H-6910
Wind Tunnel

Purpose

The Hampden **Model H-6910** Wind Tunnel has been designed to provide the fundamental air flow facilities necessary to perform any of the **H-6910** Series Wind Tunnel Experiments. This unit is mobile so that it is suitable for either a lecture hall demonstration or laboratory work.

Description

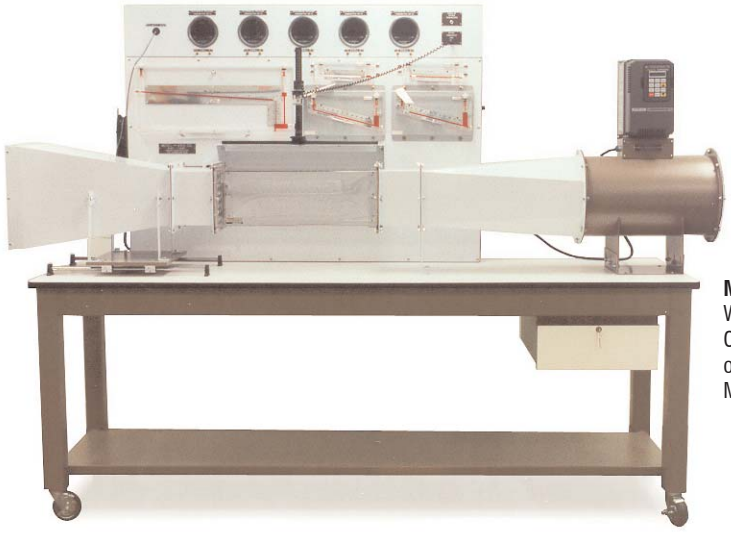
The unit is equipped with a bench, control panel, wind tunnel including an inlet cone, clear experiment section, outlet cone and screen; manual traverse unit, linear track with carrier; and main AC circuit breaker.

The manometers utilized on the **H-6910** Wind Tunnel are well-type with precision bored wells. The instruments use a colored gauge oil that is a stable petroleum base oil with a carefully controlled specific gravity which gives a consistent, high visibility meniscus. The scales are clear, sharp, accurate, easy to read and feature a silkscreened legend on polished chrome plated brass which reflects the image of the meniscus. The scales are compensated to account for the specific gravity of the indicating fluid and "well drop".

The lift and drag option on the **H-6910** allows measurement of lift and drag forces on various shapes placed in the wind tunnels airstream. The readings are displayed on a digital meter and the selection between lift or drag is accomplished with the toggle switch located on the meter front panel.

This unit provides the following features:

- Full visibility of test section
- Fully instrumented for static/dynamic pressure
- Can be expanded to allow computer control
- Air speed of greater than 3900 ft/min. (45 mph)



Model H-6910-CDL
Wind Tunnel shown with Computer Data Logging option and **Model H-6910-5** Manometer Package option
Dimensions:
69"H x 96"W x 30"D
Weight:
1,000 lbs.

- 8" square test section
- Self-contained, fully mobile
- Low head-loss, aerodynamic flow straightener section
- Low area ratios of both convergent and divergent sections provide uniform and efficient flow
- An Operating Instructions Manual and an Experiment Manual. The Experiment Manual reviews the background theory and procedures that can be performed with each piece of equipment as follows:
  - Calibration of Wind Tunnel Air Speed Using a Pitot Static Probe
  - Bernoulli Equation Demonstrator
  - Free Jet Demonstrator/Flow In Bends
  - Boundary Layer Demonstrator
  - Drag/Lift Force Demonstrator
- Many options offered to fully explore all areas of wind dynamics

Services Required

208VAC-3ϕ-60Hz

Optional Experiment Packages

The **H-6910** series of optional experiments are designed to be used with the **Model H-6910** Wind Tunnel. All experimental setups are quickly attached/removed from the wind tunnel through the use of quick connect fasteners. Any electrical equipment is easily mounted and the electrical connections are made by quick connect adapters. The pitot tubes used with the individual modules are all compatible with the pitot tube positioner and the manometers found in the **H-6910-5** Manometer Package.

H-6910-5 Manometer Package

The **Model H-6910-5** Manometer Package is intended to be used with the **Model H-6910** Series Wind Tunnel Experiments. The manometers included precisely indicate pressure/differential pressure being monitored by a given pitot tube. This manometer package comes equipped with five (5) panel-mounted manometers that have various ranges and degrees of accuracy.

All Hampden units are available for operation at any voltage or frequency

Hampden® ENGINEERING CORPORATION

030404

P.O. Box 563, East Longmeadow, MA 01028 • Tel 413-525-3981 • Fax 413-525-4741 • E-mail sales@hampden.com **800-253-2133**

Optional Experiment Packages *(continued)*

H-6910-10 Bernoulli's Equation Apparatus

The Hampden **Model H-6910-10** Bernoulli's Equation Demonstrator has been designed to investigate the validity of Bernoulli's Equation. The total and static pressure is measured along the centerline of a convergent/divergent channel at varying flow velocities to verify experimentally Bernoulli's Equation. Off-Centerline measurements can also be taken with two different types of pitot tubes, one being a traditional total/static tube and the other being a Kiel probe (probes sold separately in **Model H-6910-80** Probe Package). This allows the student to compare the total pressures where the fluid streamlines are converging or diverging for the two pitot tubes. This unit comes equipped with a convergent/divergent channel.

H-6910-25 Free Jet/Flow In Bends Demonstrator

The Hampden **Model H-6910-25** Free Jet/Flow In Bends Demonstrator consists of the following:

- The Free Jet Demonstrator has been developed to investigate the characteristics of a free jet. The total pressure in the free jet is measured by traversing a pitot tube across the jet diameter at several points along the axis of the jet. The velocity profile of the jet can be determined along with the flow direction. The apparatus can be used to show the decrease of the jet centerline velocity, radial distribution of the jet at different points along the jet axis and conservation of momentum of the jet (the kinetic energy decreases while the mass flux increases).
- The Flow In Bends Demonstrator has been developed to demonstrate the phenomena associated with fluid flow in bends. Air is passed through a 90° bend which contains provisions for measurement of the static pressure at points on both inner and outer surfaces of the bend. Static pressure taps are also located radially around the bend at one location. The student can therefore measure the pressure differential on the bend and the radial pressure distribution around the bend.

H-6910-40 Boundary Layer Demonstrator

The Hampden **Model H-6910-40** Boundary Layer Demonstrator has been designed to investigate boundary layer phenomena. Air flowing over a flat plate is used to form both laminar and turbulent boundary layers. This unit comes equipped with two flat plates to demonstrate laminar boundary layer and turbulent boundary layer. Also supplied is a boundary layer probe with a flattened top to measure the total pressure in the boundary layer. When used in conjunction with the pitot tube positioner and a static pressure probe, very accurate measurements of the boundary layer can be obtained.

H-6910-55 Lift and Drag Force Demonstrator

The Hampden **Model H-6910-55** Lift and Drag Force Demonstrator has been developed to investigate the force of drag on a body. Geometric shapes with the same projected area but with different cross-sections are mounted in a fluid stream and the pressure distribution is measured around the body. This unit includes two 2-dimensional bodies - a cylinder and a flat plate; three 3-dimensional bodies - a sphere and a pair of hemispherical discs; a load cell; a digital panel meter; an excitation power supply and an amplifier. The drag force is determined by traversing the wake of a body with a 3-dimensional probe to measure the pressure distribution around the body.

H-6910-70 Pressure Wing and Rake

The Hampden **Model H-6910-70** Pressure Wing and Rake consists of a NACA0020 Aerofoil section with nineteen pressure taps. Also provided is a Wake Survey Rake.

H-6910-71 Wing With Slat and Flap

The Hampden **Model H-6910-71** Wing with Slat and Flap consists of a NACA0020 Aerofoil section with adjustable flap. Both Slat and Flap are removable. Provided is a Wake Survey Rake.

H-6910-72 Pressure Cylinder

The Hampden **Model H-6910-72** Pressure Cylinder consists of a 2" dia. Cylinder with nineteen pressure taps finished flush with the outer surface. The outer end of each tap exits from the center of the cylinder. Provided is a Wake Survey Rake.

H-6910-73 Flutter Wing

H-6910-80 Probe Accessory Package

The Hampden **Model H-6910-80** Probe Accessory Package consists of the following components:

- 1 - Kiel Probe
- 1 - Pitot-Static Pressure Probe
- 1 - Directional Probe - Three Dimensional
- 1 - Pressure Dividing Choke
- 9 - Universal Tee Connectors
- 1 - Storage Case

H-6910-81 Smoke Generator

H-CS Computer System

Computer Data Logging

This feature adds five differential pressure transducers, one air velocity transmitter, one rotary transducer, lift/drag input (for **H-6910-55** option), angle of attack (for **H-6910-71** option), and one fan speed input into the system. One interface package containing National Instruments I/O modules is provided for interfacing into an IBM compatible computer through the RS-232 port.

Computer is not included. Templates for LabVIEW® control software are included.

Specify **Model H-6910-CDL** ♦

All Hampden units are available for operation at any voltage or frequency

Hampden® ENGINEERING CORPORATION

P.O. Box 563, East Longmeadow, MA 01028 • Tel 413-525-3981 • Fax 413-525-4741 • E-mail sales@hampden.com **800-253-2133**