfield standard warranty applies with this product

Knowledge base

- > 28 years' expertise in research & development technology
- > 50 years' providing engaging engineering teaching equipment

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

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