



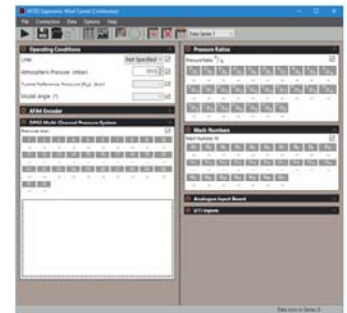
VDAS® AF302

## CONTINUOUS SUPERSONIC WIND TUNNEL

A suction-type, continuous-operation 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.



COMPLETE WIND TUNNEL SYSTEM WITH VDAS® AND OPTIONAL AF302A SCHLIEREN APPARATUS (BOTH AVAILABLE SEPARATELY)



SCREENSHOT OF THE VDAS® SOFTWARE

### KEY FEATURES

- A suction-type continuous-operation supersonic wind tunnel for investigations into two-dimensional air flow around models for nominal air speeds up to Mach 1.8
- Includes high-quality optical glass windows in the working section, suitable for use with an optional Schlieren system
- Includes a selection of models for two-dimensional flow experiments and an encoder for feedback of model angle
- Supplied with a multi-pressure display unit and calibrated pressure sensors to show pressures relative to atmosphere.
- Includes a vacuum pump with remote control for ease of use
- Works with TecQuipment's Versatile Data Acquisition System (VDAS®) for automatic data acquisition

# CONTINUOUS SUPERSONIC WIND TUNNEL

## DESCRIPTION

A suction-type continuous-operation supersonic wind tunnel for investigations into subsonic and supersonic air flow. It also allows students to study air flow in two dimensions around aerodynamic models.

An instrument frame (supplied) holds a remote-control unit that controls a high-capacity vacuum pump (supplied). The pump creates low pressure downstream of the working section to draw air into the wind tunnel. A bypass duct, with a hand-operated valve, allows the operator to reduce the air flow through the working section, without disturbing the quality of the main air flow. This is useful for startup and shutdown and for subsonic tests.

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 shaped liners.

A selection of models are included with the equipment (one has pressure tapings) for experiments in two-dimensional flow. These fit in the 'portal' of the working section, flush to both windows. A geared mechanism allows students to adjust the incidence angle of the models. An encoder works with the optional VDAS to measure the model angle.

Pressure tapings along the working section connect to a 'mimic' panel and multi-pressure display unit in the instrument frame. The display unit shows the pressures at the tapings. The display includes calibrated pressure sensors to measure pressures relative to atmosphere. It also shows the pressures on one of the models.

An analogue pressure gauge measures and displays the suction of the pump (tunnel reference pressure). This pressure line also connects to the multi-pressure display for data acquisition.

The equipment works with TecEquipment's optional Versatile Data Acquisition System (VDAS®) and can quickly and conveniently connect to a frame-mounting interface unit (VDAS-F, not included). Using VDAS® enables accurate real-time data capture, monitoring, display, calculation and charting of all relevant parameters on a suitable computer (computer not included).

The wind tunnel includes transparent windows in the working section. These are high-quality optical glass suitable for use with the optional Schlieren Apparatus (AF302a, available separately) enabling display and recording of images of high-speed flow.

## 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

- Versatile Data Acquisition System - Frame-mounted version (VDAS-F)

## RECOMMENDED ANCILLARY

- Schlieren Apparatus AF302a

## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Well ventilated laboratory

### 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

**NOTE:** For best results, use the Wind Tunnel in areas of low relative humidity (<10% at 30°C). High humidity levels can cause condensation shocks and ice may build up in the working section, giving poor results.

## ESSENTIAL SERVICES

### ELECTRICAL SUPPLY FOR INSTRUMENT FRAME:

100 VAC to 240 VAC, 50 to 60 Hz

### ELECTRICAL SUPPLY FOR VACUUM PUMP:

380 - 415 VAC three-phase neutral and earth  
150 A starting current, 90 A running current

## SOUND LEVELS

This equipment emits sound levels greater than 90 dB(A). You must wear ear defenders when you use it or work near to it.

# CONTINUOUS SUPERSONIC WIND TUNNEL

## SPECIFICATIONS

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

### VACUUM PUMP DIMENSIONS AND WEIGHT (INCLUDING HOOD):

Nett (assembled): 1800 mm x 1800 mm x 1500 mm plus a silencer of approximate height 2600 mm; 1750 kg

Packed: 7.44 m<sup>3</sup> and 1970 kg

### WIND TUNNEL DIMENSIONS AND WEIGHT:

Nett (assembled): 4000 mm long x 900 mm wide x 1600 mm high; 209 kg

Packed: Approximately 6.5 m<sup>3</sup>; 250 kg

### WORKING SECTION

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

Viewing window: 106.1mm high and 106.1mm wide

### AIR SPEEDS:

Interchangeable liners are provided to give nominal working section airspeeds of:

- Mach 1.8
- Mach 1.4
- Subsonic

### MODELS (INCLUDED):

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

### MODELS ADJUSTMENT:

Nominally  $\pm 10$  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



SHOWN WITH VDAS-F (AVAILABLE SEPARATELY)