

## AF100s

## Subsonic Wind Tunnel Starter Set

**A starter set including TecQuipment's subsonic wind tunnel, a set of models and a two-component balance for investigations into aerodynamics**

Works with  
**VDAS®**



Subsonic Wind Tunnel (AF100)



Three-dimensional Drag Models (AF109)



Basic Lift and Drag Balance (AFA2)

- A complete package of parts for experiments in aerodynamics
- Safe, compact, open-circuit suction wind tunnel – saves time and money compared to full-scale units
- Includes a lift and drag balance with a set of three-dimensional models for experiments in aerodynamic drag
- The balance works with TecQuipment's Versatile Data Acquisition System (VDAS®)
- Additional models and instruments available to extend the range of experiments and allow connection to VDAS®
- Wind tunnel controls mount on a separate, free-standing instrument frame for ease of use
- The wind tunnel has wheels for easy mobility

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### The Set

A set of parts including TecEquipment's Subsonic Wind Tunnel (AF100), the Basic Lift and Drag Balance (AFA2) and the Three-dimensional Drag Models (AF109). This complete starter set includes all parts needed for experiments in aerodynamic drag.

### The Wind Tunnel (AF100)

The wind tunnel gives accurate results and is suitable for undergraduate study and research projects. TecEquipment offers a range of additional and optional models and instrumentation to extend the experiments, including a data acquisition system (VDAS®).

Air enters the tunnel through an aerodynamically designed effuser (cone) that accelerates the air linearly. It then enters the working section and passes through a grill before moving through a diffuser and then to a variable-speed axial fan. The grill protects the fan from damage by loose objects. The air leaves the fan, passes through a silencer unit and then back out to atmosphere.

A separate control and instrumentation unit controls the speed of the axial fan (and the air velocity in the working section). The control and instrumentation unit also includes manometers and electrical outlets to supply electrical power to other optional instruments.

The working section of the tunnel is a square section with a clear roof, sides and floor. The sides are removable. The floor and each side panel has a special position to support the optional wind tunnel models. Supplied with the wind tunnel are a protractor and a model holder to support and accurately adjust the angle of any models fitted.

Two traversing probes fit on the working section. One is a Pitot-static tube and the other a standard Pitot tube. They fit upstream and downstream of any models and connect to the manometers of the instrumentation unit (or other optional instruments) to show pressure.

A metal frame supports the wind tunnel. The frame includes lockable castors for convenient mobility.

Optional wind tunnel instruments can connect to TecEquipment's Versatile Data Acquisition System (VDAS®, not included). VDAS® allows accurate real-time data capture, monitoring, display, calculation and charting of all relevant parameters on a suitable computer (computer not included).

### The Basic Lift and Drag Balance (AFA2)

A simple-to-fit balance that mounts on the side of the wind tunnel working section. This balance holds the models in the working section and measures the lift and drag forces on the models, created by the air moving past them. The balance also works with other optional models.

The balance includes a digital display unit to show the forces. The display can connect to TecEquipment's VDAS® to log experiment data on a suitable computer.

### The Three-dimensional Drag Models (AF109)

A set of models, each with a different shape but the same frontal area for direct comparisons. The models fit in the wind tunnel working section, held by the balance to allow students to see how shape affects aerodynamic drag. The models include 'classic' aerodynamic test shapes including a smooth sphere, a dimpled sphere and a streamline shape.

### Experiments

This Starter Set includes parts for experiments in three dimensional drag due to different body shapes and surface dimples.

### Additional Experiments

TecEquipment can also supply other optional models and instruments to extend experiments, giving:

- Flow past bluff and streamlined bodies with pressure and velocity observations in the wake
- Investigations into boundary layer development
- Influence of aspect ratio on aerofoil performance
- Performance of an aerofoil with flap, influence of flap angle on lift, drag and stall
- Pressure distribution around a cylinder under sub and super-critical flow conditions
- Study of characteristics of models involving basic measurement of lift and drag forces
- Study of the characteristics of three-dimensional aerofoils involving measurement of lift, drag and pitching moment
- Study of the pressure distribution around an aerofoil model to derive the lift and comparison with direct measurements of lift
- Flow visualisation

### Standard Features

- Supplied with a comprehensive user guide or guides(s)
- Five-year warranty
- Manufactured in accordance with the latest European Union directives

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**TecEquipment**

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## Available Experiment Models

TecEquipment makes many ancillaries for the wind tunnel. These include optional models, instruments and extra or different instruments that you need to work with VDAS® for data acquisition.

Refer to this page and the next page for full details of which instruments you need to do tests with the models.

Refer to the separate datasheets for full details of the optional models and instruments.

- Cylinder Model with Pressure Tapping (AF101)
- 150 mm Chord NACA0012 Aerofoil with Tappings (AF102)
- 150 mm Chord NACA2412 Aerofoil with Variable Flap (AF103)
- 150 mm Chord NACA0012 Aerofoils (AF104)
- 100 mm Diameter Flat Plate (AF105)
- Flat Boundary Layer Model (AF106)
- Aircraft Model - Low Wing (AF107)
- Aircraft Model - High Wing (AF108)

## Recommended Ancillaries

- Versatile Data Acquisition System (VDAS-F)
- Multi-Tube Manometer (AFA1)
- Three-Component Balance (AFA3)
- Angle Feedback Unit (AFA4)
- Differential Pressure Transducer (AFA5)
- 32-Way Pressure Display Unit (AFA6)
- Pitot-Static Traverse (300 mm) (AFA7)
- Smoke Generator (AFA10)

## Ancillaries – Minimum Instruments (if you do not need automatic data acquisition)

This table lists the instruments you need for experiments with the optional models if you do not need automatic data acquisition.

Models	Minimum Instrumentation
<ul style="list-style-type: none"> <li>• Cylinder Model with Pressure Tapping (AF101)</li> <li>• 150 mm Chord NACA0012 Aerofoils (AF104)</li> <li>• 100 mm Diameter Flat Plate (AF105)</li> <li>• Three Dimensional Drag Models (AF109)</li> </ul>	<ul style="list-style-type: none"> <li>• Basic Lift and Drag Balance (AFA2) or</li> <li>• Three-Component Balance (AFA3)</li> </ul>
<ul style="list-style-type: none"> <li>• 150 mm Chord NACA0012 Aerofoil with Tappings (AF102)</li> <li>• Flat Boundary Layer Model (AF106)</li> </ul>	<ul style="list-style-type: none"> <li>• Multi-Tube Manometer (AFA1)</li> </ul>
<ul style="list-style-type: none"> <li>• 150 mm Chord NACA2412 Aerofoil with Variable Flap (AF103)</li> <li>• Aircraft Model - Low Wing (AF107)</li> <li>• Aircraft Model - High Wing (AF108)</li> </ul>	<ul style="list-style-type: none"> <li>• Three-Component Balance (AFA3)</li> </ul>

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## Ancillaries – Instruments needed for Automatic Data Acquisition

This table lists the instruments you need which work with VDAS® for data acquisition.

**Note:** You also need the frame-mounting VDAS-F interface unit (which includes the VDAS® software).

Models	Minimum Instrumentation for data acquisition
<ul style="list-style-type: none"> <li>• Cylinder Model with Pressure Tapping (AF101)</li> <li>• 150 mm Chord NACA0012 Aerofoils (AF104)</li> <li>• 100 mm Diameter Flat Plate (AF105)</li> <li>• Three Dimensional Drag Models (AF109)</li> </ul>	<ul style="list-style-type: none"> <li>• Differential Pressure Transducer (AFA5) x 2</li> <li>• Pitot-Static Traverse (300 mm) (AFA7) and either</li> <li>• Basic Lift and Drag Balance (AFA2) or</li> <li>• Three-Component Balance (AFA3) with Angle Feedback Unit (AFA4)</li> </ul>
<ul style="list-style-type: none"> <li>• 150 mm Chord NACA0012 Aerofoil with Tappings (AF102)</li> </ul>	<ul style="list-style-type: none"> <li>• Differential Pressure Transducer (AFA5) x 2</li> <li>• Pitot-Static Traverse (300 mm) (AFA7)</li> <li>• 32-Way Pressure Display Unit (AFA6)</li> </ul>
<ul style="list-style-type: none"> <li>• 150 mm Chord NACA2412 Aerofoil with Variable Flap (AF103)</li> <li>• Aircraft Model - Low Wing (AF107)</li> <li>• Aircraft Model - High Wing (AF108)</li> </ul>	<ul style="list-style-type: none"> <li>• Pitot-Static Traverse (300 mm) (AFA7)</li> <li>• Differential Pressure Transducer (AFA5)</li> <li>• Three-Component Balance (AFA3) with Angle Feedback Unit (AFA4)</li> </ul>
<ul style="list-style-type: none"> <li>• Flat Boundary Layer Model (AF106)</li> </ul>	<ul style="list-style-type: none"> <li>• Differential Pressure Transducer (AFA5)</li> <li>• 32-Way Pressure Display Unit (AFA6)</li> </ul>

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### Essential Services

*Electrical supply (three phase):*

200 VAC to 240 VAC 50 Hz/60 Hz (20 A)

or 380 VAC to 440 VAC 50 Hz/60 Hz (16 A)

*Space needed:*

Solid, level floor – allow at least 2 m of free space around the inlet and 4 m at the outlet

### Operating Conditions

Laboratory environment

*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

### Specification - Wind Tunnel (AF100)

*Nett dimensions and weight (assembled):*

3700 mm x 1065 mm x height 1900 mm and 293 kg

*Approximate packed volume and weight:* 4.9 m<sup>3</sup> and 450 kg

*Working section:*

305 mm x 305 mm, and 600 mm long.

*Air velocity:* 0 to 36 m.s<sup>-1</sup>

*Noise levels:*

80 dB(A) at operators ear level.

### Specification - Basic Lift and Drag Balance (AFA2)

*Electrical supply:*

90 VAC to 264 VAC, 50 Hz to 60 Hz

**Note:** The Wind Tunnel Instrument Frame includes a suitable electrical supply outlet for the AFA2

*Approximate packed volume and weight:*

0.045 m<sup>3</sup> and 12 kg

*Nett Weight:*

6 kg

*Maximum load:*

10 kg (100 N)

### Specification - Three-dimensional Drag Models (AF109)

*Shapes*

- Plain Sphere
- Hemisphere
- Dimpled Sphere (similar to a golf ball)
- Flat Plate
- Streamlined (teardrop) Shape

All mounted on support arms.

*Frontal Area*

50 mm

*Nett Weight*

3 kg

*Approximate packed volume and weight:*

0.02 m<sup>3</sup> and 5 kg

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