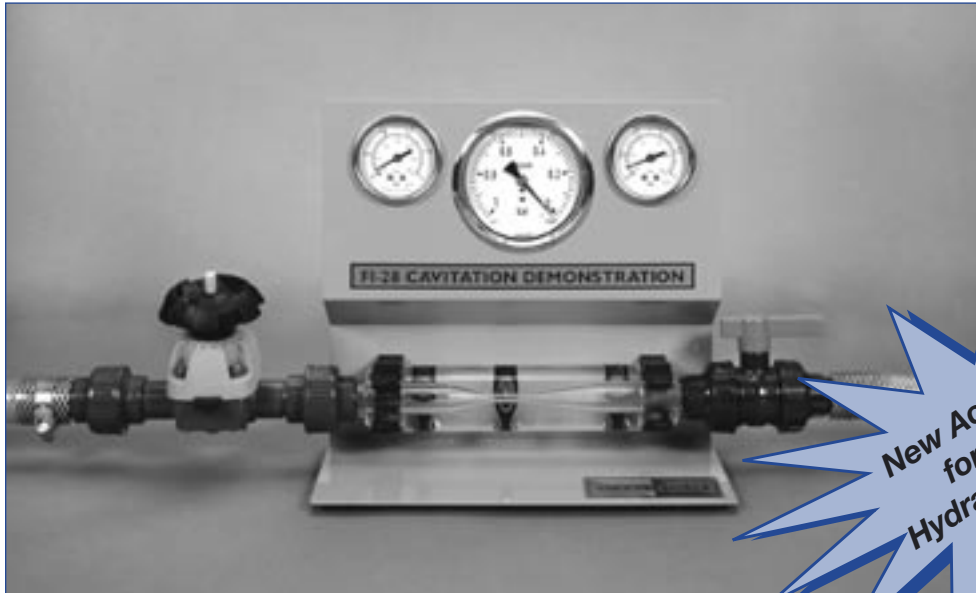




armfield

CAVITATION DEMONSTRATION



F1-28

issue 1

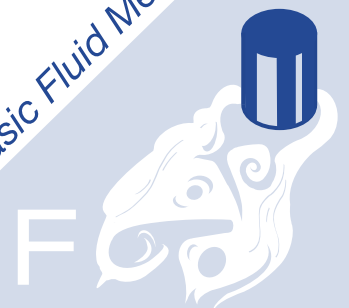
New Accessory
for F1-10
Hydraulics Bench

The Armfield Cavitation Demonstration apparatus demonstrates to students visually, audibly and numerically the phenomenon of Cavitation and its association with the Vapour Pressure of a liquid.

DEMONSTRATION CAPABILITIES

- *Observation of the phenomenon of Cavitation in a liquid (by reducing the pressure of the liquid to its Vapour Pressure)*
- *Comparison of theoretical and actual pressure at Cavitation conditions*
- *Observation of air-release due to free and dissolved gasses in a liquid*
- *Demonstration of reducing Cavitation by increasing the static pressure in a liquid*

Basic Fluid Mechanics



DESCRIPTION

The apparatus consists of a circular Venturi-shaped test section manufactured from clear acrylic to allow full visualisation of flow conditions inside the section.

Water enters the test section at relatively low velocity. As the area of the test section contracts towards the throat the velocity of the water increases and the static pressure falls in accordance with the Bernoulli equation. If the flow of water is increased the sub-atmospheric pressure at the throat causes free and dissolved gasses to be released as bubbles in the liquid.

As the flow is increased further the pressure continues to fall at the throat until a limit is reached corresponding to the Vapour Pressure of the liquid (the actual pressure depending on the temperature of the liquid). At this condition small bubbles of vapour are formed in the liquid. These bubbles collapse violently as the pressure rises again in the downstream expansion of the test section.

This process is called Cavitation and can be regarded as one of the most destructive forces created in a liquid system – the large amounts of energy released resulting in erosion of even the hardest metal surfaces in real applications such as valve seats, propeller blades etc. Any further increase in the flow of liquid causes an increase in the Cavitation (the pressure cannot reduce any further than the Vapour Pressure of the liquid).

The test section incorporates tappings that allow the static pressure upstream of the contraction, inside the throat and downstream of the expansion to be measured. Each tapping is connected to a Bourdon gauge of appropriate range.

A flow control valve upstream of the test section allows the flow through the test section to be regulated without raising the static pressure in the test section, allowing Cavitation to be clearly demonstrated. Conversely a flow control valve downstream of the test section allows the static pressure in the test section to be elevated – a technique used to prevent cavitation from occurring.

The closure of the downstream valve is restricted to prevent damage to the instrumentation.

The test section and Bourdon gauges are mounted on a plate with feet that locates on top of the F1-10 Hydraulics bench. The accessory includes the necessary flexible tubes and a connector to suit the water outlet on F1-10.

TECHNICAL DETAILS

Upstream pressure gauge:	63mm diameter, Range 0 to 1 Bar
Throat vacuum gauge:	100mm diameter, Range -1 to 0 Bar
Downstream pressure gauge:	63mm diameter, Range 0 -1 Bar

Can be operated independently from the Hydraulics Bench for visualisation only using a cold water mains supply with 0.4 litres/sec at 2 Bar gauge.

ORDERING SPECIFICATIONS

F1-28 Cavitation Demonstration

- A small scale apparatus designed to demonstrate Cavitation using an Armfield F1-10 Hydraulics Bench
- The apparatus consists of a circular Venturi shaped section manufactured from clear acrylic
- Three Bourdon gauges indicate the static pressure upstream of the contraction, inside the throat and downstream of the expansion
- Flow control valves upstream and downstream of the test section allow flow conditions to be optimised for the demonstration of Cavitation
- Quick release fitting for easy connection to hydraulics bench
- Educational software available as an option

SERVICES REQUIRED

F1-10 Hydraulics Bench
or supply of cold water. 0.4L/s at 2 Bar gauge

ESSENTIAL ACCESSORIES

Stopwatch

OVERALL DIMENSIONS

Height: 0.285m
Width: 0.640m (excluding flexible tubes)
Depth: 0.150m

SHIPPING SPECIFICATION

Volume: 0.15m³
Gross Weight: 20kg

Specifications may change without notice
iss1/5k/1105/BCP.

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