



Fluidisation and Fluid Bed Heat Transfer Unit H694



- *Safe and Suitable For Unsupervised Student Operation.*
- *Responds Rapidly to Control Changes.*
- *Negligible Operating and Maintenance Costs.*
- *Two year Warranty.*



Introduction

The HILTON H694 Fluidisation & Fluid Bed Heat Transfer Unit has been designed to provide visual and quantitative results related to the flow of air through both a packed and fluidised bed of granular material.

The Unit also provides quantitative results related to heat transfer in a fluidised bed.

The Fluidisation and Fluid Bed Heat Transfer Unit is almost silent in operation, is safe and easy to use and responds quickly to changes in operating conditions

The interesting and stimulating range of investigations which are possible with this unit make it of interest to those involved with Mechanics of Fluids, Heat Transfer and Thermodynamics in courses for

- **Chemical Engineers**
- **Energy Mangers**
- **Plant and Process Engineers**
- **Mechanical Engineers**
- **Mining Engineers**

Experimental Capabilities

- Observation of the behaviour in fluidised bed of a wide range of granular materials, from onset of fluidisation to entrainment.
- Measurement of air flow and pressure drop through a variety of granular materials, as packed and as fluidised beds.
- Investigation of the effect of distributor design on bed behaviour.
- Investigation of the effect of
 - a) Superficial velocity
 - b) Depth of immersion
 - c) Particle size
 on the surface heat transfer coefficient for a hot surface in a fluidised bed.
- Demonstration of separation by particle size and density.

Description

A bed of a chosen granular material about 70 mm deep is contained in a vertical glass cylinder. At the lower end of this is a distribution chamber and air distributor which supports the bed when defluidised. This distributor had been designed to ensure uniform air flow into the bed without causing excessive pressure drop and is suitable for the granular material supplied. However, it may be replaced by a locally designed distributor for student projects and other investigations.

On leaving the bed, the air passes through the chamber and escapes to the atmosphere through a filter. The chamber, filter and distributor assembly is suspended from a bracket mounted on the panel. Installed in this bracket are probes for temperature and pressure measurement, and a horizontal cylindrical heater, all of which may be moved vertically to any level in the bed chamber. Air from the local compressed air supply* is delivered through a filter/pressure regulator, an air flow meter fitted with a control valve and an orifice plate (to measure higher flow rates), to the distribution chamber.

When in use, the heat transfer rate from the heater is controlled by a variable transformer, and the voltage and current taken are displayed on the panel. Two thermocouples are embedded in the surface of the element. One of these indicates the surface temperature, and the other, in conjunction with a controller, prevents the heater surface temperature exceeding a set value (up to 200°C). A digital temperature indicator with a selector displays the temperatures of the element, the air supplied to the distributor, and the moveable probe in the bed chamber.





Two liquid filled manometers are fitted. One displays the pressure of the air at any level in the bed chamber, and the other displays the orifice differential pressure, from which the higher air flow rates can be determined.

If the pressure in the distribution chamber rises above about 300 mm H₂O above atmospheric, (e.g. due to a blocked filter) an excess pressure relief device operates and discharges air to the atmosphere. This device re-sets automatically when the blockage is cleared.

An important feature of this unit is the ease with which the bed material may be changed. After unscrewing two union nuts to remove the air connections to the distribution chamber, three knurled nuts are removed from the mounting bracket. The chamber, filter and distribution assembly may now be removed and the bed material tipped out. Another bed material may now be poured into the cylinder and the components reassembled in a reverse order. The unit can be in operation again in two or three minutes.

Four grades of Fused Alumina (Aluminium Oxide) Loose Grain are supplied with the unit and these are suitable for a wide range of fluidisation and heat transfer experiments. In addition to these, any dry and free flowing granular material of a suitable density and size may be introduced to the chamber and many interesting demonstrations are possible. Particularly interesting is the separation of a mixture of granules by size or by density.

** If no compressed air is available, P.A.Hilton Ltd will be pleased to forward particulars of a suitable compressor.*



Specification

General

Fluidised Bed designed for educational studies and using air as the fluidising medium. The unit incorporates a glass chamber containing the bed material and an electric heater for heat transfer studies.

Detailed

Panel: High quality glass reinforced plastic on which the following components are mounted:

Variable Transformer to vary the heater power input.

Volt and Ammeter to indicate the heater power input. Ranges 0 to 250 V and 0 to 3 A.

Flow Meters to measure air flow through bed. Range 0.15 to 3.5 litres/sec.

Digital Thermometer to indicate the temperatures of heater surface, air inlet and probe. Resolution 1°C.

Manometer to measure pressure drop through bed.

Safety Features include fusing and earthing of all components and heater temperature controller.

Dimensions

Height: 710 mm Depth: 240 mm
Width: 710 mm Weight: 28 kg

Services Required

Electrical: A: 250 W Single Phase, 220-240 Volts, 50Hz (With earth/ground)

or

B: 250 W Single Phase, 110-120 Volts, 60Hz (With earth/ground).

Compressed Air:

200 litres free air per minute at a pressure of 200 to 1000 kN m⁻² gauge.

Accessories and Spares

Unit supplied with:

One experimental operating and maintenance manual in either English, Spanish or French. Accessories and spares for 2 years normal operation. List available on request.

The policy of P.A. Hilton Limited is one of continual improvement and we reserve the right to revise this specification without notice.

Ordering Information

Order as: H694 Fluidisation and Fluid Bed Heat Transfer Unit.

Electrical Specification

Electrical: A: Single Phase, 220-240 Volts, 50Hz (With earth/ground).

B: Single Phase, 110-120 Volts, 60Hz (With earth/ground).

Language

Either: English, Spanish, French.

Shipping Specifications

Nett Weight: 28 kg

Gross Weight: 83 kg

Packing Case Size: 0.889 x 0.889 x 0.525m

Packing Case Volume: 0.145 m³

Also Available On Request

Further detailed specification.

Additional copies of instruction manual.

Recommended list of spares for 5 years operation.

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