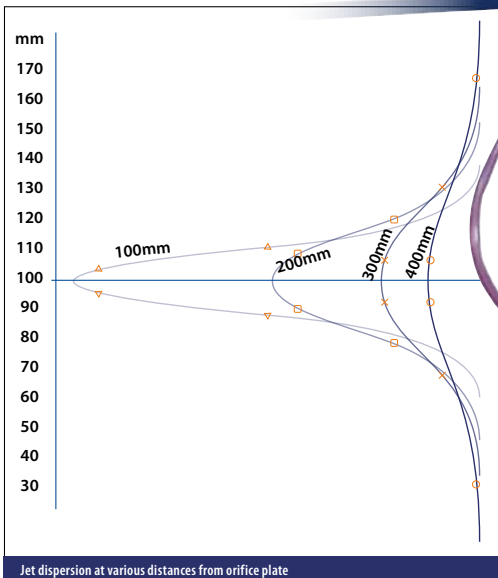
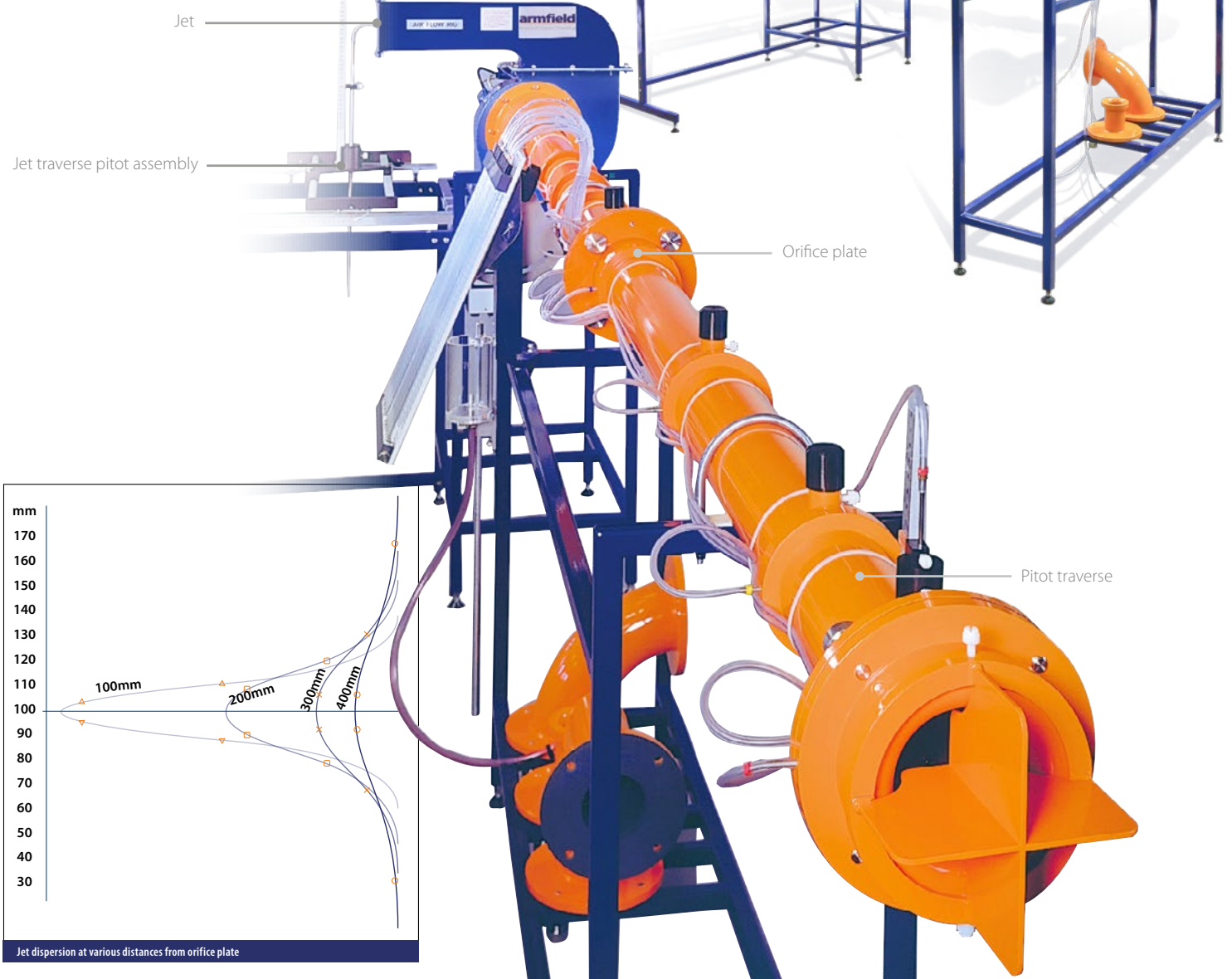


### F SERIES

### Air Flow Studies – F6

The Armfield F6 Air Flow Studies Unit has been designed to demonstrate how to measure the important characteristics of industrial air distribution systems.

It also shows how certain basic principles of fluid mechanics are applied to analyse flow in ducts and jets.



#### Educational content

- ▶ Using manometers to measure pressure drop
- ▶ Using a pitot-static tube to measure flow
- ▶ Dispersion of a jet - to explore the dispersion of a free non-buoyant fluid jet by determining the velocity distribution in the jet at various cross-sections at different distances from the orifice
- ▶ Calculating discharge, momentum flux, momentum flux in the jet at each cross-section is investigated
- ▶ Boundary layer growth in pipe flow
- ▶ Understanding and measuring velocity profiles
- ▶ Determine the discharge coefficient experimentally for an orifice plate meter fitted in an air flow pipe
- ▶ To determine the pressure distribution along the pipe downstream of an orifice plate
- ▶ To determine and compare the pressure drop across the bends and elbows and to examine the static pressure distribution along the downstream pipe
- ▶ To compare the performance of the two nozzles as flow meters by checking them against a precalibrated orifice plate meter

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Issue: 10

URL: <http://www.armfield.co.uk/f6>

Applications

ChE ME CE IP

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## Description

The equipment comprises a long smooth walled pipe connected to the suction side of an electrically driven centrifugal fan. The fan discharge pipe terminates in a flow control damper for closed conduit work or a plate containing a small aperture for jet dispersion measurements.

Air enters the smooth walled pipe through one of the two flow measurement nozzles provided. Pressure tappings along the length of the pipe permit the pressure gradient to be determined.

A bend or mitred cascade elbow may be fitted midway along the smooth wall pipe for comparison of pressure losses.

Boundary layer growth is determined by the measurement of the velocity profile at five stations along the pipe using a traversing Pitot tube.

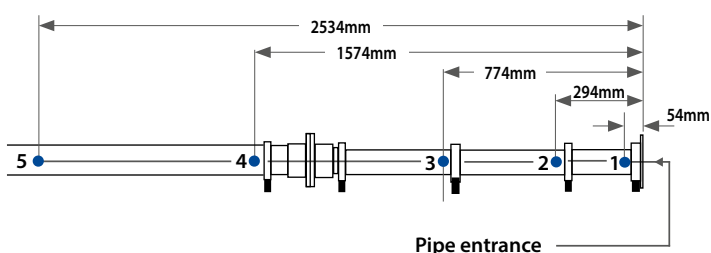
A conventional flow measuring orifice plate is supplied for installing in the pipe upstream of the fan for additional demonstrations of pressure loss and recovery.

Air-jet studies are carried out on the discharge side of the fan. A Pitot tube is traversed vertically and horizontally at different distances from the discharge orifice to investigate the dispersion properties.

The equipment is mounted on a floor-standing steel frame with an adjacent support for the extended suction pipe.

Pressure measurements are made on a multitube inclinable manometer mounted on the support frame.

An electronic manometer bank with data logging software is available as an accessory (order code H14-12).



Pitot tube position in pipe

## Complementary products

<b>H14-12</b>	Electronic Manometer Bank
<b>F1</b>	Hydraulics Bench and Accessories
<b>F1-ABASIC</b>	Programs for F1 product range
<b>F5</b>	Osborne Reynolds Apparatus
<b>F9092</b>	Fluid Properties and Hydrostatics Bench
<b>F12</b>	Particle Drag Coefficients
<b>F14-MkII</b>	Hydrogen Bubble Flow Visualisation

## Overall dimensions

Length	3.80m
Width	1.90m
Height	0.70m

## Packed and crated shipping specifications

Volume	2.3m <sup>3</sup>
Gross weight	220kg

## Requirements

## Scale



### Electrical supply:

**F6-A:** 220-240V / 1ph / 50Hz

**F6-G:** 220-240V / 1ph / 60Hz

Transformer available to accommodate 120V / 1ph / 60Hz supply

## Ordering specification

- ▶ The unit is self-contained and only requires connection to a single phase mains electrical supply
- ▶ Turbulence in the 80mm diameter test pipe is minimised by locating the pipe at the inlet of the centrifugal fan
- ▶ A profiled bellmouth inlet prevents air separation from the wall of the pipe at the entrance and straightening vanes suppress the formation of vortices
- ▶ Tappings along the test pipe enable the pressure gradient to be measured with air velocity variable up to a maximum of 35 m/s
- ▶ A Pitot tube can be traversed across the pipe at five locations to enable boundary layer growth/development of velocity profiles to be determined
- ▶ Air flow rate is determined from differential pressure measurements across an orifice plate or two different inlet nozzles
- ▶ Different bends and elbows can be fitted to enable frictional losses in fittings to be compared
- ▶ Air jet dispersion experiments are carried out on the discharge side of the fan
- ▶ A Pitot tube can be traversed laterally (across) and longitudinally (along) the jet to measure the changes in velocity as the jet disperses
- ▶ All pressure measurements are performed using a bank of 14 manometer tubes that can be inclined to increase sensitivity
- ▶ An instruction manual is supplied that describes how to perform the air flow experiments and interpret the results as well as how to install, commission and maintain the equipment

## Technical specifications

Centrifugal fan capacity:	218 l/s at STP
Pipe velocity range:	0-35 m/s
Inlet pipe:	dia. 80mm length 2.75m
Interchangeable nozzles:	dia. 50mm and 80mm
Internal pipe orifice:	dia. 50mm
Jet discharge pipe orifice:	dia. 30mm
Jet traverse range (downstream LxW):	600 x 140mm
Manometer range:	0-283mm H <sub>2</sub> O
Manometer fluid:	Kerosene (s.g. 0.78)

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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## Aftercare

Installation  
Commissioning  
Training  
Service and maintenance  
Support: [armfieldassist.com](http://armfieldassist.com)