

## AIRFLOW PROHOOD™ Capture Hood & Vane Anemometer Operating Instructions.

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PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE USING THE INSTRUMENT. A SUMMARY GUIDE IS ALSO AVAILABLE ON THE BACK OF THE INSTRUMENT

# 1 INTRODUCTION

The AIRFLOW PROHOOD is a versatile, portable, electronic system for measuring air flow. It is designed to assist building maintenance engineers and commissioning engineers in rapidly obtaining accurate measurements of air flow distribution in heating, ventilating and air-conditioning systems. The unit can be used for ceiling, wall-mounted and floor-level diffusers, working in supply or extract (incoming or outgoing air). Its lightweight bellmouth assembly together with a wide variety of interchangeable capture hoods provides comprehensive measurement and recording of volume airflow. The pocket-sized display unit may also be used with a hand-held vane anemometer head to give direct measurement and recording of airflow velocity or volume flow.

Using the bellmouth/hood assembly, air is directed past a sensing manifold with an array of sixteen calibrated measuring points. The flow is detected by a microbridge mass airflow device and passed to the electronic, digital flow meter.

With the vane anemometer fitted, air velocity is measured and, by entering the correct area, this can be converted to volume flow.

## Features

The PROHOOD system has the following features:

- ◆ Automatic sensing and display of temperature and flow direction.
- ◆ Temperature in degrees Centigrade or Fahrenheit.
- ◆ Volume flow in litres per second, cubic feet per minute or cubic metres per hour.
- ◆ Lightweight bellmouth assembly with a range of interchangeable, coated rip-stop nylon, capture hoods to meet all requirements.
- ◆ Each capture hood has a folding hood frame for ease of storage, fitted with a rubber edge strip for improved sealing and to prevent damage to surfaces.
- ◆ Direct measurement of velocity using  $\varnothing$  100 mm Head (optional) or  $\varnothing$  35 mm Head (optional).
- ◆ Direct printing and data transfer via built-in RS232 port.

## Safety Notice

DO NOT use the PROHOOD unit for gas mixtures other than air. No responsibility will be taken by AIRFLOW for any resulting damage to the unit or to operators if it is used with corrosive or other dangerous or explosive gas mixtures.

When using the PROHOOD to check air flow at ceiling diffusers, make certain that you can raise and hold the unit safely during use.

Observe standard safety procedures when working on ladders and scaffolding.

Ensure that the unit does not become caught in moving machinery or on sharp objects.

## Caution

- ◆ If stored under conditions outside the normal operating range, allow the unit to stabilise at room conditions before use.
- ◆ Owing to its size and shape, TAKE CARE when carrying the assembled unit from place to place.
- ◆ AVOID people and near-by equipment.
- ◆ AVOID sharp objects that may tear the capture hood.
- ◆ Turn the instrument OFF before storage or transportation and remove the batteries if storing for long periods or transporting by air.
- ◆ Make sure the protective cap is fitted to the RS232 connector when not in use.
- ◆ Make sure that the vane anemometer, when connected, has a suitable EMC filter fitted to the cable, close to the instrument.
- ◆ Make sure that the Bellmouth/capture hood cable is not pinched by the mounting system. When not in use, the connector can be tucked behind the mount.
- ◆ Avoid subjecting the bellmouth sensing grid to excessive loading during use or assembly. Any air flow other than through the calibrated sensing holes, such as any hair-line cracks, will seriously affect the sensitivity.
- ◆ A damaged BELLMOUTH SENSING GRID must be replaced, it CANNOT be repaired.

- ◆ DO NOT disassemble the bellmouth sensing grid from the bellmouth moulding. The retaining structure is specifically designed to accommodate loading due to normal operation.
- ◆ Under low humidity conditions, static electric charges may be encountered. These can be avoided by applying a suitable anti-static solution.

See also: Section 4 – Maintenance.

## 1.4 Acknowledgement of Trademarks

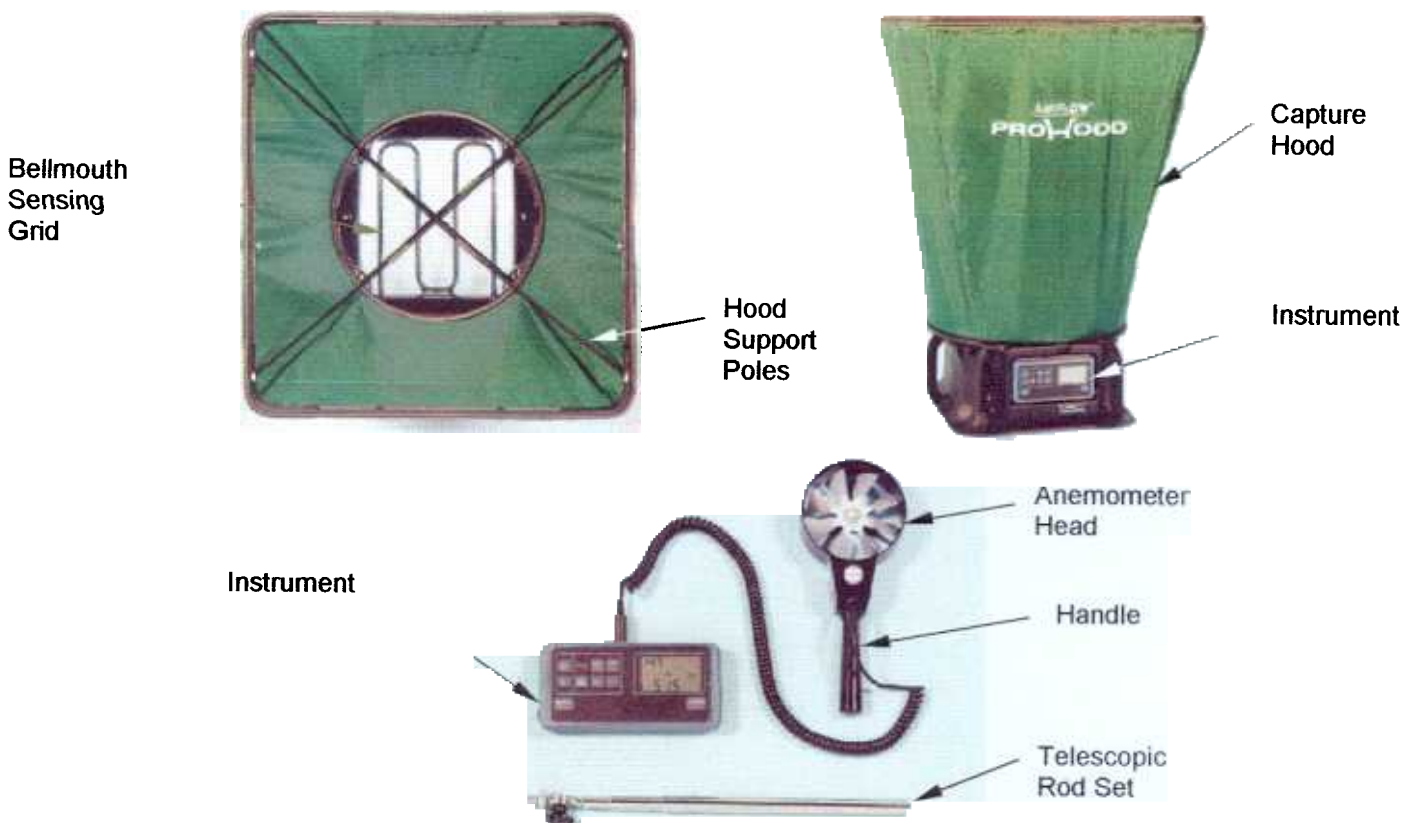
Within this manual reference is made to proprietary products and registered trademarks:

**AIRFLOW™** and **PROHOOD™** are registered trademarks of Airflow Developments Ltd, UK  
 Windows 95, MS Excel and MS Word are registered trademarks of the Microsoft Corporation, USA

## 2 DESCRIPTION

The standard PROHOOD instrument includes the following items:

- ◆ Rugged, lightweight, carry case.
- ◆ Handheld Prohood measurement and display instrument complete with batteries.
- ◆ Lightweight bellmouth assembly for volume flow and temperature measurement (with a tilting mount for optimised viewing of the installed handheld unit).
- ◆ One interchangeable colour-coded, rip-stop nylon, capture hood (for other sizes see: Section 11 - Optional Items).
- Green: 610 x 634 mm opening.
- ◆ 4 universal hood-support poles.
- ◆ Instruction Manual.



**Figure 1 – AIRFLOW PROHOOD : Showing Capture hood/bellmouth Configuration and Optional Anemometer Head / Handle with Telescopic Rod Set.**

## 2.1 Power Supply

The AIRFLOW PROHOOD instrument is powered by **four 1.5 V AA size batteries** or equivalent (supplied). These are contained in the battery compartment, which is accessible by removing the clip-on cover on the rear of the instrument.

To conserve battery power, the instrument has an **AUTO-OFF** feature that will turn off the unit if it has not been used for 3 minutes. See: 2.3.1. The battery life is in excess of 20 hours for continuous use.

### 2.1.1 Battery Selection

RECHARGEABLE CELLS		Yes
DISPOSABLE CELLS	Standard	Not recommended - Short life
	Alkaline	Yes

### 2.1.2 Installing the batteries

1. Ensure that the instrument is turned off.
2. Remove the battery compartment cover by pressing and sliding in the direction of the arrow.
3. Insert the batteries on top of the tape in the correct orientation.
4. Replace the battery compartment cover, and ensure it is clipped in place.

### 2.1.3 Replacing the batteries

The instrument has a number of power-saving features. Poor battery condition is shown as **LOBAT** on the unit LCD screen. When this appears, the batteries must be changed.

1. Ensure that the unit is turned off.
2. Remove the battery compartment cover (Section 2.1.2, Step 2)
3. Pull the tape to remove 'dead' batteries.
4. Install new batteries, (Section 2.1.2, Steps 3 and 4)

## Instrument

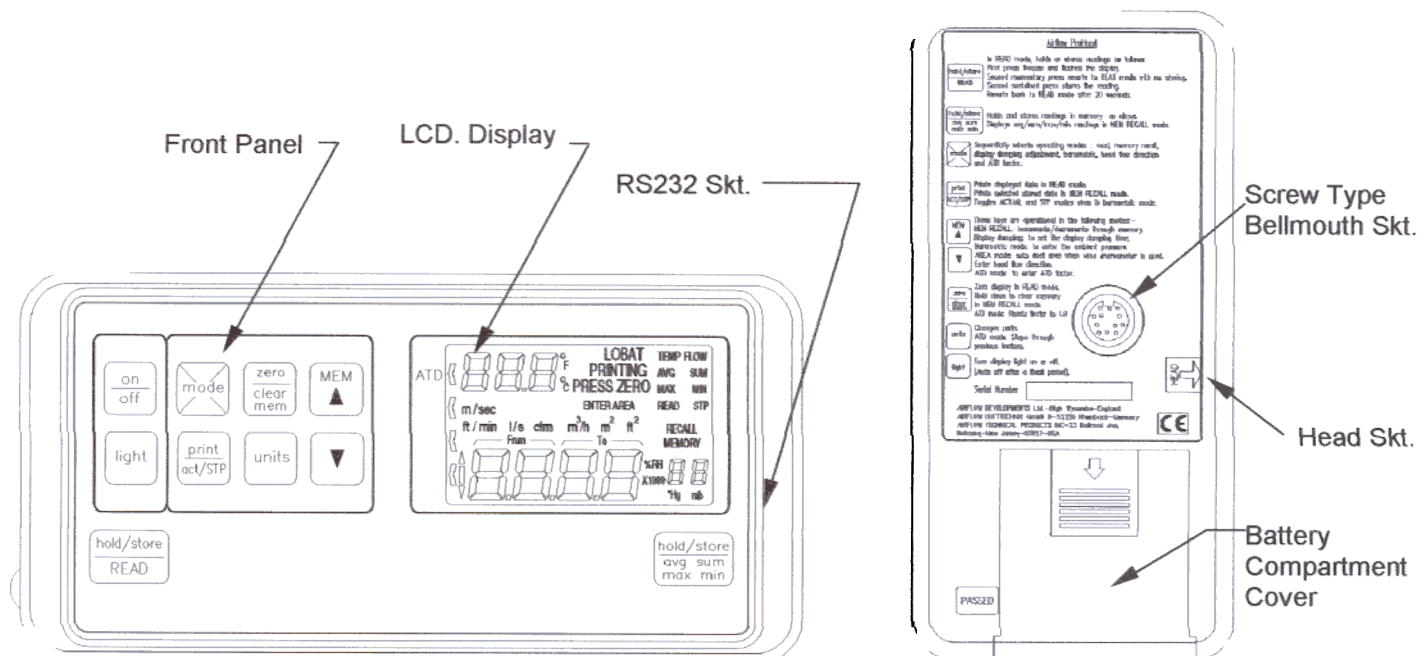
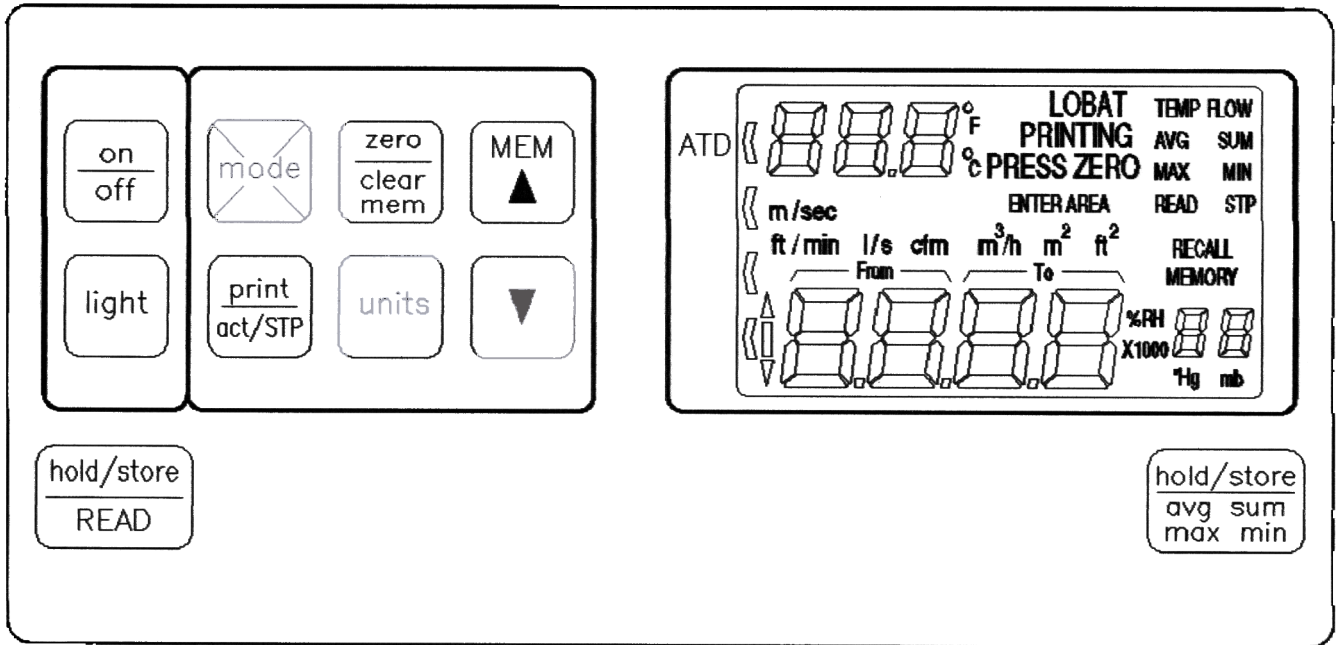


Figure 2 – AIRFLOW PROHOOD Instrument (front and back view)

**Instrument case:** a durable moulded plastic case with sockets for data input (bellmouth and head) and output (printer/computer).

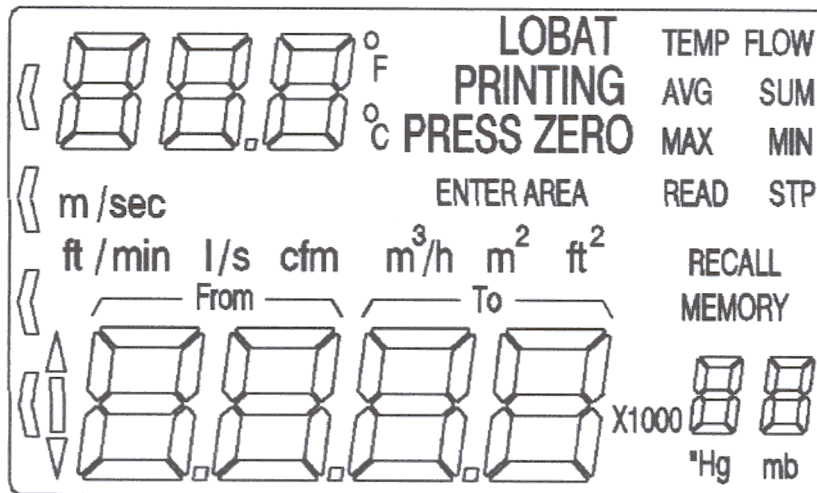
**Keypad:** a membrane type keypad. The layout is shown in Figure 3.

For key functions, see Section 2.3.



**Figure 3 – Front Panel Layout**

**Display:** a custom liquid crystal display (LCD) unit with backlight. Figure 4 shows the position of information shown on the LCD. Note: Not all of these will be shown together during normal use.



**Figure 4 – LCD Display**

**RS232 Port** (8-pin mini-DIN, non-latching): for connecting a serial printer (see Section 11 – Optional Items) or computer. Note: Supplied with a protection cap that must be fitted when the port is not being used to meet EMC requirements and also prevent dust and moisture ingress.

**Bellmouth socket** 12-way, screw-type, socket: for connecting the bellmouth connector for volume flow and temperature readings.

**Head socket** (8-pin mini-DIN, non-latching): for connecting to a 100mm or 35mm Dia. vane anemometer head for flow velocity and temperature readings. Note: The head lead must have an EMC suppression filter fitted at the end closest to the instrument.

**Battery Compartment Cover.** 'Press' and 'slide' style cover that clips into place.

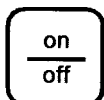
**Label:** summarises keypad functions, instrument serial number, CE marking and AIRFLOW sites world wide.

## 2.3 Keypad Functions

The instrument can either be used for taking measurements or for viewing previously stored measurements.

- ◆ READ – for setting-up the instrument and making and storing measurements.
- ◆ RECALL – for the manipulation of data stored in the instrument on-board memory.

### 2.3.1 Summary of Keypad Functions



**Press** to turn ON the power to the instrument. **A second press** turns the instrument OFF. If the unit is not used for a period of 3 minutes (i.e. no keys pressed) an 'AUTO-OFF' function conserves battery power. This feature can be inhibited by holding down the MODE key whilst turning the unit on. To indicate when the auto-off feature is disabled the current flow units annunciator on the display will flash. Turning the unit off and on again without holding down the MODE key will restore the auto-off feature.



Press to provide a backlight to the LCD screen for a period of 10 seconds.



**First Press:** to set the averaging time period over which the running average is taken. Selectable between 1 and 60 seconds. The value on the left can be changed by using the up and down arrows, the RH-symbol 'S' denotes 'seconds'.

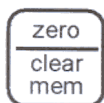
**Note :** If the averaging period is greater than 1 second then AVG will appear in the top RH. corner of the display. The display is updated every second. The value shown is the current running average based on the set averaging time period. A truly representative value will not therefore be displayed until after the initial averaging time period has elapsed.

**Second Press:** to input barometric pressure in millibar (mb). Press UNITS key to allow input in "Hg. Enter value by using up and down arrows. 'STP' means that the hood readings will be displayed in Standard Conditions. This can be changed by using the ACT/STP key.

**Third Press:** to input ATD factor. Enter the value by using the up and down arrows. Values in the range 0.100 to 9.000 can be entered. If the value is anything other than 1.000 the ATD chevron will be displayed in read and recall mode. Pressing the Units key will increment through the last four factors entered. The fifth press will return to the starting value. To reset the factor to 1.000 press the zero key.

**Fourth Press:** returns to read screen.

**Note :** Changes to Averaging Period, Barometric Pressure and ATD factor, including previous 4 ATD values are all retained in memory even when the instrument is turned off.



In READ mode, ZERO resets the flow measurement to zero. When the unit is turned on, the LCD screen shows the flashing text 'PRESS ZERO' for 3 seconds, when it stops, press ZERO key to rezero the instrument. Ensure that the bellmouth is in still air conditions, e.g. bellmouth placed on the ground with the capture hood upright. N.B. The zeroing process takes 10 seconds and this period countdown is displayed in the top left of the screen.

In RECALL mode, press CLEAR MEM for 3 seconds to delete all test values stored in memory.



In READ mode, PRINT downloads the current data values on the LCD screen via the RS232 lead to a printer, computer or data logger. In RECALL mode, it downloads the current memory location data. A double press allows selection of a range of memory values, see Section 3.4.3 – (Printing) Selecting Data Range.

In RECALL mode, MODE key first press, (or third press if anemometer head readings are also stored) allows data values to be displayed in STP (standard conditions) or ACT actual conditions.



Changes the data units displayed on screen, printed or downloaded (current readings and stored data). **Repeated pressing** of the "units" key moves through the following list, first with temperatures in °C, then with °F.

Volume flow units (bellmouth/capture hood)

m<sup>3</sup>/h → l/s → cfm →

In RECALL mode the velocity units will also be displayed if anemometer measured values have been stored with hood values. If an attempt is made to recall a velocity, then any stored hood volume flow value will appear on screen as 'HOOD'.



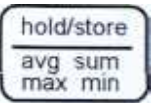
**First press:** Enters RECALL mode (i.e. recalling data stored in memory). **Further presses** increment through stored data. In selected modes, increments values to be entered.



In RECALL mode, steps down through stored data. In selected modes, decrements values to be entered.



In READ mode, HOLD/STORE buttons (situated on RHS, LHS and a GREEN BUTTON on the bellmouth) all have the same function to 'hold' the current values on screen. Three buttons for doing this operation are provided for operator convenience, e.g. left- or right-handed, working overhead, etc. A held value on the LCD screen flashes. Second press (short): Releases a held value. Second press (long, i.e. 3 seconds): stores the value in the memory at the next available location. READ returns the unit to READ mode from RECALL memory mode.



In RECALL mode, AVG, SUM, MAX MIN indexes through the data stored in memory showing the various values. Beware problems of mixed STP and ACTUAL readings if ambient pressure is not set correctly or a head is used that does not have a temperature sensor.

- a) The displayed average is the average of all the values irrespective of supply or exhaust direction.
- b) In Sum mode, flashing of the Sum symbol indicates that both supply and exhaust flows are present in the memory. The displayed value is the net difference between the supply and exhaust totals.
- c) Multiple maximum or minimum's will be indicated by either "min" or "max" flashing in the top RH corner of the display. The lowest memory location is initially displayed, the other locations may be viewed by using the up and down arrow keys.



### 2.3.2 Summary of Keypad Function Variations for Anemometer Head

The instrument works with a 100 mm or 35 mm diameter anemometer head installed. Some of the keypad functions are common between the capture hood/bellmouth and the head fitted, this section details the differences. (see also: Section 2.3.1 - Summary of Keypad Functions for Bellmouth/Capture Hood).



**First Press:** shows direction arrow (bottom left-hand side of LCD screen). The direction (up or down) can be changed with the unit up and down arrow keys. An up arrow designates extract flow and a down arrow designates supply flow.

**Second Press:** shows the duct area. This can be changed by using the up and down arrow keys.

**Third Press:** shows the averaging period. The value on the left can be changed by using the up and down arrow keys, the RH symbol 'S' denotes seconds.

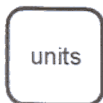
**Note :** If the averaging period is greater than 1 second then AVG will appear in the top RH. Corner of the display. The display updates every second, showing the average of the data averaging period. True average will therefore not be obtained until the total averaging period has elapsed.

**Fourth Press:** shows the barometric pressure, in millibar (mb). Press UNITS key to allow input in "Hg. This can be adjusted by the up and down arrow keys. When making measurements in ducts the barometric pressure should be modified to include the duct static pressure. Readings from the head will be in actual flow. To change to STP conditions, press the ACT/STP key. STP will now appear on the LCD screen.

**Fifth Press:** : to input ATD factor. Enter the value by using the up and down arrows. Values in the range 0.100 to 9.000 can be entered. If the value is anything other than 1.000 the ATD chevron will be displayed in read and recall mode. Pressing the Units key will increment through the last four factors entered. The fifth press will return to the starting value. To reset the factor to 1.000 press the zero key.

**Sixth Press:** Returns to read screen.

**Note :** Changes to Direction Arrow, Duct Area, Averaging Period, Barometric Pressure and ATD factor, including previous 4 ATD values are all retained in memory even when the instrument is turned off.



Changes the data units displayed on screen, printed or downloaded (current readings and stored data). Temperature units are linked to volume flow (and/or velocity, if anemometer head is fitted): Repeated pressing of the "units" key rotates through the following list, first with °C, then with °F.

Volume Flow, Velocity units: (if anemometer head fitted) :

m<sup>3</sup>/h → l/s → cfm → m/sec → ft/min →

## 2.4 Assembly

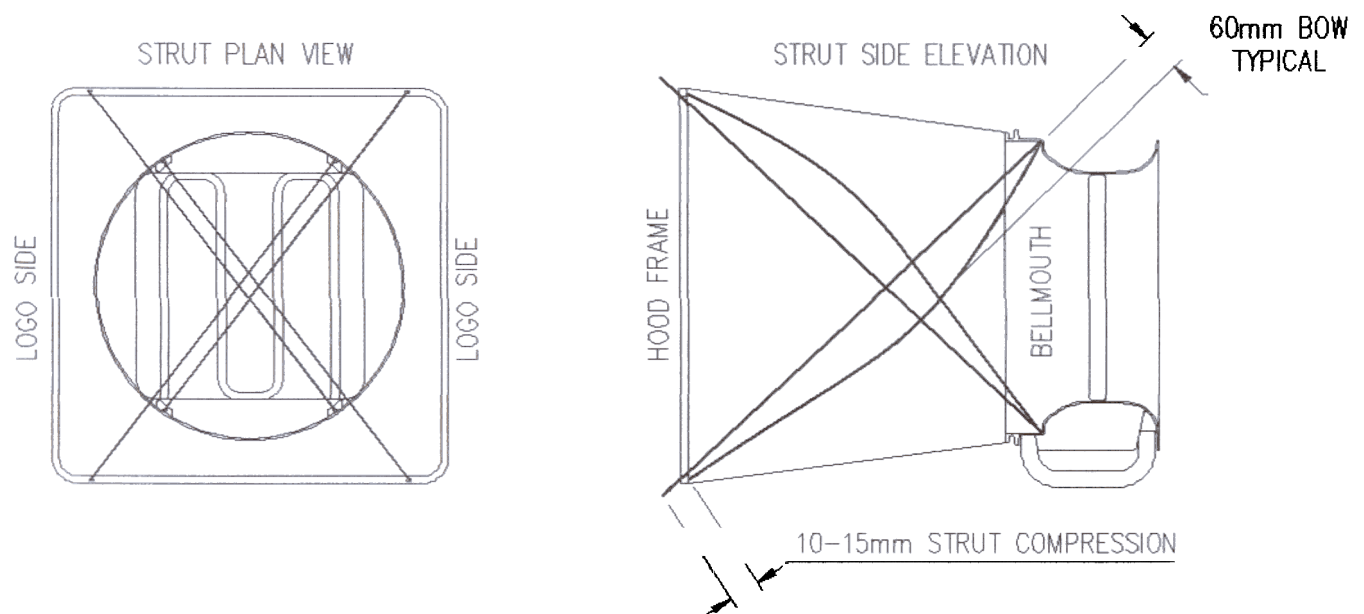
PLEASE READ THIS SECTION FULLY BEFORE ASSEMBLING THE EQUIPMENT

### 2.4.1 With Bellmouth/Capture Hood

The nylon capture hood is extended and tensioned using 4 foldable glass-fibre stiffening poles placed between the bellmouth moulding and the hood frame. The exact arrangement of the poles depends on which capture hood is in use. Figure 5 shows the pole arrangement for the Green (610 x 634mm) capture hood.

**Note:** the degree of flexing required to fit the poles will also vary with the hood.

Pole diagrams for any other hoods purchased are included with these additional hoods.



**Figure 5 – Pole Arrangement for Green (610 x 634mm) Capture Hood**



## Erecting the Capture Hood

Note: Refer to the appropriate pole-arrangement diagram.

1. Remove bellmouth/hood assembly from the carry case and place on the ground with the hood attachment upwards.
2. Remove the 4 stiffening poles from their pouch in the left-hand side of the carry case, unfold and fit them together using the central alloy tube section. Place them somewhere accessible from a standing position, e.g. inside the bellmouth, taking care not to damage the grid.
3. Leaving the bellmouth on the ground, unfurl the hood and open out its hinged frame.
4. Holding the frame against your body with one hand on the opposite side, insert the lower end of a pole into a rebate in an internal corner on the upper face of the bellmouth moulding. Locate the upper end of the pole into one of the moulded cells in the lower face of the hood frame (near to the corner indicated by a white dot).
5. Repeat this process next for the diagonally opposite pole – flexing of the poles may be necessary, depending on the hood. When these two poles have been inserted the assembly will be more-or-less self supporting.
6. Repeat the process for the two remaining poles.
7. If necessary, alter the locating cell position of the upper ends of the poles to increase or decrease tension in the hood. Symmetrically placed poles are recommended to minimise hood twisting and to maintain assembled stability.

## Connecting the Prohood instrument

1. Release the display-mount locking lever to allow the mount to angle out from the bellmouth moulding. Lock this off at about 45 degrees. If necessary, the locking angle of the lever can be adjusted by pressing the red button.
2. Ensure that the connector and cable from the bellmouth pass through the large hole in the rear of the display mounting plate.
3. Insert the connector into the socket on the rear of the Prohood instrument in the correct orientation (rotate connector until keyway engages). Push home and secure using the knurled ring on the connector.
4. Locate lower edge of the Prohood instrument into lower side of mount (edge nearest the hinge).
5. Rotate and clip upper edge of Prohood instrument inside the upper edge of the mount.
6. Use the display-mount locking lever to position the display as appropriate.

## Changing Capture Hoods

Removing the capture hood:

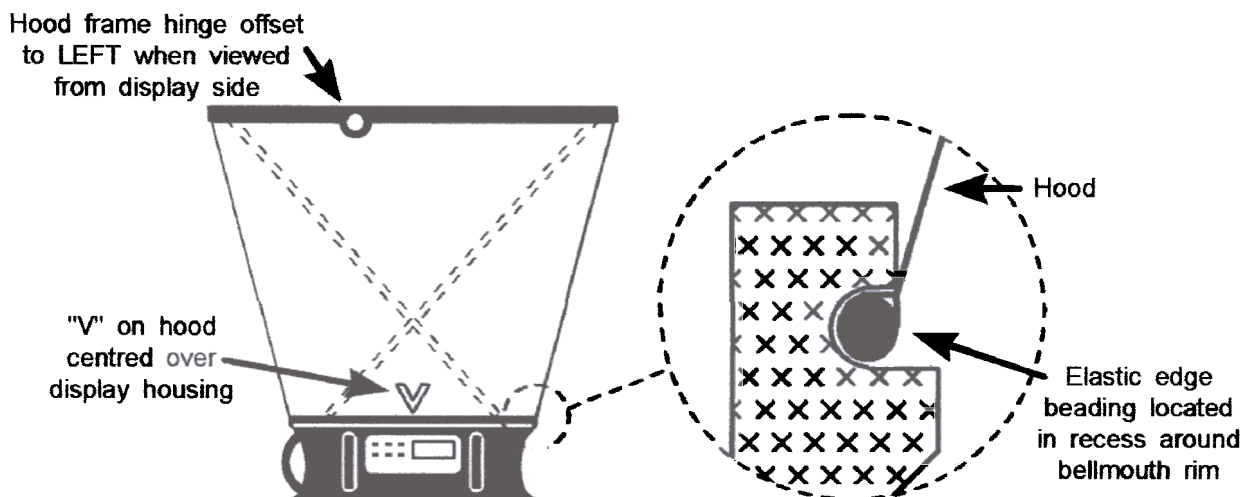
1. Place the bellmouth on a flat, clean surface so that the capture hood stands vertically. Remove the tensioning poles. With the hinged frame still forming a rectangle/square, lower the capture hood so that it sits on the bellmouth moulding.
2. Place a hand inside the capture hood and gently ease the elasticated band away from the moulding and out of the retaining groove. Do not use any sharp implements, as this may damage the capture hood fabric.
3. With one hand, move around the diameter of the bellmouth moulding releasing the elasticated band.
4. When free, fold the released hood framework and wrap the fabric around the central portion of the frame. Avoid pinching the capture hood fabric in the frame hinge.

Replacing the capture hood:

1. Place the bellmouth moulding on a flat surface with the circular end uppermost. Remove the new capture hood from the packaging.
2. Open out the frame and place this on the ground behind the bellmouth such that (1) the frame hinge is to the left of centre when viewed from the front (side with instrument installed), and (2) the elasticated end is towards the bellmouth.

**Note:** Ensure the position of the hinge is correct, otherwise the assembled unit cannot be stored properly in the case. See Figure 7.

3. With the hinge correctly orientated, line up the V-shaped arrow printed on the capture hood with the centre of the instrument fitting recess in the bellmouth moulding, i.e. the centre-point between the two handles. Place the elasticated band into the groove, slide left or right to retain correct position of arrow. See Figure 7.



**Figure 7 – Replacing the Capture Hood - Correct Orientation**

4. With both hands, run the elasticated band around the groove. At the opposite point, push the band into the groove. If the fabric has been trapped in the groove by the elastic, gently ease it free before pulling the capture hood upright and proceeding to install the support poles.
5. Refer to the appropriate positioning information supplied with the capture hood as to the placement of the supporting poles.

### **2.4.2 With the Optional 100 mm or 35 mm Head**

1. Screw the black handle into the base of the head, or, if required, add the telescopic rod between the head and the handle.
2. Plug the head lead connector into the mini 8-pin DIN socket at the top of the Prohood instrument (this is indicated by an arrow on the rear-panel label).

**NOTE:** If required either head can be connected while the Prohood instrument is still connected to the bellmouth – although it is necessary to unclip the instrument from the bellmouth mount, See: 2.5.1. In these circumstances data will only be taken from the head.

## **2.5 Disassembly**

### **2.5.1 With Bellmouth/Capture Hood**

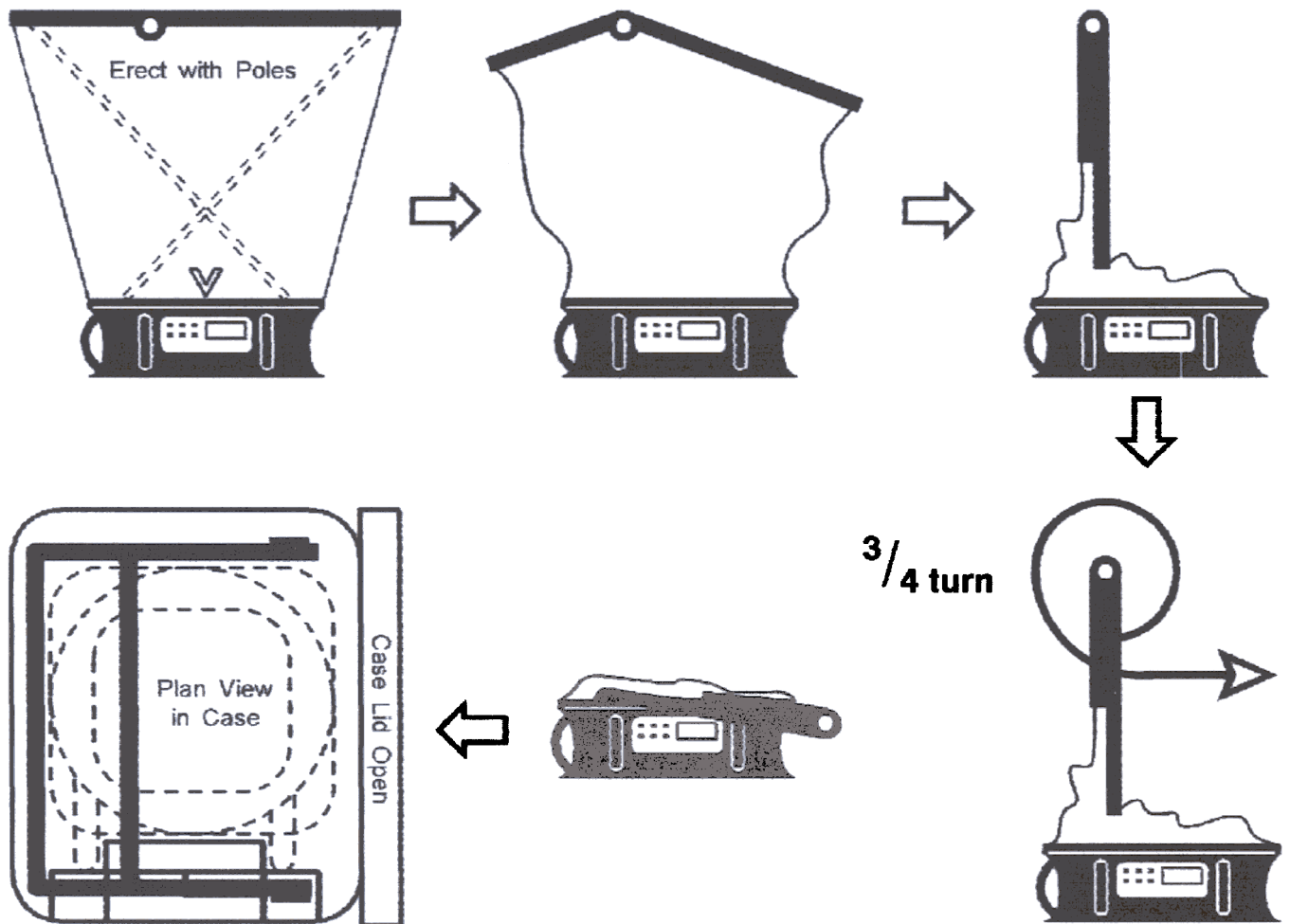
Disassembly is essentially the reverse of the assembly procedure.

#### **Disconnecting the Prohood instrument**

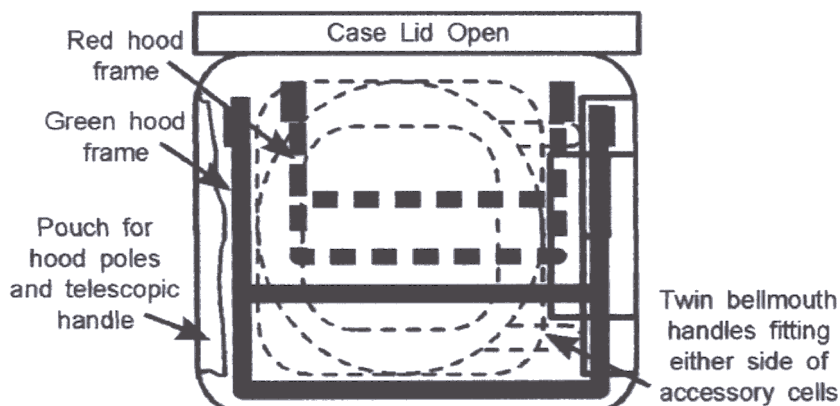
1. Release the display-mount locking lever and angle the mount out from the bellmouth moulding. Lock this off at about 45 degrees. If necessary, the locking angle of the lever can be adjusted by pressing the red button.
2. With fingers at the upper ends of the Prohood instrument and thumbs on the top edge of the mount, unclip the upper edge of the Prohood instrument and slip the unit away, easing the bellmouth connecting cable through the mounting plate.
3. Disconnect the cable from the socket on the rear of the Prohood instrument after unscrewing the knurled ring on the connector.
4. Use the display-mount locking lever to hold the display mount back flush in the bellmouth moulding.
5. Tuck the bellmouth connector and cable into the cavity left by the display.

## Collapsing the Capture Hood

6. Place the bellmouth on the ground with the capture hood upwards. See Figure 8.
7. Hold the frame against your hip with one hand on the opposite side. Disengage the upper tip of each pole in turn – flexing of the poles may be necessary, depending on the hood.
8. Disengage the poles at the central alloy joints by pulling then fold the poles in half. Place the folded poles in their pouch on the left-hand side of the carry case.
9. Position the bellmouth in the carry case with capture hood upwards and the display mount facing the accessory dividers, see Figures 8 and 9.
10. Fold the hood frame and roll it down  $\frac{3}{4}$  turn to leave the frame hinges facing the hinge of the case lid. Lay the frame across the top surface of the bellmouth with the hinges angled slightly down to the back of the case. Roll the other hood around its frame and lay across the bellmouth in the same way.



**Figure 8 – Collapsing and Stowing the Capture Hood.**



## 2.5.2 With 100 mm or 35 mm Head

1. Unplug the head cable connector.
2. Unscrew the handle and/or telescopic extension rod.
3. Store the items in the carrying case. The Prohood instrument can be stored in one of the accessory cells or in its mount in the bellmouth if preferred.

## 3 USING THE AIRFLOW PROHOOD

Before using the PROHOOD system, **CHECK** that the:

- Instrument is fitted with batteries (see section 2.1).
- Battery condition is acceptable, press **ON** key and check display for absence of **LOBAT** warning.
- Correct size of capture hood is fitted and erected correctly (see section 2.4.1), and
- Bellmouth and/or anemometer head are properly connected (see section 2.4.1)

The PROHOOD instrument retains previously set-up parameters in its on-board memory even if the batteries are removed. Previous settings are shown on the LCD display, e.g. units, etc.

For first time use, it is recommended that any data stored in memory (resulting from test/calibration purposes prior to shipping) be erased.

Turn **ON**, press **MEM** to enter **RECALL** mode, a 3 second press on **CLEAR MEM** erases all stored data. Press **READ** to return to read mode.



### 3.1 Measuring Volume Flow with Capture Hood/Bellmouth

To use the capture hood/bellmouth configuration, ensure that the anemometer head is **NOT** connected, and that the inside of the bellmouth area is not obstructed by hands, or any other stray object.

1. Turn **ON** - The display shows 'press zero' if display shows a reading close to zero Step 2 may be omitted.
2. With bellmouth placed on the ground (blocked), press **ZERO**. This zeroing process takes 10 seconds and this period countdown is displayed in the top left of the screen.
3. The instrument is now in **READ** mode.
4. With **MODE** key, set-up the instrument:
  - Set averaging period required in 'seconds', i.e. the period over which values are averaged.
  - Set pressure. This is used when **ACTUAL** readings are required to be displayed.
  - Set **STP** or **ACTUAL** conditions (if **STP** is selected this is shown on the LCD display).
  - Set **ATD** to 1.000 or enter new factor if required. (If **ATD** is other than 1.000, the Chevron indicating **ATD** factor is active and will flash continuously.)
  - Set **UNITS** of volume flow required.
5. To **HOLD** a data value, press **HOLD/STORE**. The LCD display flashes to show the value is held. To return to 'live' readings, short press **HOLD/STORE**. Note: The unit will automatically return to **READ** mode after 20 seconds, if no keys are pressed.
6. To enter a value in memory, first **HOLD** the value (display flashes), then press and hold **HOLD/STORE** until the display changes. The **MEMORY** position increments with each value stored, to a maximum of 99.
7. To view stored data, press **MEM** to enter **RECALL** mode. With each press of **MEM** Up Arrow, or Down Arrow the data-storage position in memory increments or decrements.
8. Use **AVG/ SUM/MAX/MIN** to display data in required format.
9. To erase data in memory, press **MEM** followed by a long press ( 3 seconds) on **CLEAR MEM**.
10. Press **READ** to exit **RECALL** mode
11. To **PRINT** the current values on screen, in **READ** or **RECALL** mode, press **PRINT**.



### 3.2 Measuring Velocity with Anemometer Head

The PROHOOD instrument works with a 100mm Dia. or 35 mm Dia. vane anemometer head. With the anemometer head connected, the instrument will automatically switch to using the HEAD. Readings using the capture hood/bellmouth cannot be made when the HEAD is connected. The menu options will be for the HEAD and not the capture hood/bellmouth configuration.

1. Turn ON - The display shows 'ENTER AREA' which flashes for 4 seconds.
2. Use MODE to set-up instrument:
  - Set flow direction, using UP and DOWN ARROW keys.
  - Set area – This function can be ignored when measuring velocity only.
  - Set damping required in 'seconds', i.e. the period over which values are averaged.
  - Set pressure. This is used for when STP readings are required to be displayed.
  - Set STP or ACTUAL conditions (if STP is selected this is shown on the LCD display).
  - Set velocity UNITS required, e.g. m/s.
3. To HOLD a data value, press HOLD/STORE. The LCD display flashes to show the value is held. To return to 'live' readings, short press HOLD/STORE. Note: The unit will automatically return to live READ mode after 20 seconds, if no keys are pressed.
4. To enter a value in memory, first HOLD the value (display flashes), then press and hold HOLD/STORE until the display changes. The MEMORY position increments with each value stored, to a maximum of 99.
5. To view stored data, press MEM to enter RECALL mode. With each press of MEM Up Arrow, or Down Arrow the data-storage position in memory increments or decrements.
6. Use AVG/ SUM/MAX/MIN to display data in required format.
7. To erase data in memory, press MEM followed by a long press ( 3 seconds) on CLEAR MEM.
8. Press READ to exit RECALL mode.
9. To PRINT current values on screen, in READ or RECALL mode press PRINT



### Measuring Volume Flow with Anemometer Head

The PROHOOD instrument works with a 35 mm or 100mm Dia. vane anemometer head (optional). With the anemometer head connected, the instrument will automatically switch to using the HEAD. Readings using the capture hood/bellmouth cannot be made when the HEAD is connected. The menu options shown will be for the HEAD and not the capture hood/bellmouth configuration.

Turning ON the instrument will display 'ENTER AREA' and flashes for 4 seconds.

1. Use MODE to set-up instrument:
  - Set flow direction, using UP and DOWN ARROW keys.
  - Set area of duct or grill to be measured, using UP and DOWN ARROW keys. NOTE: A single press increments the last decimal place, a continued press increments faster. The area value entered allows conversion of measured velocity data to a volume flow value by assuming a constant flow across the area. Alternatively by taking measurements and using the average feature in RECALL mode a velocity profile can be compiled and used to display volume flow.
  - Set damping required in 'seconds', i.e. the period over which values are averaged.
  - Set pressure. This is used for when STP readings are required to be displayed.
  - Set STP or ACTUAL conditions (if STP is selected this is shown on the LCD display).
  - Set volume flow UNITS required, e.g. m<sup>3</sup>/h
2. To HOLD a data value, press HOLD/STORE. The LCD display flashes to show that the value is held. To return to 'live' reading, short press HOLD/STORE. Note: The unit will automatically return to live READ mode after 20 seconds if no keys are pressed.
3. To enter a value in memory, first HOLD the value (display flashes), then press and hold HOLD/STORE until the display changes. The MEMORY position increments with each value stored, to a maximum of 99.

4. To view stored data, press MEM to enter RECALL mode. With each press of MEM Up Arrow, or Down Arrow the data-storage position in memory increments or decrements.
5. Use AVG/ SUM/MAX/MIN to display data in required format.
6. To erase data in memory, press MEM followed by a long press (3 seconds) on CLEAR MEM.
7. Press READ to exit RECALL mode.
8. To PRINT current values on screen, in READ or RECALL mode, press PRINT.

### 3.4 ATD Factor (Air Terminal Device Factor)

The ATD factor is a method of adjusting a displayed flow in a situation where a diffuser or grille may have characteristics outside the range of that covered by the normal Hood design. In the majority of cases normal Hood operation is very accurate and should provide more than satisfactory results, however in the few cases where an ATD factor is required, the following method is recommended.

Using cardboard or a similar light rigid material, a short length of ducting should be made up which is just larger than the overall dimensions of the grille. The duct should be placed over the grille and sealed to the wall. Measurements of flow can now be conducted using the Log-Tchebycheff\* sampling pattern with a Rotating Vane or Pitot Tube. When completed remove the duct extension and measure the flow using the ProHood. Finally to obtain the required ATD factor for adjusting the ProHood, divide the measured flow value by the ProHood reading. The resulting ATD factor can then be entered using the mode key.

**Note; When ATD is active, the factor is applied to all flow and velocities displayed in read and recall memory mode, including any flow or velocities sent to the RS232.**

\* For further information regarding the Log-Tchebycheff method of sampling please contact Airflow Developments or refer to BS1042 Part2 Section 2.1:1983(1998) and ISO3966:1977.

### 3.5 Printing

#### 3.5.1 Currently displayed values

In READ mode, press the PRINT key.

#### 3.5.2 Data stored in memory

In RECALL mode, a single press of the PRINT key will download the currently displayed stored data via the RS232 Output.

#### 3.5.3 Selecting Data Range

In RECALL mode, a double-press of the PRINT key displays 'From' and 'To' values for memory locations. Initially the values presented are the lowest and highest used locations with the FROM value selected (flashing). The selected value can be incremented/decremented using the ARROW keys. Move to the TO value using either HOLD/STORE key and set this using the ARROW keys. PRINT will now cause only data between the selected inclusive memory locations to be sent.

### 3.6 Transfer of Data to a Computer

This section describes the transfer of data from the RS232 (serial) port of the Prohood instrument to a computer for display and/or analysis using Microsoft® Windows 95™ and any suitable Windows-based software package.

These instructions assume a basic knowledge of Windows 95™ and some experience in one of the standard Windows software packages such as MS Excel, MS Word, MS PowerPoint etc.

#### 3.6.1 Set-up Computer

1. Click on the **Start** button to display the main menu.
2. Click on **Programs** option to display the programs menu.
3. Click on **Accessories** option to display the accessories menu.
4. Click on the **HyperTerminal** option to open the HyperTerminal window.

5. Double-click on the **Hypertrm.exe** icon to start HyperTerminal.
6. When HyperTerminal is loaded the **Connection Description** dialog box is displayed. In the name box enter the instrument name, e.g. "PROHOOD", and click on the **OK** button to continue.
7. The **Phone Number** dialog box will be displayed next. Change the **Connect Using** option to "Direct to COM 1" or "Direct to COM 2" depending on which port the Prohood instrument has been connected to. Click on the **OK** button to continue.
8. The Port Settings dialog box is then displayed. The settings should be:

<u>Setting</u>	<u>PROHOOD</u>
Bits per second	2400
Data bits	8
Parity	None
Stop bits	1
Flow control	Hardware

When the above settings have been entered, click on the **OK** button.

9. Go to the menu bar and click on **Transfer** to display related drop-down menu.
10. Click on the **Capture Text** option.
11. From the **Capture Text** dialog box enter a drive, directory (Folder) and file name for saving the data (enter the full path name).
12. Click on the **Start** button to set the computer to receive data from the Prohood.

### 3.6.2 Transmit Data from Prohood

13. Transmit the data from the Prohood instrument to the computer by using the Printing instructions for the Prohood, i.e. proceed as if printing to a printer. Data may be transmitted on-line or from the Prohood's memory. See: Printing.

### 3.6.3 End Transmission

14. When the transmission of data is complete go to the HyperTerminal menu bar and click on **Transfer** to display the drop-down menu.
15. Click on the **Capture Text** option then select Stop.
16. Go to the menu bar and click on **Call** to display the drop-down menu.
17. Click on the **Disconnect** option.
18. Go to the menu bar and click on **File and Exit**.
19. When prompted to **Save Session** click on **No** as this is not necessary.
20. The data is now saved in your designated file and directory.
21. The stored data file is in plain text format and can now be opened using any software package which accepts this, e.g. Excel, Word, PowerPoint, etc.

## 4 MAINTENANCE

Some simple routine maintenance after each use will ensure that your PROHOOD instrument will function correctly for many years.

- ◆ Remove any moisture droplets using a clean, absorbent cloth/paper before disassembling and storing the unit.
- ◆ Remove batteries if the unit is to be stored, unused for an extended period.
- ◆ Always store and transport the unit in the carry-case provided. Store in dry conditions.
- ◆ If stored in cold conditions, always allow the unit to warm to ambient temperatures before use.

INSTRUMENT CASE may be wiped clean with a damp cloth and dried:

- ◆ DO NOT immerse the instrument in water
- ◆ DO NOT use abrasive cleaning products. These will damage the case and scratch the display.

BELLMOUTH MOULDING can be wiped clean with a damp cloth and dried:

- ◆ DO NOT immerse the bellmouth in water

- ◆ DO NOT use abrasive cleaning products, which may block or damage the grid.

BELLMOUTH SENSING GRID may be CAREFULLY wiped clean with a cloth. Ensure sensing grid holes are not contaminated with moisture.

- ◆ DO NOT use abrasive cleaning products that may damage the grid, or may leave a residue in or around the holes.
- ◆ DO NOT attempt to remove the grid from the bellmouth moulding.
- ◆ DO NOT immerse in water.
- ◆ CHECK periodically for damage or any visible cracks.
- ◆ Take care NOT to damage or obscure the calibrated holes in the grid. This can seriously affect the measurements obtained.

CAPTURE HOOD GASKET rubber-bead may be wiped clean with a damp cloth and dried.

CAPTURE HOOD fabric can be wiped with a damp cloth, if necessary, and moisture droplets dried with an absorbent cloth/paper. Periodically, wash in cool water using a mild detergent. Drip dry, ensuring it cannot become caught on any sharp objects.

The fabric used is impermeable, tough and very resistant under normal use. In the event that the fabric becomes worn or torn, replace the fabric hood immediately. A damaged hood will seriously affect the measurements taken.

VANE ANEMOMETER HEAD should be checked for damage/distortion to the vanes (free-running, without vibration or noise). The vane detecting sensor (located at the bottom of the vane housing) should not be obscured by dirt. If dirty, wipe with a clean cloth. DO NOT use abrasive cleaning products that may damage the surface or dry to leave a residue.

ANTI-STATIC SOLUTION can be applied sparingly to the instrument by using a clean, lint-free cloth and carefully rubbing it over the instrument case and window. NOTE: This is normally only necessary when working in low-humidity conditions.

It is recommended that the PROHOOD instrument be recalibrated ANNUALLY. See: Section 9 - Service and Recalibration.

To obtain replacement parts or return the unit for calibration, See: Section 9 - Service and Recalibration.

## 5 TROUBLE SHOOTING

<b>No display on switch-on</b>	No batteries fitted. Batteries fitted but incorrect orientation (wrong polarity). Batteries exhausted.
<b>LOBAT on LCD screen</b>	Low battery power warning.
<b>Random pattern on display</b>	Battery power too low.
<b>Units annunciator flashing</b>	Indicates that auto turn off mode is inhibited – Turn unit off then back on to clear.
<b>Instrument stops working (no display on LCD)</b>	Not switched ON. If unit has not been used for 3 minutes, the AUTO-OFF feature will have turned OFF the instrument.
<b>Data not downloaded to printer</b>	Check printer correctly connected. Check correct type of printer connected and is properly set up. Check that correct printer cable is being used. Contact AIRFLOW.
<b>Data not downloaded to computer</b>	Check computer connected correctly. Check computer configured correctly. Check that correct printer cable is being used. Contact AIRFLOW.

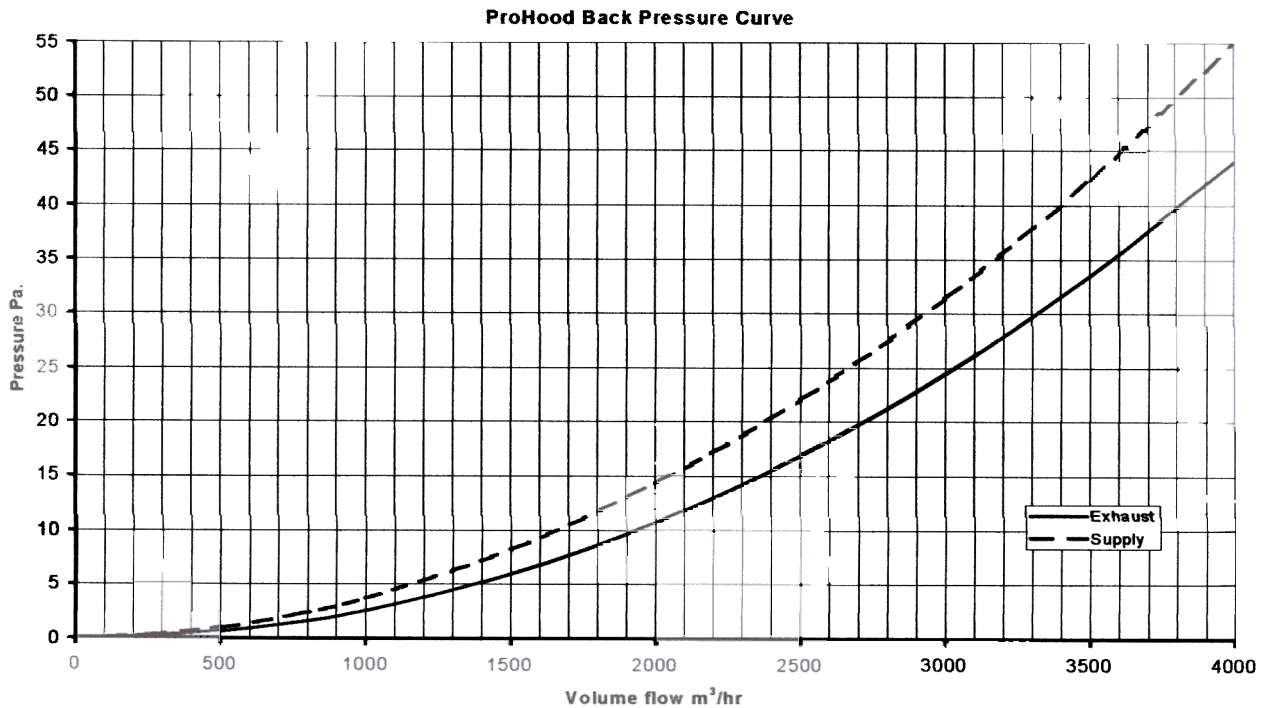


## 6 TECHNICAL DATA

Function	Min	
Volumetric flow range:		
Metric (m <sup>3</sup> /h)	85	4078
Metric (l/s)	24	1133
Imperial (CFM)	50	
Grid air temperature:		
Metric (°C)	0	80
Imperial (°F)	32	176
Accuracy:		
Calibrated to better than	Supply ± 3% of reading ± 12 m <sup>3</sup> /hr	
	Exhaust ± 4% of reading ± 12 m <sup>3</sup> /hr	
Display Resolution:		
Flow	1 m <sup>3</sup> /h	
	1 l/s	
	1 CFM	
Velocity (over complete range)	0.01 m/s	1 fpm
Temperature	0.1 °C	1 °F
Total available memory locations:	99	
Display readout speed (damping)	Display updates every second but averaging period is user adjustable between 1 and 60 seconds in 1 second increments	
Instrument ambient temperature range	0°C(32°F)	+50°C (122°F)
Instrument storage temperature	-10°C(14°F)	+60°C(140°F)
Working Weight (Includes 610 x 634mm Hood, Instrument and Batteries)	3.80Kg(8.37lbs)	
Velocity Range -100mm Head	0.25 – 30 m/s (50 – 6000 ft/min)	
- 35mm Head	0.5 – 20 m/s (100 – 4000 ft/min)	
Uncertainty of Measurement @ 20°C & 1013mb.	Calibrated to better than:	
-100mm Head	0.25 to 30 m/s +/- 1% of reading +/- 1 digit (50 – 6000 ft/min +/- 1% of reading +/- 1 digit)	
- 35mm Head	0.5 to 20 m/s +/- 2% of reading +/- 1 digit (100 to 4000 ft/min +/- 2% of reading +/- 1 digit)	

## 7. BACK PRESSURE

When using the Capture Hood, it can slightly restrict the flow coming out of the diffuser causing some back pressure on the system. This added resistance may alter the true air flow, however in most cases this error is likely to be less than the accuracy of the instrument. The back pressure curves shown below for both Supply and Exhaust indicate the pressure drop through the unit for different flow rates. This can be used to correct the measured value if the system pressure/flow performance curve is known.



## 8. RS232 OUTPUT

This provides a serial data output for sending to a printer (or other compatible device), via an 8 pin mini Din, non latching socket. The attached device must conform to the following protocol:

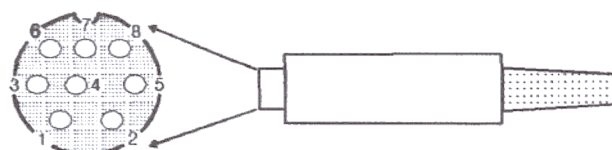
Emulation: DTE emulation as per IBM PC.

Lines:	"TDX" Transmit data	pin 3
	"CTS"	Clear to send pin 8
	"SG"	Signal ground pin 5
	CTS time out :	3 seconds
	Baud rate :	preset to 2400 Baud
	Transmission protocol :	8 bit, no parity, 2 stop bits. (this allows compatibility with printers that expect either 1 or 2 stop bits.)

Output Voltages : RS232 compatible + 10v nominal for logic low  
 - 10v nominal for logic high  
 input +/- 3v minimum sensitivity

- 1) The mating mini Din 8-pin plug (Airflow Part No.9040180) connector pin number identification is shown in the following diagram.

### External View



2) Inter-connections to Airflow APU 10 Printer.

<b>Prohood 8-pin</b>	<b>APU 10 Printer</b>
<b>Mini-DIN Socket</b>	<b>(with 9-way "D" socket)</b>
TX pin 3 (●-----●)	pin 3 DATA
SG pin 5 (●-----●)	pin 5 SG
CTS pin 8 (●-----●)	pin 8 BUSY

3) Inter-connections to a PC or typical Printer.

<b>Prohood 8-pin</b>	<b>PC or typical Printer</b>
<b>Mini-DIN Socket</b>	<b>(with 9-way "D" connector)</b>
TX pin 3 (●-----x	pin 2 RD x – cable terminating in a 9 way D plug - 72329607
SG pin 5 (●-----x	pin 5 SG x – cable terminating in a 9 way D socket - 72329608
CTS pin 8 (●-----x	pin 4 DTR

<b>Prohood 8-pin</b>	<b>PC or typical Printer</b>
<b>Mini-DIN Socket</b>	<b>(with 25-way "D" connector)</b>
TX pin 3 (●-----x	pin 3 RD x – cable terminating in a 25 way D plug - 72329609
SG pin 5 (●-----x	pin 7 SG x – cable terminating in a 25 way D socket - 72329610
CTS pin 8 (●-----x	pin 20 DTR

**CE Marking.** - The unit complies with the EEC Directive on Electromagnetic Compatibility (EMC) 89/336/EEC, applied Harmonised Standard: EN50081-1 Radiated Emissions and EN50082-1 Radiated and ESD Immunities.

**NOTE:** For full immunity to ESD, the instrument printer socket **MUST** have the supplied plastic plug fitted whenever a printer, or other device is not connected to it.

## 9 SERVICE AND RECALIBRATION

If the instrument appears not to be working correctly or requires re-calibration, contact your nearest Airflow agent or the Airflow UK Service Department. Airflow operates an instrument hire service for the convenience of customers during repair or calibration. If you intend to make use of this service, please contact our service department to make arrangements prior to returning your instrument. Our contact details are as follows:

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## 10 SPARES

<u>Item</u>	<u>Part No.</u>
Display locking lever	9021146
Capture hood: 610 x 634mm – Green	72380702
Mini DIN Socket Cap	82345201
ProHood pole set	72447101
Pro hood Instrument	72380801

## 11 OPTIONAL ITEMS

<u>Item</u>	<u>Part No.</u>
100 mm diameter head unit - with Temperature Sensor	72447301
35 mm diameter head unit – with Temperature Sensor	72447701
Telescopic Rod Set Assembly	71933702
Handle for 100mm Head / Telescopic Rod Set	9020766
Plastic Air Cone Kit - 180mm Dia & 285mm x 235mm	72402201
Plastic Air Cone Kit – 285mm x 235mm	72402202
Large Plastic Air Cone – 330mm x 330mm	9021283
Capture hoods:	
• 410 x 434mm – Red	72380701
• 610 x 634mm – Green	72380702
• 310 x 1234 mm – Yellow	72380703
• 310 x 1534 mm – Orange	72380704
• 610 x 1234 mm – Blue	72380705
• 910 x 934 mm – Grey	72380706
Professional Hood Sets:	
• Airflow Set (72380701, 03, 04, 05, 06)	72401001
• Full Set (72380701, 02, 03, 04, 05, 06)	72401002
• Carry Case	72479501
Printer: APU 10 Mini Printer (Battery/Mains powered) Supplied with RS232 cable:	
• UK/European version	72313303
• USA version	72313304
PC or typical printer cable:	
• with 9-way D-type plug	72329607
• with 9-way D-type socket	72329608
• with 25-way D-type plug	72329609
• with 25-way D-type socket	72329610



## 12 CONTACTING AIRFLOW

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