Airflow System
F100

Figure 1. F100 base unit (comprising of a Pressure Centrifugal Fan, a Plenum chamber) and Optional F100B fitted

- ***A Flexible Air Flow System With An Expandable Range Of Optional Experimental Modules Designed For Student Use.***
- ***With The Optional Modules, Allows Investigation Of Fundamental Aspects Of Air Flow, And Aerodynamics And Heat Transfer.***
- ***Safe and Suitable For Unsupervised Student Operation***
- ***Responds Immediately To System Changes Allowing Efficient Use of Laboratory Time***
- ***Negligible Operating and Maintenance Costs***
- ***Two year Warranty.***

Introduction

The Hilton Airflow System F100 and its range of optional accessories enable students to safely investigate the fundamentals of airflow and simple aerodynamic experimental procedures.

The unit consists of a small footprint, high volume high pressure centrifugal fan with adjustable flow control, inlet and outlet couplings. The Hilton Airflow System F100 is available with an extensive range of optional accessories that makes the unit a very flexible and economic investment

The unit provides an extensive and expandable range of studies for students in the following disciplines.

- Aeronautical Engineering
- Mechanical Engineering
- Fluid Mechanics
- Nuclear Engineering
- Chemical Engineering
- Control and Instrumentation
- Plant and Process Engineering
- Building Services
- Engineering Physics
- Marine Engineering

Experimental Capabilities

The extensive range of optional accessories allow investigation of :-

- Bernoulli's equation
- Drag forces on various shapes
- Investigation of a turbulent jet
- Investigation of boundary layer development
- Pressure distribution of flow around a bend
- Fan performance characteristics
- Jet attachment
- Pressure distribution around a cylinder
- Pressure distribution around an aerofoil
- Flow visualisation studies.
- Air flow measurement methods.

Specification

Airflow System F100

A small footprint, high volume high pressure centrifugal fan with adjustable flow control, inlet and outlet couplings. A comprehensive range of optional accessories are available that may be connected to the fan inlet, outlet or both as required.

Dimensions

Height: 440mm Depth: 440mm
Width: 650mm Weight: 20kg.

Services Required

Electrical: A: 220-240 Volts, Single Phase, 50Hz (With earth/ground).
Line current up to 10A at 230v
B: 110-120 Volts, Single Phase, 60Hz (With earth/ground).
Line current up to 20A at 110v

Ordering Information

Order as: Airflow System F100

Electrical Specification

Either: **A**: 220-240 Volts, Single Phase, 50Hz (With earth/ground).
B: 110-120 Volts, Single Phase, 60Hz (With earth/ground).

Language

Either: English, Spanish or French.

Shipping Specification

Service Unit Net Weight: 50 kg.
Packing Case Volume: 0.52m^3

Accessories and Spares

Unit supplied with:

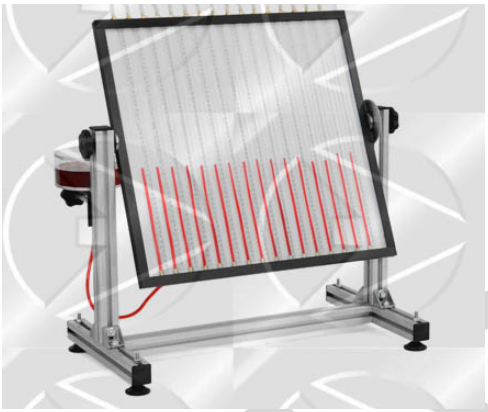
- One experimental operating and maintenance manual in English, Spanish, French.
- Accessories and spares for 2 years normal operation. List available on request

Also Available On Request

Further detailed specification.
Additional copies of instruction manual.
Recommended list of spares for 5 years operation.

Optional Extras

Multi-tube Manometer F100A



A multi-tube manometer with a common reservoir that may be used to give a graphic display of pressure distribution on multi-point pressure tapings.

The device allows up to 16 pressures to be monitored simultaneously either relative to atmospheric pressure or another pressure, via the common reservoir.
In order to increase the device sensitivity the device may be inclined at a known angle.
The unit is a recommended accessory for all of the following optional items and is <u>essential</u>, if a similar unit is not available locally.

Bernoulli's Equation F100B

A convergent divergent duct section that connects to the Hilton Airflow System F100 using a flexible coupling. The device has a pitot-static tube that can be moved axially along the duct to allow students to measure the local variations in total and static pressure due to the variation in duct cross section.

The measured pressure changes may be compared with the Bernoulli equation predictions.

The device is designed for use with the optional multi-tube manometer F100A.

Boundary Layer Investigation F100C

A reversible flat plate located inside a rectangular duct. The plate has one smooth and one artificially roughened face. The duct has removable profile plates that can establish an increasing or decreasing pressure gradient in the direction of flow.

To investigate the growth of the boundary layer profile in a variety of conditions along the plate a micro-pitot tube is provided. This may be moved toward the plate in measured intervals using a micrometer adjustment.
The growth of the boundary layer along the plate may be investigated.

Round Turbulent Jet Investigation F100D

A round parallel tube with a sharp edged discharge is used to create a turbulent jet using the air from the
Air flow System F100. A pitot tube is attached to a measuring frame that allows the device to be traversed horizontally and axially over the whole flow field.

By this method the velocity profile at various axial distances from the jet, the pressure loss and entrained mass may be investigated.

Flow Around a Bend Investigation F100E

A 90 degree bend of constant cross section has air blown through it from the Airflow System F100. Along the inner and outer radius at strategic points, static pressure tapping points are located. When connected to a suitable multi-tube manometer the static pressure profile along the inner and outer radius of the bend may be measured at a range of air velocities.

Drag Force Investigation F100G

A short duct with integral load balance allows the drag of a body to be directly measured at a range of approach velocities.
The bodies include an aerofoil, cylinder and plate. The cylinder has a radial tapping to allow investigation of the pressure distribution around the cylinder.

Jet Attachment Investigation F100F

A rectangular slit directs an air jet towards a Y shaped duct with two outlet passages. The shape of the duct may be changed by tilting and sliding moveable elements to allow students to investigate the Coanda effect of jet attachment to a wall. By blowing air from one side or another at the jet the airflow can be directed down either of the Y shaped passages as in a pneumatic flip-flop.

Flow Visualisation Investigation F100H

A smoke generator generates a visual oil mist that is introduced into the airstream ahead of the test shape through a number of fine nozzles. The resulting smoke filaments clearly show streamlines around the test shapes.

Principles of Airflow, Pressure and Velocity Distribution (Pitot-Traverse) F100J

A Pitot tube may be traversed across the air duct in both the free stream condition and behind a cylinder in cross flow allowing the velocity distribution to be measured. A cylinder with local static pressure tapping allows the pressure distribution around a cylinder in cross flow to be measured and compared with the theoretical distribution.

Principles of Airflow, Fan Test and Flow Measurement F100M

Measurement of fan air flow rate using an intake orifice plate, and an iris diaphragm at a range of air flow rates in order to determine the fan characteristics

Principles of Airflow, Friction Losses in Bends, and Pipe Elements F100K

A series of straight pipe sections, bends and different air inlet shapes that are equipped with static pressure tapings to allow air pressure drops due to pipe friction to be measured at a range of air velocities. The air flow rate may be measured using a standard orifice using the differential pressure.

P.A.HILTON Ltd.

Horsebridge Mill, King's Somborne,
Stockbridge, Hampshire, SO20 6PX, England.

Telephone: National (01794) 388382
International +44 1794 388382

Fax: National (01794) 388129
International +44 1794 388129

E-mail: **sales@p-a-hilton.co.uk**
Website: www.p-a-hilton.co.uk

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