



## INTERMITTENT SUPERSONIC WIND TUNNEL

**VDAS® AF300**

An intermittent supersonic (up to Mach 1.8) wind tunnel for investigations into subsonic and supersonic air flow around two-dimensional models. Also for analysis of the profile of the tunnel working section.



### KEY FEATURES

- Laboratory-scale wind tunnel for subsonic and supersonic tests, nominally up to Mach 1.8
- Compact design, does not need large laboratory space
- Supplied with aerodynamic models for supersonic tests, includes model angle-feedback encoder
- Works with TecQuipment's Versatile Data Acquisition System (VDAS®) for instant recording of multiple readings and automatic calculations
- Electronic instruments measure and display multiple pressures at the same time, for ease of use and for connection to TecQuipment's VDAS®
- Supplied with set of different liners for controlled subsonic and supersonic air flow
- Induction flow for better air flow and accurate results



# INTERMITTENT SUPERSONIC WIND TUNNEL

**VDAS**® AF300

## DESCRIPTION

An intermittent operation, induction-type supersonic wind tunnel for investigations into subsonic and supersonic flow. This includes tests on the flow around two-dimensional models at subsonic and supersonic air speeds.

A compressed air supply (AF300b, available separately) induces a flow in the working section of the wind tunnel. This gives a less turbulent and more stable flow for accurate results and comparison with theory. The essential compressed air supply includes filters and air dryers to give the dust-free and dry air source needed for good results.

Students use a delivery valve to allow compressed air to enter the wind tunnel. The wind tunnel includes two analogue pressure gauges. One measures the compressed air pressure available from the supply (for reference); the other measures the pressure delivered to the wind tunnel and includes an electronic transducer that connects to TecQuipment's optional Versatile Data Acquisition System (VDAS®) to record the pressure.

The working section of the wind tunnel is a convergent-divergent nozzle with a removable top part ('liner'). The shape of the liner controls the maximum air velocity at the divergent part of the working section. Included are three different liners.

High optical-quality polycarbonate windows ('portals') are at each side of the divergent part of the working section. The portals allow students to use the optional Schlieren Apparatus (AF300a, available separately). This allows display and recording of images of pressure waves around two-dimensional models.

Included is a set of two-dimensional models. These mount between the portals inside the working section. Students can adjust the angle of the models. An encoder electronically measures the model angle.

Spaced at precise intervals along the working section of the wind tunnel are pressure tappings. Two extra tappings connect to one of the models when in use. A 32-way pressure display (included) connects to all the pressure tappings. It displays the pressures and transmits them to VDAS® for instant recording and calculations of pressure ratios and Mach numbers.

Included is a bench-mounting instrument frame that holds and provides power for the electronic instruments and the VDAS® interface unit. The instrument frame connects to a suitable electrical supply.

VDAS® allows accurate real-time data capture, monitoring, display, calculation and charting of all the important readings on a suitable computer (computer not included).

## STANDARD FEATURES

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- An ISO 9001 certified company

## LEARNING OUTCOMES

- Pressure distribution along a convergent/ divergent (Laval) nozzle with subsonic and supersonic air flow
- Comparison of theoretical and actual pressure distributions
- Comparison of actual and theoretical area ratios of a nozzle at supersonic air velocities (Mach numbers)
- Pressures around a two-dimensional model in subsonic and supersonic flow conditions, at different angles of incidence
- Lift coefficients for aerodynamic models in supersonic flow
- Shock waves and expansion patterns around a two-dimensional model in supersonic flow conditions (when used with the optional Schlieren Apparatus)

## ESSENTIAL ANCILLARY

- Air Compressor, Receiver and Dryer (AF300b)
- Versatile Data Acquisition System (VDAS-F, frame-mounted version)

## RECOMMENDED ANCILLARY

- Schlieren Apparatus (AF300a)

## ESSENTIAL SERVICES

### ELECTRICAL SUPPLY:

Single Phase, 90 - 250 VAC, 50/60 Hz 10 A, Instrument Frame.

See specifications for AF300b.

### AIR SUPPLY:

Greater than 7 bar and 0.5 kg.s<sup>-1</sup> of clean, dry air, or use the optional AF300b.

The air supply must not contain more than 0.2 kg of water for 450 kg of air.

### FLOOR SPACE NEEDED (DEPENDANT ON LAYOUT):

4 m x 2 m for the wind tunnel and optional Schlieren Apparatus (AF300a)

5 m x 3.5 m for the wind tunnel with the Compressed Air Supply (AF300b) and instruments on table.

See illustration on page 4 for typical layout.

# ≡ INTERMITTENT SUPERSONIC WIND TUNNEL

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## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Laboratory that allows for high sound levels

### STORAGE TEMPERATURE RANGE:

-25°C to +55°C (when packed for transport)

### OPERATING TEMPERATURE RANGE:

+5°C to +40°C

### OPERATING RELATIVE HUMIDITY RANGE:

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

## SOUND LEVELS

This equipment emits sound levels greater than 100 dB(A). You must wear ear defenders when you use it or work near to it.

## SPECIFICATIONS - AF300

TecQuipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

### DIMENSIONS AND WEIGHT (WIND TUNNEL):

Nett: 2000 mm high x 3150 mm long x 805 mm wide and 236 kg

Packed: approximately 5.9 m<sup>3</sup> and 300 kg

### DIMENSIONS AND WEIGHT (INSTRUMENT FRAME WITHOUT INSTRUMENTS):

Nett: 1260 mm long x 840 mm high x 510 mm wide and 22 kg

Packed: approximately 0.78 m<sup>3</sup> and 30 kg

### NOMINAL NETT DIMENSIONS (AF300B):

2120 mm high x 4500 mm x 1000 mm

### WORKING SECTION

Full section: 25.4 mm wide, 101.6 mm high and 647 mm long

Viewing window: 106.1 mm high and 106.1 mm wide

### AIR SPEEDS:

Interchangeable liners are provided to give nominal working section air speeds of:

- Mach 1.8
- Mach 1.4
- Subsonic

### MODELS:

- 5-degree single wedge
- 7-degree double wedge
- 10-degree double wedge
- 10-degree double wedge with two pressure tapings.

### MODELS ADJUSTMENT

Nominally ± 10 degrees

### INSTRUMENTS:

- Angle encoder input board for VDAS-F
- Angle encoder
- 32-way pressure display
- Pressure mimic module
- Delivery pressure: mechanical gauge and electronic transducer
- Supply pressure: mechanical gauge

# INTERMITTENT SUPERSONIC WIND TUNNEL

**V**DAS® AF300

TYPICAL LAYOUT INCLUDING OPTIONAL AF300B AND INSTRUMENT TABLE (NOT SUPPLIED)

