ZEPHYR **II** +
ZEPHYR **II**

operating instructions

DIFFERENTIAL PRESSSURE

AIR QUALITY MEASUREMENT

PRODUCT WARNING

GrayWolf Sensing Solutions' Zephyr instruments are NOT
suitable for use in flammable or potentially explosive environments.
They are NOT certifed intrinsically safe. They are also NOT intended
for use in confined spaces where operator safety might be at risk due
to exposure levels, such as reduced oxygen, during the course of the
instrument survey.

HELP US TO HELP YOU

Every effort has been made to ensure the accuracy in the
contents of our documents, however, GrayWolf can assume
no responsibility for any errors or omissions in our documents
or their consequences.

GrayWolf would greatly appreciate being informed of any
errors or omissions that may be found in the contents of any
of our documents and to this end we include the following
form for you to photocopy, complete and return to us so that
we may take the appropriate action.

HELP US TO HELP YOU

To:	Marketing Communications, GrayWolf Sensing Solutions 12 Cambridge Dr. Trumbull, CT 06611	From :
		Address :

Tel   :   1-203-416-0005
Fax   :   1-203-416-0002
email   :   Manuals@WolfSense.com

Tel   :
Fax   :
email   :

I suggest the following corrections/changes be made to Section ....

Marked up copies attached (as appropriate):   Yes / No

Please inform me of the outcome of this change: Yes / No

For GrayWolf Use

Actioned By: Date:

Response: Date:

COPYRIGHT AND WARRANTY

COPYRIGHT

This publication contains information partly derived from proprietary data of GrayWolf Sensing Solutions. The express purpose of this information is to assist in the operation and maintenance of the instrument described herein. The publication of this information does not convey any right to reproduce or use the information for any purpose other than in the operation or maintenance of the equipment described herein.

GrayWolf shall not be liable for any incidental or consequential damages in connection with any deletions, errors or omissions in this Manual.

WARRANTY

GrayWolf warrants each ZEPHYR instrument to be free from any defects in workmanship, materials and components for one year from the date of purchase. Any ZEPHYR instrument found to be defective by GrayWolf within the warranty period will be repaired (or replaced at GrayWolf's discretion), providing that the product is returned, shipping prepaid, to GrayWolf or an authorized GrayWolf distributor.

ZEPHYR instrument failure must not have occurred as a result of operation of the instrument other than in accordance with the instructions furnished with the instrument.

This warranty does not apply if the instrument has been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered.

This warranty will not apply if adjustments, repair or parts replacement is required because of accident, hazard, misuse, transportation or causes other than ordinary use; in which case repair will be charged at normal rates. An estimate will be submitted before repair work starts and a purchase order must be supplied before work begins. Any out of warranty repairs are warranted 90 days from the date of invoice. The warranty does

COPYRIGHT AND WARRANTY

not apply if any modifications have been made by anyone other than GrayWolf or an authorized distributor.

The foregoing warranty is in lieu of all other warranties, conditions, terms, undertakings and obligations implied by statute, common law, custom, trade usage, course of dealing, or otherwise, all of which are hereby excluded to the fullest extent permitted by law. This warranty does not affect the statutory rights of a consumer. In such transactions, the rights and obligations of the Buyer and Seller shall be determined by statute.

GrayWolf shall have no liability or obligations under this warranty other than to remedy breaches thereof by the provision of materials and services within a reasonable time and without charge (or, where appropriate In accordance with the above at normal rates). If GrayWolf shall fail to comply with such obligations its liability for such failure shall be limited to a sum equal to the price. The foregoing states the entire liability of GrayWolf, whether in contract or in tort, for defects in the instrument notified to it after the date of purchase order other than liability arising where loss of damage to any property or injury to or death of any person is caused by any negligent act or omissions or wilful misconduct of GrayWolf, its employees, agents or subcontractors or by any defect in the design or workmanship of the instrument.

Save as otherwise stated, in no circumstances shall GrayWolf be liable in contract or in tort or otherwise for any direct incidental or consequential loss suffered by the purchaser or their agents.

GrayWolf does not give any warranty that the instrument is fit for any particular purpose unless the purpose is specifically advised to GrayWolf in writing and GrayWolf confirms in writing that the instrument can fulfil that particular purpose. Representations and warranties which are inconsistent with the tens of this warranty are not valid unless approved in writing by an officer of GrayWolf. Contact GrayWolf directly if there are any questions about this warranty.

TWENTY SHORT-CUTS

The following may be of help as a quick reference:

	How do I?	You should: (then press **MENU/METER to** return to the Measurement screen)	Or Refer To Section:
1	Change the units of measurement for one of the sensors. *(not available for all sensors).*	Press **MENU/METER**; select **Channel Setup**; select sensor to change; select **Select Units**; select new units; press **ACCEPT.**	2.4.3.1
2	Find out when a sensor was last calibrated.	Press **MENU/METER**; select **Channel Setup**; select sensor; select **Channel Info.**	2.4.3.5
3	Calibrate a sensor. (Not available for all sensors)	Press **MENU/METER**; select **Channel Setup**; select sensor; select **Calibrate Sensor**. Select **Do Standard Low Cal**; calibrate; press **ACCEPT**. Select **Do Standard High Cal**; calibrate; press **ACCEPT**.	6.1
4	Revert to the factory calibration settings for a sensor.	Press **MENU/METER**; select **Channel Setup**; select sensor; select **Calibrate Sensor**; select **Clear Cal**; press **ACCEPT.**	6.3.3
5	Display the min/max/average values.	Press **MENU/METER**; press **ACCEPT**; press left/right arrows to show all available data.	2.5.1

TWENTY SHORT-CUTS

	How do I?	You should: (then press **MENU/METER to** return to the Measurement screen)	Or Refer To Section:
6	Reset the min/max/average calculations.	Press **MENU/METER**; select **Clear Min/Max/Avg**; press **ACCEPT.**	2.5.3
7	Change the name of a Site/Location.	Press **MENU/METER**; select **Data Logging**; select **Rename Site/Loc**; use alphanumeric screen to rename; press **ACCEPT.**	4.2.2
8	Change the default Site/Location.	Press **MENU/METER**; select **Data Logging**; press **ACCEPT**; select new Site/Location; press **ACCEPT.**	4.2.4
9	Change the default logging interval.	Press **MENU/METER**; select **Data Logging**; select **Log Timing**; change timing; press **ACCEPT.**	4.3.5
10	Set the instrument to log overnight.	Press **MENU/METER**; select **Data Logging**; select **Log Timing**; change **Auto St.** to **ON**; set start time/date; set finish time/date; press **ACCEPT**	4.3.4

TWENTY SHORT-CUTS

	How do I?	You should: (then press **MENU/METER to** return to the Measurement screen)	Or Refer To Section:
11	Find out how much log memory remains.*	Press **MENU/METER**; select **Instrument Info**; press **ACCEPT**.	2.2.3
12	View the log data that is stored in the instrument.*	Press **MENU/METER**; select **Data Logging**; select **View Log Data**; select Site/Location; select session to view; limit data to be viewed; press **ACCEPT**.	4.4.2
13	Print the log data that is stored in the instrument.*	Press **MENU/METER**; select **Data Logging**; select **Print Logged Data**; select Site/Location; press **ACCEPT**; select session; limit data to be printed; press **ACCEPT.**	4.4.4
14	Display the battery remaining life percentage	Press **MENU/METER**; select **Instrument Info,** press **ACCEPT**	2.2.3
15	Lock the keypad.	Press **MENU/METER**; select **Instrument Setup**; select **Lock Keypad**; press **ACCEPT**.	2.3.3.4
16	Unlock the keypad.	Press the cursor left and right arrows at the same time.	2.3.3.4

* Not available on Zephyr II.

TWENTY SHORT-CUTS

	How do I?	You should: (then press **MENU/METER to** return to the Measurement screen)	Or Refer To Section:
17	Switch on/off the alarm or keypad bleep.	Press **MENU/METER**; select **Instrument Setup**; press **ACCEPT**; press right arrow; press up for On or down for Off; press **ACCEPT.**	2.3.3.1
18	Change the alarm levels for one of the sensors.	Press **MENU/METER**; select **Channel Setup**; select sensor to change; select **Set Alarms**; change alarm level; press **ACCEPT.**	2.4.4
19	Display the serial number of a probe.	Press **MENU/METER**; select **Instrument Info**; press **ACCEPT**	2.2.3
20	Switch off one of the sensors.	Press **MENU/METER**; select **Channel Setup**; select sensor to switch off; select **Disable Channel**; press **ACCEPT.**	2.4.3.4

CONTENTS

CONTENTS

CONTENTS

CONTENTS

8. SPECIFICATION   85

   8.1   Dimensions and Weight   85
   8.2   Display   85
   8.3   Serial Interface (Printer)   85
   8.4   Housing   85
   8.5   Battery Capacity at 20°C   85
   8.6   Environmental   86
   8.7   Electromagnetic Compatibility (EMC)   86
   8.8   Measurement Ranges   87

9. PROBES AND ACCESSORIES   89

   9.1   GrayWolf Probes Available for use with the   89
          Zephyr instruments
   9.2   GrayWolfbbbb Accessories Available for use with the   90
          Zephyr instruments

10. PITOT STATIC TUBES AND ACCESSORIES   91

   10.1   GrayWolf Pitot Static Tubes   91
   10.2   Specifications   92

          10.2.1 Nose and Head Section   92
          10.2.2 Rigid Tubes Types 229MS,   92
                 229MM, 299ML
          10.2.3 Flexible Tubes Type 50-4, 229EXT   92
          10.2.4 Dimensions and Weight   92

CONTENTS

FIGURES

TABLES

APPENDICES

1. INTRODUCTION

1.1   INTRODUCTION

The Zephyr II+ and Zephyr II (Figure 1) are two instruments capable of measuring a variety of air parameters. These parameters include differential pressure, wind speed, temperature and relative humidity, depending on the type of probe connected to the instrument. It should be noted that certain probes will only operate with specific instruments. Up to four measured parameters are continuously displayed on the instrument large graphics display and these readings may be stored internally. A maximum of 16 parameters are available depending upon the type of probe fitted to the instrument.

The instruments can be used for hand held walk through surveys or set up to periodically log readings which can later be downloaded to a PC for further analysis.

This manual covers both instruments and therefore some features listed may not be available on the Zephyr II.

Thermocouple Socket and Pressure Port

Accessories Connecting Point. For PC, Printer or an external ac supply. (PCCOMMS not available on Zephyr II)

Liquid Crystal Display

Battery Compartment

Probe Mounting. Showing one of the probes available.

Start/Stop Average Datalog.

Simple to use Keypad

Probe Connections
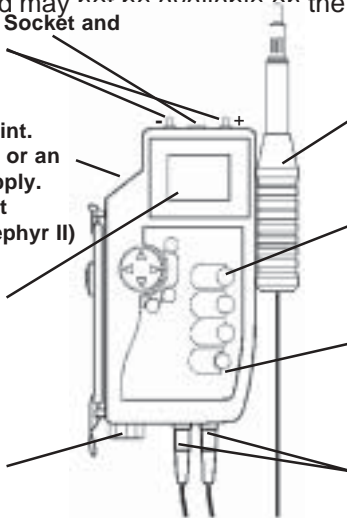
Figure 1 Zephyr Instruments

1. INTRODUCTION

1.2 MAIN FEATURES

1.2.1 Zephyr II +

a. Auto data logging with log download to PC.

b. Two smart probe sockets.

c. Built-in micromanometer and Type k thermocouple socket.

d. Duct averaging facility.

Note: Does not support 1260GSS multi-paramter probe.

1.2.2 Zephyr II

a. Two smart probe sockets.

b. Built-in micromanometer and Type k thermocouple socket.

c. Duct averaging facility

Note: Does not support 1260GSS Multi-parameter probe.

1.3 POWER SUPPLIES

1. INTRODUCTION

Power supplies for the instruments may be:

a.   Three alkaline dry cells.
        Duracell MN1400 LR 14 types are recommended.

b.   Three rechargeable cells.
        Nickel Cadmium or Nickel Metal Hydride (NiMH).

Note: It is recommended that alkaline dry cell batteries are used as battery life indications are not valid with any other type of battery.

Insert the three batteries, positive terminal first, into the battery compartment and securely tighten the battery end cap.

Rechargeable batteries must be removed from the instrument and recharged externally using a proprietary battery charger.

Alternatively the instrument may be operated from an external GrayWolf AC Adaptor operating from a 110 V or 240 V ac supply.

Note: When the adaptor is plugged into the instrument the internal batteries are automatically disconnected. There is therefore no need to remove the batteries from the instrument when an ac adaptor is being used.
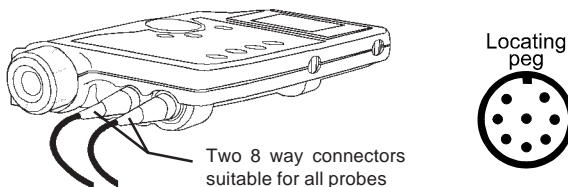
1. INTRODUCTION

1.4   BATTERY LIFE

Approximately 150 hours:Pressure and thermocouple only

Approximately 75 hours:Using 2300AHTS Multi-parameter
probe (assumes zero air speed)

1.5   PROBE CONNECTIONS

Both versions of the instrument may operate two smart

Location of the Probe Connectors

probes simultaneously. Probes are connected to sockets
located at the bottom of the instrument as shown below:

When connecting a probe ensure that the locating peg on the
probe plug is aligned with the corresponding slot in the
socket. Push the plug firmly into the socket and carefully
screw the plug collar into the security ring.

An additional external temperature measurement can be
made using a suitable thermocouple connected to the k type
socket on the top of the instrument.

Two ports on the top of the instrument allow the connection
of tubing for the measurement of differential pressure

1. INTRODUCTION

(micromanometer).

1.6   CONNECTING AUXILIARY EQUIPMENT

7 Way Accessories Connector

Individual Cables

PC Cable
Printer Cable
AC Adaptor

Y Adaptor

Connect to PC (Not zephyr II)

Connect to ac Adaptor
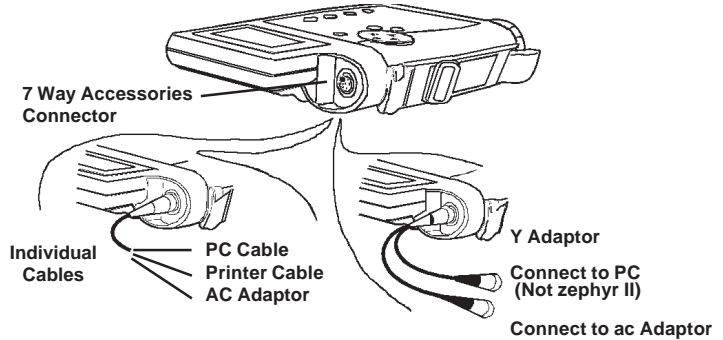
Accessories Connector

Both instruments are fitted with an accessories socket on the top left of the instrument as shown below:

The following equipment may be connected to the accessories socket:

a.   An ac adaptor.

b.   Equipment such as a PC or printer.

Note: The Zephyr II does not support a PC interface.

The GrayWolf   ACC-ADY125-CL adaptor may be used when connecting both the ac adaptor supply and the external

1. INTRODUCTION

equipment to the instrument.

1.7   KEYPAD FUNCTIONS

The instrument operation is controlled from an easy to use keypad which includes a four way cursor key for selecting

LOG/F1
Press to initiate Continuous Logging. (F1 refers to menu functions only)

STORE/F2
Press to store the displayed measurement. (F2 refers to menu functions only)
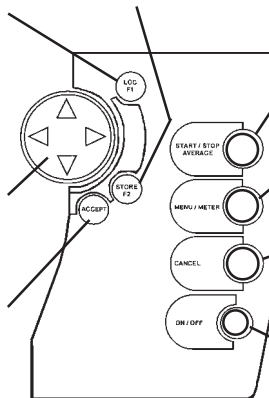
START/STOP AVERAGE
Press to initiate START/ STOP duct averaging using the STORE/F2 key

4 Way Cursor Key
Press the appropriate arrow to move to other information.

MENU/METER
Toggles between METER mode and MENU mode.

CANCEL
Used to abort menu selections.

ACCEPT
Used in conjuction with the menu selections. (ie. to accept site and locations).

ON/OFF
Press to switch on. To switch off, press until countdown 3, 2, 1 is complete.

Keypad

sub menus. The keypad functions are shown below:

When the instrument is switched on, the display will briefly show the time and date. Shortly afterwards and if a probe is connected, the display will show readings from the probe with the selected units. Some probes need time to stabilise when first switched on and during this time the display will show three arrows until the probe has stabilised. The thermocouple channel will display 3 arrows until a thermocouple probe is inserted. If the instrument does not detect a probe connection, eg. if the connector has not been fully inserted, the display will only show

1. INTRODUCTION

the built in thermocouple and micromanometer readings.

The display can show up to four separate readings simultaneously. However, where information extends beyond that displayed, scrolling arrows are shown on the right hand

| 0.0 PaPrs |
| 23.8 °C Tc |
| 0.0 m/s Vel |
| 0.0 m3/s Vfr ▼ |

| ▲ 23.8 °C Tc |
| 0.0 m/s Vel |
| 0.0 m3/s Vfr |
| 540 rpm Tach |
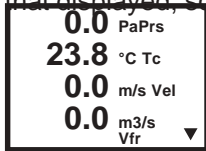
When indicated, press the cursor down arrow to show additional information.

Alternatively, press the cursor up arrow to show additional information

side of the display as shown below:

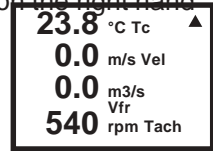Use the cursor keys to scroll the display up or down to show the additional information.

.

The display is also used to display calculated data such as dewpoint and averages, logged data, instrument setup

| 0.0 PaPrs |
| 23.8 °C Tc |
| 0.0 m/s Vel |
| 0.0 m3/s Vfr ▼ |

Alternative Symbols (Not Log for Zephyr II)

L O G or A V G

Battery Symbol

Scrolling Arrow

information and instrument warnings as shown:
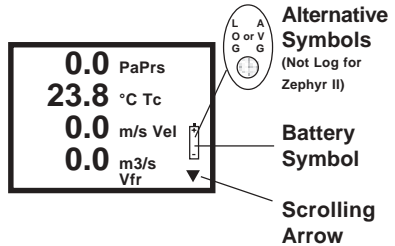
Abbreviations are used for the measurement units and symbols for operational information.

Scrolling arrows and other symbols that may be seen on the display, are as follows:

> Press the corresponding arrow on the cursor key to view the additional information (ie. a continuation to the right/left of the current display).

▼ ▲ Press the corresponding arrow on the cursor key to view the additional information (ie. a continuation

1. INTRODUCTION

below/above the current display).

The instrument is in the duct averaging mode.

The instrument is carrying out a preprogrammed logging function (referred to as Continuous logging).
(not on Zephyr II)

⌐ᴸ   A fully programmed logging sequence is set up and waiting (referred to as Autostart).

▯   The batteries need to be changed.

↓↓↓   Three arrows (down or up) indicate an out of range measurement.

Note: Three dots after a menu item (eg. Channel Setup... in the Main Menu) indicate that the item involves subsequent selections from more than one screen.

1.8   MODES OF OPERATION

1.8.1   General

The instruments have two display modes, Meter mode and Menu mode. The instrument will start up in the Meter Mode when initially switched on and can be changed from Meter mode to Menu mode by pressing the **MENU/METER** button. Subsequent pressing of the **MENU/METER** button toggles

Meter Mode
(Typical Dispay)
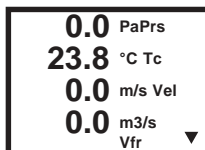
Menu Mode
Zephyr II +
ZEPHYR II

```
  0.0  PaPrs
 23.8  °C Tc
  0.0  m/s Vel
  0.0  m3/s
       Vfr      ▼
```

```
       MAIN MENU
View Min/Max/Avg
Channel Setup
Data Logging...
Clear Min/Max/Avg...
Instrument Setup...
Instrument Info
Duct Averaging...
```
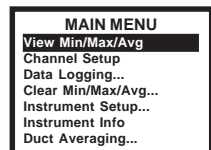
1. INTRODUCTION

the instrument between Meter and Menu modes.

1.8.2 Meter Mode

The instrument displays the probe instantaneous readings
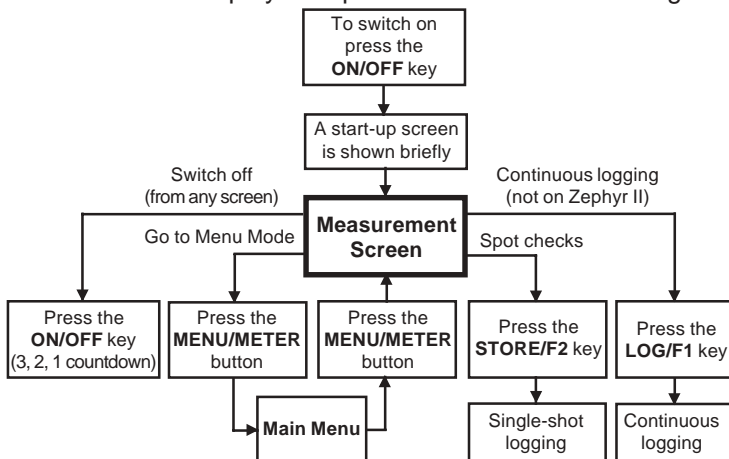
Sequence of Keypad operations - Meter Mode

1. INTRODUCTION

and the sequence of keypad operations is as shown below:

1.8.3   Menu Mode

The Menu mode allows operations to be carried out such as probe sensor calibration, set up and configuration of site and location references, alarm level settings, date and time, etc. Any of these configuration procedures can be aborted by pressing the **CANCEL** button.

The sequence of keypad operations is as shown below:

Main Menu

| View Min/ Max/Avg | Channel Setup | Data Logging | Clear Min/ Max/Avg | Instrument Setup | Instrument Info | Duct Averaging |

View Min/ Max/Avg levels, with time/date that they occurred.

Alarm Set bleeper on/off, time/ date, keypad lock, printer.

View instrument details (time, date, battery, log left, bleeper on/off and default site/location).

Calibrate probe sensor.

View calibration data stored in probe.

Set calibration and alarm levels/ limits. Disable channel.

Select site/ location as default. Delete or rename a site/ location.

Set log timing.

View, print or delete logged data.

View Results

Set User Parameters

Set imperial or metric units

Edit/set duct values

Set Compensation sensor values.

Sequence of Keypad operations - Menu Mode

2. USING THE INSTRUMENTS

2.1 GETTING STARTED

The instrument automatically detects the type of probe connected to it and displays the appropriate measurement units. The instrument screen displays shown in this section assume that a 2300AHTS 3-function multi-parameter probe is connected to the instrument.

Before using the instrument:

(1)   Ensure that a probe suitable for the measurement requirements is connected and securely locked to the instrument.

(2)   Press the **ON/OFF** button and note that the time and date are briefly displayed followed by the measurement screen for the connected probe.

Note   If a probe is not connected to the instrument, the measurement screen will just display the thermocouple and micromanometer readings.

(3)   Ensure that there is sufficient battery life for the period of monitoring that is about to be undertaken.

If the battery symbol **is** displayed all three batteries should be replaced.

If the battery symbol is **not** displayed there are at least 15 minutes battery life remaining.

A more detailed state of the batteries may be obtained using the **Instrument Info** menu screen under **Battery**.

(4)   To switch off, press and hold the **ON/OFF** button until the display *3*, *2*, *1* countdown is complete.

2. USING THE INSTRUMENTS

2.2 USING THE INSTRUMENT INFORMATION FACILITY

2.2.1 General

The default settings of the instrument may be displayed on the Instrument Info screen.

2.2.2 Getting to the Instrument Info Screen
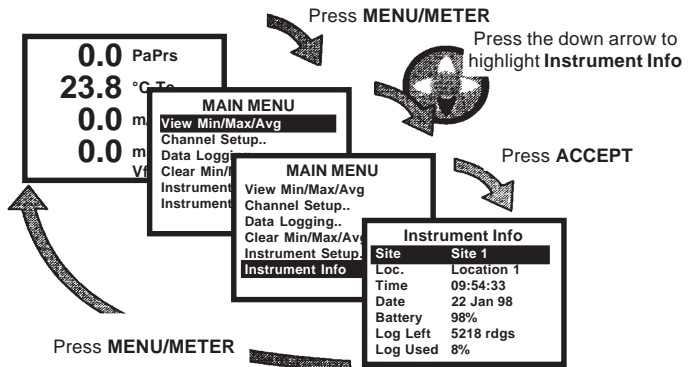
(1) From the Measurement screen, press the **MENU/METER** button to display the Main Menu screen.

(2) From the Main Menu screen, use the cursor key to highlight the **Instrument Info** option.

(3) Press **ACCEPT** to display the Instrument Info screen.

(4) Press the **MENU/METER** button to return to the Measurement screen.

2. USING THE INSTRUMENTS

2.2.3   Details on the Instrument Info Screen

Parameter details, as shown on the Instrument Info screen, are read only. Scroll to show details that are not immediately visible by pressing the up/down (▼ ▲) cursor keys.

Unless otherwise stated, refer to Section 2.3 to change the default parameters settings. (Log functions not available on Zephyr II).

Site   Default site reference (normally Site 1).

This reference will be offered as first choice when pressing the **LOG** or **STORE** button. Refer to Section 4.2 to change.

Loc.   Default location reference (normally Location 1).

This reference will be offered as first choice when you press the **LOG** or **STORE** button. Refer to Section 4.2 to change.

Time   Time, in hours:minutes:seconds that is set into the instrument. eg. **14:47:41**.

Date   Day: Month: Year that is set into the instrument. eg. **19 Aug 04.**

Note: This format cannot be changed.

Battery Approximate percentage of capacity remaining.

Calculation for capacity remaining assumes that alkaline batteries are being used. There is no direct correlation with other types of battery (eg. rechargeable NiCd).

2. USING THE INSTRUMENTS

Log Left   Number of readings that can be logged
before the log memory is full. This reading is
calculated on the probes currently connected
and the channels that are enabled.

Log Used   Approximate percentage of the log memory
capacity that contains data.

Key Beep   **ON/OFF** refers to the beep that sounds each
time one of the instrument buttons is pressed.

Auto Log   **ON/OFF** refers to the Autostart log facility (see
Section 4.3).

ON indicates that Autostart logging has been
programmed to take place, although it may not
have yet started.

Log Status **ON/OFF** refers to the Continuous Logging
facility (see Section 4.3).

Continuous Logging is started, or stopped, by
pressing the **LOG** button (while the
Measurement screen displayed).

Refer to Section 4.3 to change Auto Log and
Log Status.

Prb 1 S/No. Serial number of the probe that is connected to
the Connector 1 position.

Prb 1 Ver.   Version number of the probe configuration.

Prb 1 Filter Whether the probe has adaptive filtering
enabled.

Prb 2 S/No. Serial number of the probe that is connected to
the Connector 2 position.

2. USING THE INSTRUMENTS

Prb 2 Ver.   Version number of the probe configuration.

Prb 2 Filter Whether the probe has adaptive filtering
enabled.

Prb 3 S/No Serial number of the internal probe.

Prb 3 Ver.   Version number of the internal probe
configuration.

Prb 3 Filter Whether the internal probe has adaptive filtering
enabled.

Printer   Number of columns (27, 40 or 80) of the printer
to be connected to the instrument. Refer to
Section 4.4 for printing details.

ON/OFF   Refers to the printer line feed facility.

S/W Ver.   Version number of the instrument software that
is configured into the instrument.

2.3   USING THE INSTRUMENT SETUP FACILITY

2.3.1   General

Four of the default instrument settings (bleeper on/off, time/
date, printer configuration, keypad lock and Autozero setup
for pressure measurements) can be changed using the
Instrument Setup screen.

Once changed, the new default settings are retained when
the instrument is switched off.

2. USING THE INSTRUMENTS

2.3.2   Getting to the Instrument Setup screen
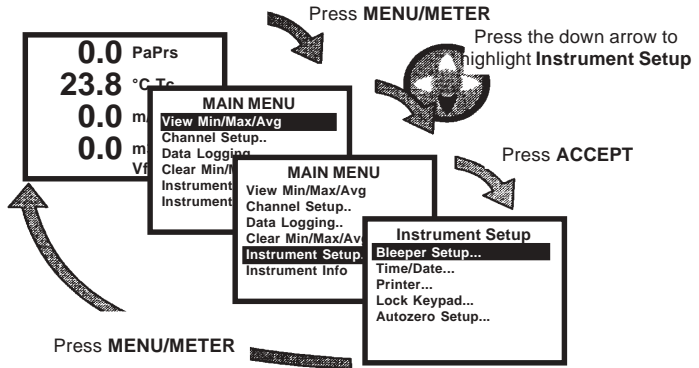
1)   With the Measurement screen displayed, press the
        MENU/METER button to show the Main Menu screen.

(2)   On the Main Menu screen, use the down arrow key to
        highlight the **Instrument Setup** option.

(3)   Press **ACCEPT** to display the Instrument Setup screen
        with the **Bleeper Setup** option highlighted.

(4)   Press **MENU/METER** to return to the Measurement
        screen.

2.3.3   Using the Instrument Setup Options

The Instrument Setup screen can be used to configure the
following options:

2.3.3.1 Bleeper Setup

Provides an optional sounding of the bleeper with each key
press, or when an alarm condition has been exceeded.

2. USING THE INSTRUMENTS

(1) With **Bleeper Setup** highlighted, press **ACCEPT** to display the Bleeper Setup screen.

(2) Use the cursor up/down arrows to highlight **Keypress** or **Alarm** as required.

(3) Press the cursor right arrow.

(4) Press the cursor down arrow to change to **OFF**, or the up arrow to change to **ON** as required.

(5) Press **ACCEPT** to return to the Instrument Setup screen.

2.3.3.2 Time/Date

Provides adjustment of the internal clock/calendar.

(1) With **Time/Date** highlighted, press **ACCEPT** to display the Set Time/Date screen.

(2) Use the cursor up/down arrow to highlight the **Time** or **Date** as required.

(3) Press the cursor right/left arrow to highlight the component to be changed (Hours or Minutes of the time; or Day, Month or Year of the date).

(4) Press the cursor down arrow to decrease or the up arrow to increase, the highlighted component as required.

(5) Press **ACCEPT** to return to the Instrument Setup screen.

2.3.3.3 Printer

Sets the instrument to suit the printer that is connected to the instrument.

2. USING THE INSTRUMENTS

(1)   With **Printer** highlighted, press **ACCEPT** to display the Printer Setup screen.

(2)   Use the cursor up/down arrows to highlight **Cols** or **Line Feed** as required.

(3)   Press the cursor right arrow.

(4)   For **Cols**, press the cursor up/down arrows to select between **27**, **40** or **80**.

      For **Line Feed**, press the cursor down arrow to change to **OFF** or the up arrow to change to **ON**.

(5)   Press **ACCEPT** to return to the Instrument Setup screen.

2.3.3.4 Lock Keypad

By locking the instrument keypad, you can prevent accidental misuse.

(1)   With **Lock Keypad** highlighted, press **ACCEPT** to display the Lock Keypad screen.

(2)   If required, press **ACCEPT** to lock the keypad.

      The display returns automatically to the Measurement screen and if an instrument button is now pressed the prompt **Keypad is Locked** is displayed. Press cancel to return the measurement screen to the display.

(3)   To unlock, press the left and right cursor arrows at the same time. If one arrow is pressed slightly ahead of the other the prompt **Keypad is Locked** is displayed.

2. USING THE INSTRUMENTS

2.3.3.5 Autozero (only with micromanometer / micromanometer probe fitted).

Provides adjustment of the time period at which the pressure autozero function operates.

(1)   With **Autozero** highlighted, press **ACCEPT** to display the Autozero Setup screen.

(2)   Use the cursor up/down arrow to highlight the autozero enable or autozero interval as required.

(3)   Press the cursor right arrow to highlight the component to be changed (autozero on/off, interval).

(4)   Press the cursor up arrow to turn the autozero function **ON**, the down cursor arrow to turn **OFF**.

(5)   The autozero interval is given in minutes. To increase the value press the up cursor arrow, to decrease the value press the down cursor arrow.

(6)   Press **ACCEPT** to return to the Instrument Setup screen.

2. USING THE INSTRUMENTS

2.4   USING THE CHANNEL SETUP FACILITY

2.4.1   General

The units and alarm levels for each probe sensor can be displayed using the Channel Setup facility. These settings are stored within the probe and apply when the probe is next used, even if this is on another instrument.

The Channel Setup facility is also used to calibrate the sensors. (Refer to Section 6 and the Probe Operating Instructions for further details).

Note: In most cases a channel corresponds to a sensor. Dewpoint is however one of the exceptions to this, there being no sensor. It is calculated from the temperature and humidity measurements.

2.4.2   Getting to a Channel Setup Screen.
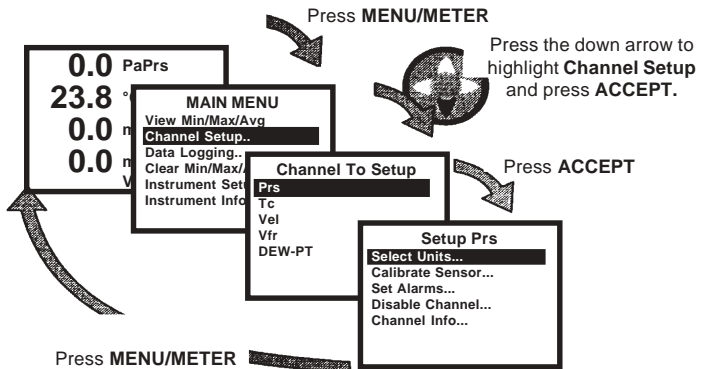
Press **MENU/METER**

Press the down arrow to highlight **Channel Setup** and press **ACCEPT.**

MAIN MENU
View Min/Max/Avg
Channel Setup..
Data Logging..
Clear Min/Max/..
Instrument Setu
Instrument Info

0.0 PaPrs
23.8 °
0.0 n
0.0 n
V

Channel To Setup
Prs
Tc
Vel
Vfr
DEW-PT

Press **ACCEPT**

Setup Prs
Select Units...
Calibrate Sensor...
Set Alarms...
Disable Channel...
Channel Info...

Press **MENU/METER**

(1)   With the Measurement screen displayed, press the **MENU/METER** button to show the Main Menu screen.

(2)   On the Main Menu screen, use the down arrow key to highlight the **Channel Setup** option.

2. USING THE INSTRUMENTS

(3)   Press **ACCEPT** to display the Channel To Setup
       screen.

(4)   Use the down arrow to highlight the required sensor.

(5)   Press **ACCEPT** to display the associated Setup
       screen.

(6)   Press **MENU/METER** to return to the Measurement
       screen.

To change the units that are used in the min/max/average
calculations, as well as selecting the units for each channel,
refer to Section 2.4.3.

2.4.3   Using the Channel Setup Options

As an example of the Channel Setup options, those available
on the Setup Prs screen are listed below. Other channels
may have fewer options, eg. calibration is not available for
the dewpoint channel.

2.4.3.1 Select Units

If available, alternative units can be
selected for the measurement display.

Select Prs Units
Pa
in H_2O
mm H_2O
m bar
mm Hg

(1)   With **Select Units** highlighted,
       press **ACCEPT** to display the
       corresponding Select Units screen.

(2)   Highlight the required units and press **ACCEPT**
       (display returns to the Setup screen).
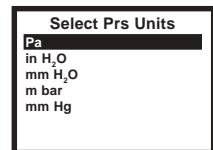
2.4.3.2 Calibrate Sensor

Refer to Section 6 for details.

2. USING THE INSTRUMENTS

2.4.3.3 Set Alarms

Allows the high and low alarms to be set, enabled and disabled (refer to Section 2.4.4 for details).

```
┌─────────────────────────┐
│     Set Prs Alarms      │
│ Lower Limit   +4000.0Pa │
│ Upper Limit   +5000.0Pa │
│ Low Alarm          OFF  │
│ High Alarm          ON  │
│                         │
│                         │
└─────────────────────────┘
```

(1)   With **Set Alarms** highlighted, press **ACCEPT** to display the corresponding Set Alarms screen.

(2)   Use the cursor up/down arrows to highlight a **Limit** or an **Alarm** as required.

(3)   To change a limit, refer to Section 2.4.4.

(4)   Press the cursor right arrow.

(5)   To set an alarm to **ON**, press the up arrow. To set an alarm to **OFF**, press the down arrow.

(6)   Press the cursor left arrow and if necessary, highlight and change other selections.

(7)   Press **ACCEPT** to return to the Setup screen.

2.4.3.4 Enable/Disable Channel

If disabled, channel measurement is not displayed on the Measurement screen, used in the min/max/average calculations or made available for datalogging.

```
┌─────────────────────────┐
│       Setup Prs         │
│ Select Units...         │
│ Calibrate Sensor...     │
│ Set Zeroing Level...    │
│ Set Alarms...           │
│ Disable Channel...      │
│ Channel Info...         │
└─────────────────────────┘
```

(1)   With **Disable Channel** highlighted, press **ACCEPT** to disable the channel. The menu option will then change to **Enable Channel.** The channel is now disabled.

38

2. USING THE INSTRUMENTS

(2)   With **Enable Channel** highlighted, press **ACCEPT** to enable the channel. The menu option will change to **Disable Channel** The channel is now enabled.

(3)   Press **MENU/METER** to return to the Measurement screen.

2.4.3.5 Channel Info

Displays information that is stored within the probe.

(1)   With **Channel Info** highlighted, press **ACCEPT** to display the corresponding Channel Info screen.

```
     Channel Info
         Prs

Last Cal.   19Feb98
Low Cal.    100.0Pa
High Cal.   1000.0Pa
```
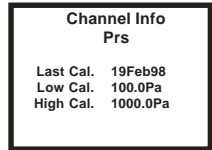
The displayed information is read only.

To change the calibration levels, refer to Section 6.3.2.

(2)   Press **CANCEL** to return to the Setup screen.

2.4.4   Changing the Alarm Limits

An alarm condition exists when a measurement is **below** the lower limit that is set for the channel, or **above** the upper limit that is set.

An alarm is only indicated if the alarm is enabled for the channel. The related measurement flashes on and off and the bleeper sounds if the bleeper is enabled for the channel. The alarm indication is only removed when either the measurement returns to a value between the lower and upper limits, or the **ACCEPT** button is pressed. If the alarm level is still present, the reading flashes again and the bleeper will sound if enabled.

To change the lower and upper alarm limits:

```
      Set Tc Alarms
Lower Limit   +0065.0°F
Upper Limit   +0082.0°F
Low Alarm          OFF
High Alarm          ON
```

(1)   On the appropriate Set Alarms screen, highlight either **Lower Limit** or **Upper Limit** as required.
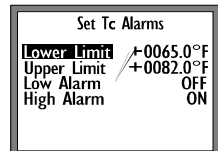
2. USING THE INSTRUMENTS

(2)   Press the cursor right arrow, to highlight the least significant digit of the limit.

(3)   Use the cursor up/down arrows to adjust the value of the last digit as required.

Note: The value can only be set between 0 and 9. ie. Pressing the down arrow at zero or the up arrow at nine is ignored.

(4)   Press the cursor left arrow, to highlight the next to last digit and adjust this digit as required.

(5)   Repeat steps (3) and (4) for any other digits that need changing.

Notes   1. The cursor right arrow can be used to return to digits that you have already adjusted.

2. The position of the decimal point cannot be changed.

3. Where the reading may go negative, the + sign can be toggled between + and -.

4. If the lower limit is set greater than the upper limit, the alarm will operate continuously.

(6)   Press **ACCEPT** to return to the Setup screen.
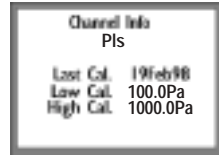
2.4.5   Displayed Channel Information

On the selected setup screen, highlight **Channel Info...** and press accept. The channel information displayed from a channel setup option comprises:

2. USING THE INSTRUMENTS

2.4.5.1 Last Cal.

Refers to the date on which the channel was last calibrated.

```
Channel Info
    Pls

Last Cal.   19Feb98
Low Cal.   100.0Pa
High Cal.  1000.0Pa
```

2.4.5.2 Low Cal

The low calibration level that was used when the channel was last calibrated. When next calibrated, a new low calibration level may be used.

2.4.5.3 High Cal

The high calibration level that was used when the channel was last calibrated. When next calibrated, a new high calibration may be used.

2.5   USING THE MIN/MAX/AVERAGE FACILITY

2.5.1   General

Minimum, maximum and average values are calculated automatically by the instrument. These calculations are initiated:

a.   at instrument switch on.

b.   from a manual reset.

c.   when a probe is changed.

Min/max/average calculations continue to be updated during the time that the instrument is used in Menu mode, or is used for datalogging.

For the min/max/average values to be meaningful, they must be reset manually (see Section 2.5.3).

2. USING THE INSTRUMENTS

The resultant calculated values can be viewed by selecting the **View Min/Max/Avg** option of the Main Menu. These values are updated approximately once every second while being displayed.

Note: When the units are changed for a channel, the units shown on the min/max/average display are automatically changed as well.
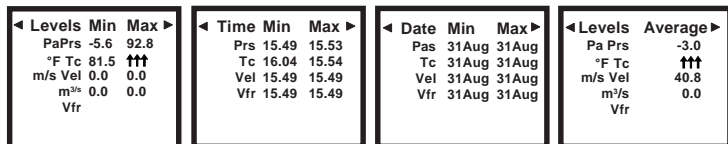
2.5.2   Viewing the Min/Max/Average Values

(1)   With the Measurement screen displayed, press the **MENU/METER** button to display the Main Menu screen, with the **View Min/Max/Avg** option highlighted.

(2)   Press **ACCEPT**, to display the first of four min/max/ average screens.

Notes: 1. If a channel has been disabled it is not shown on the min/max/average screens.

2. If out of range measurements have occurred, the corresponding minimum or maximum, and probably the average, is shown as three vertical arrows (eg ↓↓↓).

(3)   Move between the four screens by using the cursor left/right arrows.

◄ Levels Min Max ►	◄ Time Min Max ►	◄ Date Min Max ►	◄Levels Average►
PaPrs -5.6 92.8	Prs 15.49 15.53	Pas 31Aug 31Aug	Pa Prs -3.0
°F Tc 81.5 ↑↑↑	Tc 16.04 15.54	Tc 31Aug 31Aug	°F Tc ↑↑↑
m/s Vel 0.0 0.0	Vel 15.49 15.49	Vel 31Aug 31Aug	m/s Vel 40.8
m³/s 0.0 0.0	Vfr 15.49 15.49	Vfr 31Aug 31Aug	m³/s 0.0
Vfr			Vfr

First display (Min, Max values). Press ► arrow to show **Time** that min/max occurred.	Time that **Min, Max** occurred. Press ► arrow to show **Date**.	Date that **Min, Max** occurred. Press ► arrow to show **Average** values.	Average values. Press ► arrow to show **Min/Max** values.

2. USING THE INSTRUMENTS

(4)   Press **METER/MENU** to return to the Measurement
        screen.

2.5.3   Resetting the Min/Max/Average Values

Min/max/average calculations are cleared by using the **Clear
Min/Max/Avg** option of the Main Menu, by changing a probe
or by switching off the instrument.

In practice, the min/max/average values should be reset by
using the **Clear Min/Max/Avg** option on the Main Menu. The
reset at switch on, or when a probe is changed, does not
exclude out of range measurements that may occur during
the warm up of the probe sensors.

It is recommended that the min/max/average calculations are
reset as follows:

(1)   With the Measurement screen displayed, wait until the
        displayed measurements have stabilized.

*Note: Depending on the type of probe being used,
        stabilisation after switch on can take two or three
        minutes.*

(2)   Press the **MENU/METER** button to display the Main
        Menu screen.

(3)   Highlight the **Clear Min/Max/Avg**
        option and press **ACCEPT**.

(4)   Note the prompt, **Clear Min/Max/
        Avg Readings?**

```
       MAIN MENU
View Min/Max/Avg
Channel Setup..
Data Logging..
Clear Min/Max/Avg..
Instrument Setup..
Instrument Info
```

(5)   Press **ACCEPT** to reset the min/
        max/average calculations and to return to the Main
        Menu screen.
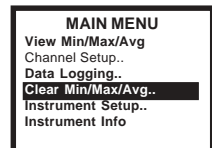
3. MICROMANOMETER AND THERMOCOUPLE

3.1   GENERAL

The Zephyr II and Zephyr II + have a built-in Micromanometer and type K Thermocouple socket. The Micromanometer can be used to measure differential pressure or, in conjunction with a pitot static tube, to provide a direct indication of velocity and volume flow rate.

+VE Port   **Thermocouple   -VE Port   External
Socket   Equipment
Socket**
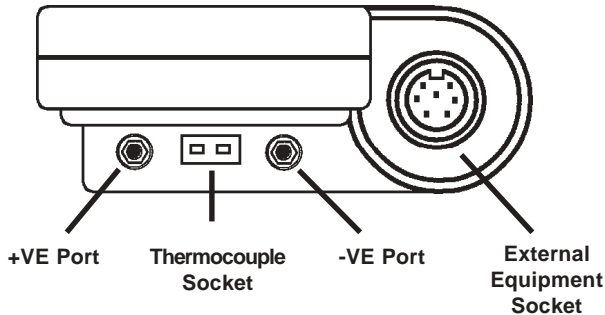
3.2   THERMOCOUPLE

Any Type k thermocouple or thermocouple probe may be connected to the thermocouple socket. Simply connect the thermocouple probe to the instrument and locate the probe in the environment to be measured. The instrument can display temperature in the range -80 ^{o}C to +1100 ^{o}C.

3.3   MICROMANOMETER

3.3.1   General

Differential pressure is applied between the two input ports (**+VE** and **-VE**, see Section 3.1) and the resultant measurement is displayed in user selected units. The instrument is factory calibrated using a deadweight tester which is designed to accurately apply a pressure differential between the two ports. Note that if a negative pressure differential is applied to the **+VE** port the measurement accuracy may not be within specification.

3. MICROMANOMETER AND THERMOCOUPLE

Depending upon the application, the pressure differential can be used to indicate pressure, a velocity or calculate volume flow rate (VFR) if the duct area is programmed into the instrument. Used in conjunction with a pitot static tube, the micromanometer is particularly useful in determining the parameters of air flow in ducts and pipework, and can provide three basic measurement modes:

3.3.2 Pressure Measurements

A differential pressure of up to ±5000 Pa can be applied between the instrument inlet ports.The range and units used for the display are user-selected and the display resolution is to 0.1 Pa. In conjunction with these pressure measurements, instrument facilities are available as follows:

a.   Manual selection of the most appropriate pressure range to optimise the resolution of the indicated pressure.

b.   Selection of the most meaningful units of measurement. For example, a 3,000 Pa pressure can be displayed as a 30.0 mbar or 306 mm H_2O.

c.   An averaging facility to provide the mean value of a series of selected measurements.

d.   A datalogging facility to automatically store a series of measurements, which can be taken at timed intervals or selected manually. The logged information can be downloaded to a PC via the external equipment output connector, using the WolfSense PC software package.

Note: The Zephyr II has manual datalogging and data download to a PC is not available.

3. MICROMANOMETER AND THERMOCOUPLE

3.3.3   Auto Zero Facility

The auto zero facility is particularly useful in applications where ambient temperature changes occur during the measurement procedure. At user selectable intervals, the instrument automatically resets the instrument zero by disconnecting the external pressure circuit and connecting together the two input pressure ports for approximately five seconds. During this zeroing process, **ZEROING** is indicated on the display and the digital display is held at the last measured pressure-difference (or velocity/VFR). Refer to section 2.3.3.5 for details of how to set up the autozero function.

3.3.4   Pressure Connections

WARNING

None of the instruments are suitable for use with corrosive gas or for liquid pressure measurements and are not approved for use in life support applications.

CAUTIONS

1. Pressures greater than 100 kPa (400 in H_2O) above atmospheric must not be applied to the instrument input ports.

2. While in use, the instrument must not be left in direct sunlight for long periods.

3. Moisture can block the instrument pressure ports. Do not moisten the ends of the pressure tubes or apply pressure by mouth.

3. MICROMANOMETER AND THERMOCOUPLE

Notes: 1. *Normally, the light coloured, or clear, silicone tubing is used for the positive pressure connection (+VE) and the dark coloured silicone tubing for the negative pressure connection (-VE).*

     2. *Ensure that the connections to both pressure ports are of the same length and that the tubing is neither kinked nor squashed.*

     3. *To avoid any liquid or contaminant draining into the pressure ports when making measurements on saturated or dirty airstreams, use the full length of the tubing provided with the instrument and keep the instrument above the pressure tapping point. If possible, allow the tubing to descend below the level of the tapping point before rising to the instrument.*

Connect to the pressure ports as follows:

(1)   For positive static measurements, connect the gauge pressure tapping (for example, duct static, plenum pressure and inlet cone depression), to the **+VE** port, and leave the **-VE** port open to atmosphere.

(2)   For negative static measurements, connect the gauge pressure tapping to the **-VE** port, and leave the **+VE** port open to atmosphere.

(3)   For differential pressure measurements (for example, orifice plates, venturi devices, flow grids, valves, diaphragms and filters) connect the upstream tapping to the **+VE** port and the downstream tapping to the **-VE** port.

3. MICROMANOMETER AND THERMOCOUPLE

Table 1 Instrument Display Ranges

Units	Range (±)	Zero Indication	Displayed Resolution
Pressure Indications			
Pa	±5000 Pa	0.0	0.1 Pa
mm H_2O	510.00	0.00	0.01 mm H_2O
in H_2O	±20.07	0.000	±0.001 in H_2O
mbar	±50.00	0.00	0.01 mbar

3.3.5   Volume Flow Rate

In order for the instrument to calculate volume flow rate from air velocity, the duct dimensions must be entered into the Surveyor instrument. The dimensions can be in the form of a duct cross sectional area (csa) in m^2 (or feet^2), or duct height and width in metres (or feet).

(1)   Press Meter/Menu.

(2)   Use the cursor key to select 'Duct Averaging' and press accept.

(3)   With 'User Parameters' highlighted, press accept.

(4)   With 'Units' highlighted, press accept and select 'Imperial' or 'Metric'.

(5)   With 'Duct Values' highlighted, press accept.

(6)   Select 'Edit Area' 'Yes' to enter csa dimensions, or 'No' to enter height and width dimensions.

(7)   Press 'Cancel' to return to meter mode.

3. MICROMANOMETER AND THERMOCOUPLE

The Volume Flow Rate reading displayed and logged will now be calculated using these duct dimensions.

3.3.6   Duct Averaging - Storing Readings

Both instruments provide a facility to record measurements as a duct is traversed and then to automatically calculate the average values.

To enter the duct averaging mode:

(1)   Press the **START/STOP AVERAGE** button and then select the Site and Location.

```
100.0  Pa Prsr
 23.0  °C Tc    A
 28.1  m/s Vel  V
                G
280.2  m3/s
       Vfr
```
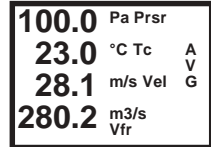
(2)   To indicate that the instrument is in the averaging mode, the display will show the letters AVG vertically on the right side of the screen.

(3)   Place the probe in the required location and wait for the instrument reading to stabilise.

(4)   Log the displayed readings at the selected location by pressing the **STORE (F2)** button.

(5)   Repeat steps (3) and (4) at all the required locations.

(6)   When all the required readings have been taken and logged, press the **START/STOP AVERAGING** button.

(7)   When prompted to cancel the logging process, press the **ACCEPT** button.

3. MICROMANOMETER AND THERMOCOUPLE

3.3.7   Duct Averaging - Viewing Readings

To view the readings taken:

(1)   Press the **MENU/METER** button to display the Main Menu.

(2)   Select **Duct Averaging** and press **ACCEPT**.

(3)   Select **View Results** and press **ACCEPT**.

(4)   Select site and location and press **ACCEPT**.

(5)   Select Session and press **ACCEPT**.

(6)   Select appropriate channel (such as velocity) and press **ACCEPT**.

(7)   The instrument will display the minimum, average and maximum readings obtained during the traversing period.

(8)   Refer to Section 4.4.2 if it is required to view individual data points.

4. DATALOGGING FACILITIES

4.1   GENERAL

Note: Auto data logging and PC downloading facilities are not available on the Zephyr II instrument.

Once the instrument has been set up with an appropriate probe, each channel that is required to record is switched on, checked and set to the required units, individual measurements may be **Stored** or a longer term **Log** may be initiated.

To ensure that the results of the survey may be identified, the appropriate **Site** and **Location** reference must be set before logging starts.

The logged data stored in the instrument may be viewed or printed, or the WolfSense PC Software may be used to download and analyse the results on a PC.

4.2   CONFIGURING THE SITE/LOCATION REFERENCES

4.2.1 General

The Site and Location references can be configured to be suitable for each IAQ Survey undertaken. The configuration that is set up is retained when the instrument is switched off.

Configuring these references is simplified using the WolfSense PC Software and a PC.

4.2.2   Changing an Existing Site or Location Reference

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

```
     Data Logging
Select Site/Loc...
Log Timing...
Rename Site/Loc...
Delete Site/Loc...
View Logged Data...
Print Logged Data...
Initialise Entire Log...
```

(3)   Highlight **Rename Site/Loc** and
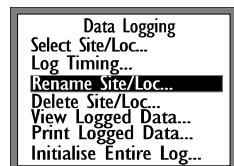
4. DATALOGGING FACILITIES

press **ACCEPT** to display the Rename Site/Loc screen.

(4)   Navigate to the required Site or Location as detailed in Section 4.2.6.

(5)   Press **F1** to display the alphanumeric selection screen. Change the name of the Site or Location as described in Section 4.2.7.

Note: When the name of a Location is changed, any existing logged data remains available under the new name.

4.2.3   Adding a New Site or Location Reference

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen, **Select Site/Loc** is highlighted.

(3)   Press **ACCEPT** to display the Select Site/Loc screen.

*Note: This screen is also accessed by pressing **LOG** or **STORE** when the Measurement screen is displayed and pressing **F1** to change the site location (refer to Section 4.3).*

```
┌─────────────────────┐
│   Select Site/Loc.  │
│ Site 1 ▶            │
│ Site 2 ▶            │
│ Site 3 ▶            │
│                     │
│  F 1  to add new    │
└─────────────────────┘
```

(4)   To add a Site, highlight one of the existing Sites. To add a Location, navigate to an existing Location at the required Site (see Section 4.2.6).

(5)   Press **F1** to display the Add Site/Loc alphanumeric screen. Add a new Site or Location reference as described in Section 4.2.7.

(6)   Press **ACCEPT** to confirm the addition.

54

4. DATALOGGING FACILITIES

4.2.4   Changing the Default Site/Location Reference

If **LOG** or **STORE** is pressed with the Measurement screen displayed, confirmation is required that the default Site/Location is the reference against which the data is to be stored. To change this default Site/Location:

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen, **Select Site/Loc** is highlighted.

(3)   Press **ACCEPT** to display the Select Site/Loc screen.

(4)   Navigate to the required Site/Location as described in Section 4.2.6.


```
        Select Site/Loc.
   Site 1  ▸
   Site 2  ▸
   Site 3
   Location  1
   Location  2

     F 1  to  add  new
```

(5)   Press **ACCEPT** to set the selected Site/Location as the default.
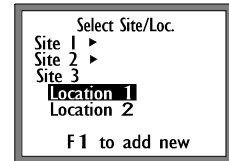
4.2.5   Deleting a Site or Location

Before deleting a Site or Location reference, or just the stored data at that reference, ensure that there is no further use for any of the data by viewing it (see Section 4.4.2) or printing it out (see Section 4.4.4).

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

(3)   Highlight **Delete Site/Loc** and press **ACCEPT** to display the Delete Site/Loc screen.

4. DATALOGGING FACILITIES

(4) Navigate to the required Site/
     Location as described in Section
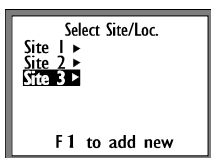   4.2.6 and press **ACCEPT** to
     display the Delete What? screen.

```
    Delete What?
 Data  Only...
 Data  &  Site...
```
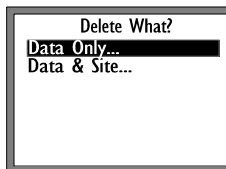
(5) Select **Data Only** or **Data & Site**
     and press **ACCEPT.**

(6) Confirm the deletion. Press **ACCEPT** to returned to
     the Delete Site/Loc screen.

(7) As necessary, delete any other Sites or Locations, or
     press **MENU/METER** to return to the Measurement
     screen.

4.2.6   Navigating to a Site and Location

When a screen showing Site/Location information is displayed
(eg. when it is required to log the IAQ measurements to other
than the default Site/Location), the available Sites are displayed
with a right arrow at the end of the name.

(1) Use the cursor up/down keys to highlight the required Site.

(2) Press the cursor right arrow to display the Locations
     that are available at the selected Site.

```
   Select Site/Loc.
 Site 1  ►
 Site 2  ►
 Site 3 ►

   F 1  to  add  new
```

```
   Select Site/Loc.
 Site 1  ►
 Site 2  ►
 Site 3
 Location  1
 Location  2
   F 1  to  add  new
```
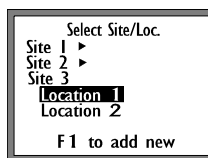
Highlight the Site ......   **then press the 'right' arrow**

(3) Use the cursor up/down arrows to select the required
     Location.

4. DATALOGGING FACILITIES

(4)   If necessary, press the cursor left arrow to return to the list of Sites.

4.2.7   Using the Alphanumeric Selection Screen

Use the alphanumeric selection screen to add, or rename, a Site or Location (see Sections 4.2.2 or 4.2.3).
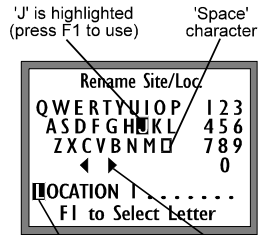
An alternative to using this screen is to connect the instrument to a PC and use the WolfSense PC Software to rename the Site or Location (Not Zephyr II).

Note: Upper case characters are only available when using the alphanumeric selection screen, however, upper or lower case characters are available when using the WolfSense PC Software.

(1)   When the alphanumeric screen is first displayed, the letter **J** is highlighted, together with the first character of the Site or Location name.

'J' is highlighted (press F1 to use)

'Space' character

Rename Site/Loc
QWERTYUIOP   123
ASDFGHJKL   456
ZXCVBNM   789
          0
LOCATION   ......
F1 to Select Letter

First character is highlighted ready to change

Select 'arrow' to move past a character

(2)   Use the four cursor keys, up/down and left/right, to move the cursor around the **QWERTY** display and to highlight the first alphanumeric character that is required for the new name.

(3)   Press **F1** to select the character, which is then inserted in the Site or Location name at the position of the highlighted character.

*Note: If **ACCEPT** is pressed instead of **F1**, the name is accepted as it is and if this is incorrect the rename process will have to be repeated (see Section 4.2.2).*

4. DATALOGGING FACILITIES

(4)   As necessary, use the following options to complete the renaming of the Site or Location.

   a. To insert a space, select the square symbol (next to the letter M) and press **F1**.

   b. To move past characters that you do not want to change, select the left or right arrows (▶ ◀) and press **F1**.

Notes: 1. You cannot move past a blank position, you must insert a space or a character.

2. You cannot delete a character, you must overwrite it with a new character (or space).

(5)   When you have compiled the Site or Location name, press **ACCEPT**.

Note: If you repeat an existing Site/Location reference, you are prompted to change the name that you have just entered.

4.3   LOGGING THE ENVIRONMENTAL CONDITIONS

4.3.1   General

Every time a log is carried out at a particular location a new session is started. A session consist of one or more samples of readings, new sessions will be started under the following conditions:

a.   Addition of a probe.

b.   Removal of a probe.

c.   Pressing the STORE F2 button.

d.   Stopping and starting another continuous log session.

Sessions are displayed based upon the start time.

4. DATALOGGING FACILITIES

4.3.2   Storing Individual Probe Measurements

To store individual probe measurements (eg. for a spot check IAQ survey):

(1)   Press the **STORE** button.

(2)   Press **ACCEPT** to confirm that the measurements are required to be stored against the default Site/Location.

(3)   Alternatively, press **F1** to navigate to another reference (see Section 4.2.6) or to add a new Site or Location (see Section 4.2.3).

4.3.3   Logging Continuously

Note: Logging continuously is not available on the Zephyr II instrument.

To log continuously, at the default time interval (see Section 4.3.5), press the **LOG** button to start logging and the **LOG** button again to stop logging.

While a continuous logging session is in progress, the Menu mode can be used to view the instrument information, including the data being logged (see Section 4.4.2), but:

a.   switching off the instrument ends the continuous logging session (ie. the session does not restart when the instrument is switched on again).

b.   the **STORE** button or the **Channel Setup** facility **cannot** be used and the Data Logging screen has a restricted number of options.

c.   the logging interval, the measurement units or the alarm levels cannot be changed. During a continuous logging session, a sensor cannot be calibrated or disabled, or a Site or Location deleted.

4. DATALOGGING FACILITIES

d.   a probe may be changed while datalogging but this will
        stop the current session and start a new session.

(1)   Press the **LOG** button to start logging.

(2)   Press **ACCEPT** to confirm the measurements are to
        be stored against the default Site/
        Location, to start logging and to
        return to the Measurement screen
        (the **LOG** symbol is displayed).

```
0.0  PaPrs
23.8 °C Tc    L
0.0  m/s Vel  O
              G
0.0  m3/s
     Vfr
```
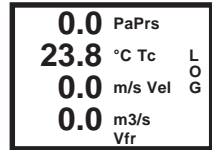
*Note: The **LOG** symbol is extinguished
        each time a reading is being stored.*

        Data is logged at each default logging interval (see
        Section 4.3.5).

(3)   Alternatively, press **F1** to navigate to another
        reference (see Section 4.2.6) or to add a new Site or
        Location (see Section 4.2.3).

(4)   Press **LOG** to end the logging session.

(5)   Confirm the end of the logging session by pressing
        ACCEPT, or **CANCEL** to continue logging.

4.3.4   Using the Data Logging Autostart Facility

*Note: Autostart facility is not available on the Zephyr II
        instrument.*

The instrument can be set to log overnight, for example, at
start and finish times when it is known that a building will be
unoccupied.

Autostart allows the instrument to automatically start and
stop a continuous logging session using start and stop times
specified by the user.

4. DATALOGGING FACILITIES

Notes: 1. Ensure that the instrument clock is set correctly before using Autostart. The instrument clock time is displayed briefly when first switched on or by accessing the instrument info screen (see section 2.2.3). See section 2.3.3.2 on setting the clock.

2. The clock time may be changed during Autostart logging but the logging session will be ended if the clock time goes outside the start and finish times.

Autostart logging takes place during two time intervals:

a. The first interval is before the specified start time. During this time, no logging takes place but the Autostart symbol (⊟) is displayed to show that Autostart is configured. If the instrument is switched off and back on again before the specified start time, the Autostart remains configured.

b. The second interval is between the specified start and finish times. During this time, continuous logging takes place and the **LOG** symbol is displayed, however the restrictions described in Section 4.3.3 apply.

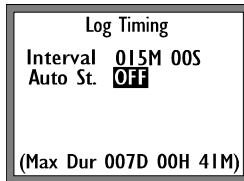Autostart logging can be stopped by pressing the **LOG** button.

To configure Autostart:

(1) Press **MENU/METER** to display the Main Menu screen.

(2) Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

(3) Highlight **Log Timing** and press **ACCEPT** to display the Log Timing screen, with **Interval** highlighted. The time shown is the default time interval.
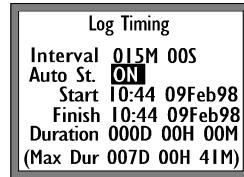
61

4. DATALOGGING FACILITIES

(4)   If necessary, change the default time interval by pressing the cursor right arrow once to highlight the units of minutes, or twice to highlight the units of seconds.

Increase these times by using the up arrow, or decrease by using the down arrow, then press the left arrow until **Interval** is highlighted.

(5)   Highlight **Auto St.** and then press the right arrow to highlight **OFF**.

(6)   Press the up arrow to change to **ON** (down arrow to return to **OFF**) and to add the Autostart **Start** and **Finish** times to the display.

```
┌─────────────────────────┐      ┌─────────────────────────┐
│       Log Timing        │      │       Log Timing        │
│                         │      │                         │
│ Interval  015M 00S      │      │ Interval  015M 00S      │
│ Auto St.  ▐OFF▌         │      │ Auto St.  ▐ON▌          │
│                         │      │    Start 10:44 09Feb98  │
│                         │      │   Finish 10:44 09Feb98  │
│                         │      │ Duration 000D 00H 00M   │
│ (Max Dur 007D 00H 41M)  │      │ (Max Dur 007D 00H 41M)  │
└─────────────────────────┘      └─────────────────────────┘
```

Log Timing screen ......   with the Autostart ON

(7)   To set the **Start** time, highlight **Start** and use the left/right arrows to move to the required portion of the time/date. Use the up/down arrows to change the time/date.

(8)   Similarly, set the **Finish** time.

About the **Start** and **Finish** times of Autostart:

a.   The displayed **Start** and **Finish** times both default to the current time and date. To use Autostart, the **Finish** time must be changed.

b.   If the **Start** time is incremented, the **Finish** time will follow automatically.

4. DATALOGGING FACILITIES

c.   The **Duration** time is automatically changed to show the difference between the **Start** and **Finish** times.

d.   The **Max Dur.** time is calculated automatically and depends on the memory available to store the proposed measurements. That is, it is reduced as memory is used up but increased if some of the probe sensors are disabled (see Section 2.4.3.4).

(9)   Press **ACCEPT** to return to the Data Logging screen.

If logging is configured to start at the current time (eg. the **Start** time is not altered) the prompt **Autostart Datalogging Commenced** will be displayed. Press **ACCEPT** to return to the Data Logging screen.

(10)   Press **MENU/METER** to return to the Measurement screen, which shows the Autostart symbol (⌐) at the right-hand side.

If logging is configured to start at the current time (see Step 9), the **LOG** symbol is displayed (see Step 11).

(11)   When the **Start** time is reached, the prompt **Autostart Datalogging Commenced** is displayed. Press **ACCEPT** and the **LOG** symbol is displayed.

*Note: Logging starts at the **Start** time, it does not wait for the **ACCEPT** to be pressed.*

4.3.5   Setting the Default Logging Interval

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

4. DATALOGGING FACILITIES

(3)   Highlight **Log Timing** and press **ACCEPT** to display the Log Timing screen, with **Interval** highlighted. The time shown is the default time interval (normally 15 minutes).

```
     Log Timing
 Interval  015M 00S
 Auto St.  OFF


(Max Dur 007D 00H 41M)
```
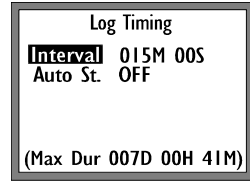
(4)   Press the cursor right arrow once to edit the units of minutes, or twice to edit the units of seconds.

Increase these times with the up arrow, or decrease with the down arrow.

Note: The value can only be set between 0 and 9. ie. Pressing the down arrow at zero or the up arrow at nine is ignored.

(5)   Press **ACCEPT** to configure the new default logging interval.

Note: The default logging interval is not altered when you switch off.

4.4   ACCESSING THE LOGGED DATA

4.4.1   General

Data that has been logged to the instrument can be viewed on the instrument display, selectively deleted or printed to a printer that is attached to the instrument.

Alternatively, these procedures can be carried out more effectively by using WolfSense PCsoftware (not Zephyr II).

4.4.2   Viewing Logged Data

(1)   Press **MENU/METER** to display the Main Menu screen.

4. DATALOGGING FACILITIES

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

(3)   Highlight **View Logged Data** and press **ACCEPT** to display the View Logged Data screen.

(4)   Navigate to the required Site/Location as described in Section 4.2.6 and press **ACCEPT** to display the **Select Session** screen.

Select the logged session that is required to be viewed and press **ACCEPT** to display the view window screen.

The **Start** time that is shown is for the first data that has been logged to the selected Site/Location. The data that is required to be viewed may be much later than this start time.

```
┌─────────────────────┐
│     View Window     │
│ Start  11:21 09Feb98│
│                     │
│                     │
└─────────────────────┘
```
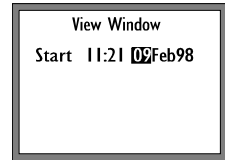
(5)   In order to limit the view window to the required data, use the left/right arrows to highlight the sections of the time/date that is to be altered.

Use the up/down arrows to change the time/date.

An attempt to change the time/date past that for which there is data is ignored.

(6)   Press **ACCEPT** to display the logged data, starting at the time specified in step (5).

(7)   After viewing the data, press **MENU/METER** to return to the Measurement screen.

Log data is displayed for the first probe channel and is arranged vertically with the most recent at the top and with the top measurement is highlighted.
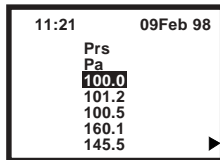
Use the up/down arrows to highlight other measurements for
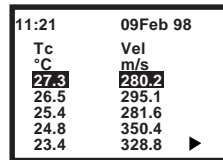
4. DATALOGGING FACILITIES

the same channel. As other measurements are highlighted, the time/date at the top of the screen changes to refer to the data that is highlighted.

Display the data from any other channels by using the left/ right arrows. If the data has been logged from the three function probe, up to five channels are available.

4.4.3   Deleting Logged Data

11:21	09Feb 98
Prs	
Pa	
100.0	
101.2	
100.5	
160.1	
145.5	▶

Log data for pressure is displayed ...

11:21	09Feb 98
Tc	**Vel**
°C	**m/s**
27.3	**280.2**
26.5	295.1
25.4	281.6
24.8	350.4
23.4	328.8 ▶

... press the right arrow to view velocity data

4.4.3.1 General

Logged data can be deleted either by initialising the complete log memory or by deleting data at individual Site/Location references.


CAUTION

Before deleting any log data, ensure that there is no further use for it by viewing the data (see Section 4.4.2) or printing it out (see Section 4.4.4).

4.4.3.2 Deleting Log Data at an Individual Site/Location

4. DATALOGGING FACILITIES

To delete log data at an individual Site/Location, proceed as follows:

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

(3)   Highlight **Delete Site/Loc** and press **ACCEPT** to display a list of Sites and Locations.

```
┌─────────────────────────┐
│      Delete What?       │
│ Data Only...            │
│ Data & Site...          │
│                         │
│                         │
│                         │
└─────────────────────────┘
```

(4)   Navigate to the required Site/Location as described in Section 4.2.6 and press **ACCEPT** to display the Delete What? screen.

(5)   Select **Data Only** or **Data & Site** and press **ACCEPT**.
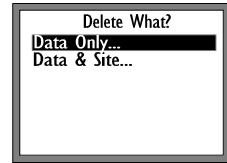
For a specific Location, selecting **Data Only** deletes all the log data stored against that Location. For **Data & Site** the Location name is removed from those available at the associated Site.

For a specific Site, selecting **Data Only** deletes the log data stored against all the Locations associated with that Site. For **Data & Site** the Site name, and all associated Locations, are also removed.

(6)   Press **ACCEPT** to confirm the deletion and the prompt **Now deleting, please wait** is displayed.

        The display returns to the Delete Site/Loc screen.

(7)   Delete data at any other Sites or Locations as required. Press **MENU/METER** to return to the Measurement screen.

4.4.3.3 Initialising the Complete Log Memory

4. DATALOGGING FACILITIES

This procedure deletes all logged data. To initialise the complete log memory, proceed as follows:

(1)   Press **MENU/METER** to display the Main Menu screen.

(2)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

(3)   Highlight **Initialise Entire Log** and press **ACCEPT** to display the Initialise Data Log screen, with a prompt asking for confirmation of the deletion.

```
┌─────────────────────────┐
│   Initialise Data Log   │
│      All Log Data       │
│    will be deleted:     │
│     Are you sure?       │
│   Accept to Delete      │
│    Cancel to Quit       │
└─────────────────────────┘
```

(4)   Press **ACCEPT** to confirm the deletion and to return to the Data Logging screen.

Note: Log data at all Sites and Locations is deleted, but the Site and Location structure is not affected.

4.4.4   Printing Logged Data

To print the log data that is stored in the instrument, ensure that the printer:

a.   Has a serial port (a 25-pin female connector on the printer).

b.   Is configured to print from a serial port.

c.   Has the serial interface set to:

        baud rate of 9600;
        8 data bits;
        no parity bit;
        one stop bit
        X On/Off is not used
        DTR is not used

d.   Line Feed On/Off and the number of columns is

4. DATALOGGING FACILITIES

correctly configured. Use the Instrument Setup option of the Main Menu to change these settings as described in Section 2.3.

To be sure about these items refer to the documentation that was provided with the printer.

Note: Alternatively, WolfSense PC Software may be used to print stored data to a printer that is attached to your PC. (not Zephyr II).

(1)   Connect the GrayWolf printer cable (reference ACC-CAP-CL) to the instrument external accessories connector (7-pin DIN).

(2)   Connect the other end of the printer cable (25-pin male connector) to the serial socket of the printer.

(3)   Switch on the instrument and press **MENU/METER** to display the Main Menu screen.

(4)   Highlight **Data Logging** and press **ACCEPT** to display the Data Logging screen.

(5)   Highlight **Print Logged Data** and press **ACCEPT** to display the Print Logged Data screen, which allows selection of the required Site/Location.

(6)   Navigate to the required Site/Location as described in Section 4.2.6.

```
    Print Window
Start  11:21 09Feb98
 End   12:08 12Feb98
```

(7)   Press **ACCEPT** to display the Print Window screen, which shows the first and last time/dates at which data has been stored against the selected Site/Location.
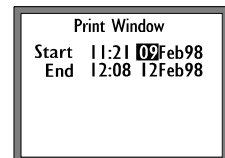
4. DATALOGGING FACILITIES

(8)   To limit the window to the required data, adjust the **Start** and **End** times and dates.

The display cannot be moved outside the start and end times and dates that were first displayed.

Note: When the hours reading is increased to more than 24, the date also changes.

(9)   Press **ACCEPT** and the prompt **Now Printing** is displayed. Depending on the amount of data selected for printing, this prompt could remain displayed for two or three minutes.

The display returns to the Print Window screen.

*Note: If the configuration of the printer, or the connection to the instrument is incorrect, the **Now Printing** prompt can remain displayed permanently. Under these conditions, press **CANCEL** to return to the Print Window screen.*

(10) Select any other data for printing, or press **MENU/ METER** to return to the Measurement screen.

5. PC SOFTWARE

Note: PC software facilities not available on the Zephyr II instrument.

5.1   GENERAL

The Zephyr II + instrument can be connected to a PC in order to download logged data to a Microsoft Excel™ spreadsheet. A software utility (WolfSense PC) is available to enable transfer of the data to a hard disk and provide basic graphical analysis. The utility also enables easy setup of the logging parameters such as site locations, etc.

Using WolfSense PC Software can simplify the operation of the instrument, particularly in configuring it for datalogging and in analysing the results of a differential pressure, airspeed or volume flow survey.

6. CALIBRATION PROCEDURES

6.1   INTRODUCTION

Calibration procedures are detailed in the Probe Operating Instructions that accompany each of the GrayWolf probes. This section provides a summary of those calibration procedures.

Each sensor should be calibrated at two levels (low and high) and for some sensors the low calibration level is zero.

Use the Quick Cal facility to calibrate the low calibration level for a sensor, but this method does rely on the sensor being in the correct zero environment at the time of calibration (see Section 4.2).

If a probe or sensor fails to calibrate, it should be returned to GrayWolf or one of their approved agents for repair or replacement.

6.2   USING THE QUICK CAL FACILITY

This procedure is not applicable for all sensors (i.e. for relative humidity or temperature).

> ### CAUTION
> Take great care when using Quick Cal that the environmental conditions to which the sensor is exposed are known. For example, do not assume that the %RH at your location is the same as what you hear on the weather forecast

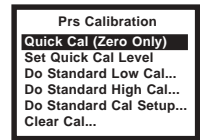(1)   Display the channel Setup screen for the sensor as described in Section 2.4.2.

6. CALIBRATION PROCEDURES

(2)   With **Calibrate Sensor**
       highlighted, press
       ACCEPT to display the
       Calibration screen for
       the selected sensor.
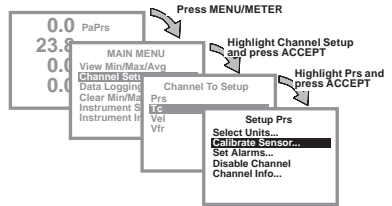
(3)   With **Quick Cal (Zero
       Only)** highlighted, press **ACCEPT**.

(4)   The prompt **Zeroing Sensor, Are
       you sure?** will be displayed.

       Press **ACCEPT** to zero the sensor
       at the default low calibration level
       (refer to Section 6.3.2 to change this calibration level).

(5)   Press **MENU/METER** to return to the Measurement screen.

6.3   CHANGING THE CALIBRATION LEVELS

6.3.1   General

To calibrate a sensor at a level that is different to that
programmed into the probe, (eg. if the appropriate %RH
reference is not available), change the calibration level as
described in Section 6.3.2 and, when calibrated, the new
level will be programmed into the probe.

An adjustable Calibration Time is provided for each sensor.
This time is in addition to any time that has been allowed for
sensor measurements to stabilize, and is intended as a time
to allow the sensor measurement to be observed prior to
calibration.

The calibration levels for each sensor that are programmed
into the probe may be changed at any time back to those
originally used in the factory. By doing this (see Section 6.3.2)
the output of the sensor is automatically set to correspond
with that expected at the factory setting.

74

6. CALIBRATION PROCEDURES

6.3.2   Setting new Calibration Levels

(1)   Display the channel Setup screen for the appropriate
       sensor as described in Section 2.4.2.

(2)   With **Calibrate Sensor** highlighted, press **ACCEPT** to
       display the Calibration screen for the selected sensor.

(3)   With **Do Standard Cal Setup** highlighted, press
       ACCEPT to display the associated Cal Setup screen.

(4)   Highlight the required calibration
       level, **Low Cal** or **High Cal**.

```
        Prs Calibration
Quick Cal (Zero Only)
Set Quick Cal Level
Do Standard Low Cal...
Do Standard High Cal...
Do Standard Cal Setup...
Clear Cal...
```

(5)   Press the cursor right arrow, to
       highlight the least significant digit of
       the calibration level.

```
        Prs Cal. Setup

Low Cal      0100.0Pa
High Cal     1000.0Pa
Cal. Time    0005Secs
```

(6)   Use the cursor up/down arrows to
       adjust the value of this digit.
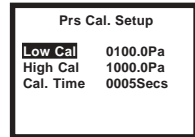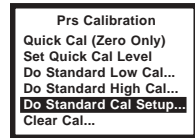
*Note: The value can only be set between
        0 and 9. ie. Pressing the down arrow at zero or the up
        arrow at nine is ignored.*

(7)   Press the cursor left arrow, to highlight the next to last
       digit. Adjust this digit if required. Adjust any other
       digits as required.

Note: The position of the decimal point cannot be changed.

(8)   Repeat Steps 4 to 7, if required, to adjust the other
       calibration levels.

Adjusting the Calibration Time:

(9)   On the Cal Setup screen, highlight **Cal. Time**.

6. CALIBRATION PROCEDURES

(10)   Repeat Steps 5 to 7 to adjust the Calibration Time.

*Note: **Cal Time** digits are adjusted by positioning the cursor*
*to the **left** of the required digit.*

(11)   Press **ACCEPT** to return to the Calibration screen and
MENU/METER to return to the Measurement screen.
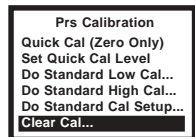
6.3.3   Reverting to the Factory Settings

Use this procedure to change the calibration levels that are
stored in the probe back to those originally used during
production. The calibration levels that are programmed into
the instrument are not changed. These levels remain as
previously set, but will change automatically to correspond
with any new probe that is connected to the instrument.

(1)   Display the channel Setup screen for the appropriate
sensor as described Section 2.4.2.

(2)   With **Calibrate Sensor**
highlighted, press **ACCEPT** to display the Calibration
screen for the selected sensor.

(3)   With **Clear Cal** highlighted, press **ACCEPT** and a
prompt **Clear Calibration?** is displayed.

(4)   Press **ACCEPT** to restore the factory calibration levels,
including the Calibration Time, for the selected sensor.

*Note: The sensor alarm levels are **not***
restored to their factory settings.

Prs Calibration
Quick Cal (Zero Only)
Set Quick Cal Level
Do Standard Low Cal...
Do Standard High Cal...
Do Standard Cal Setup...
Clear Cal...

(5)   Press **MENU/METER** to return to
the Measurement screen.

76

7. MAINTENANCE PROCEDURES

7.1 INTRODUCTION

Routine maintenance of the instruments consists of external care only. Except for the batteries, there are no user serviceable parts inside the instrument. Opening the instrument voids the warranty.

This section provides details of the recommended preventive maintenance, advice on battery maintenance and lists some simple checks that can be carried out if operational problems are experienced.

7.2 PREVENTIVE MAINTENANCE

(1)   Ensure that the battery end cap is fully screwed into position.

(2)   Ensure that the exterior of the instrument is clean, dry and free of corrosive contaminants. If necessary, wipe with a cloth moistened with a mild detergent. Allow to dry before using the instrument.

(3)   Ensure that the batteries are kept in a useable condition.

7.3 BATTERY MAINTENANCE

7.3.1 Dry Cell Batteries

(1)   When the battery warning symbol is shown on the instrument display, switch off and replace all three dry cell batteries.

This symbol indicates that there is at least 15 minutes use remaining. For a more precise estimation, refer to the **Instrument Info** option of the Main Menu (see Section 2.2.3).

7. MAINTENANCE PROCEDURES

(2)   Insert the new batteries into the instrument battery compartment, positive terminal first, and ensure that the battery end cap is replaced securely.

7.3.2   Rechargeable Batteries

To charge rechargeable batteries, first remove them from the instrument.

(1)   NiCd batteries should be fully discharged before charging.

(2)   Charge discharged NiCd, NiMH or Li Ion batteries according to the instructions supplied with your battery charger.

(3)   Insert the recharged batteries into the instrument battery compartment, positive terminal first and ensure that the battery end cap is replaced securely.

7.4   TROUBLESHOOTING

Basic problems that may encountered with the instruments are listed in Table 3 and a summary of possible displayed warnings in Table 4.

7.5   SERVICE

GrayWolf offers calibration and repair services at many locations throughout the world. Contact GrayWolf for details of your nearest Service Location.

7. MAINTENANCE PROCEDURES

The instrument is warranted for one year and is manufactured to the specifications applicable at that time. GrayWolf is under no obligation to update or modify products once sold.

If an instrument failure occurs:

(1)   Carefully read these Operating Instructions and the Probe Operating Instructions, ensuring that the problem is not a user fault or easily corrected.

(2)   Notify GrayWolf or your nearest Authorized Distributor, giving full details of the problem, including the instrument Serial Number and details of any displayed fault messages.

(3)   Forward the instrument with shipping prepaid according to the shipping instructions.

(4)   The time required for servicing the Zephyr instruments depends on whether the instrument is returned to a GrayWolf Service Location or if it can be repaired or replaced locally.

For instrument returns, please contact the nearest Service Location for a Return Authorization Number (RAN#) before despatching the instrument. This procedure helps GrayWolf to provide a speedy response and accurate tracking of the instrument.

7. MAINTENANCE PROCEDURES

Table 2 Basic Problems and Suggested Remedies

Problem	Checks	Suggested Remedies
Display is blank.	Is the instrument switched on?	Press the **On/Off** button.
	Are the batteries inserted and in a satisfactory condition?	Check that the battery end cap is screwed in fully.
	Is the external power supply connected and switched on?	Replace/recharge the batteries.
Measured indication is either zero or obviously incorrect. (ie. showing as three arrows).	Is the probe connected correctly?	Check that the probe connection is tight.
	Have you allowed time for the probe to warm up?	Allow three minutes for the probe to warm up (also, try moving the probe in the air).
	Is the probe calibrated?	Calibrate the probe.
	Is the probe damaged or malfunctioning?	Try another probe.
One, or more, of the displayed measurements is flashing on and off.	Are the sensors in an alarm condition?	Try switching off the sensor alarms (use the **Channel Setup** menu option).
	Is the probe damaged or malfunctioning?	Try another probe.
Some of the min/max/average values are obviously incorrect.	Have you reset the min/max/average values?	Reset the min/max/average values (use the **Clear min/max/avg** option).
	Is the probe functioning correctly?	Try another probe.
Pressing the **LOG/F1** button does not display the **Log** symbol.	Is the keypad locked?	Press the right and left arrows together to release the lock.
	Is the Autostart symbol already displayed?	Check the Log Status from the **Instrument Info** menu option.
	Was logging already running?	

7. MAINTENANCE PROCEDURES

Table 2 Basic Problems and Suggested Remedies (Cont.)

Problem	Checks	Suggested Remedies
There is no display from one of the sensors of a Multi Function probe.	Is the sensor disabled?	Check the enable/disable status from the **Channel Setup** menu option.
	Was the probe ordered with a full set of sensors?	Check your original order.
	Is the probe damaged or malfunctioning?	Try another probe.
One of the sensors of the Multi Function probe will not calibrate.	Are the test gases appropriate to the sensor being calibrated?	Calibrate using known good (and appropriate) test gases.
	Are you trying to calibrate by using Quick Cal in an unclean atmosphere?	
	Is the probe damaged or malfunctioning?	Try another probe.
Pressing the **ON/ OFF** button does not switch off the instrument	Are you holding the button pressed long enough?	Keep the **ON/OFF** button pressed until the *3, 2, 1* countdown has finished.
	Is the keypad locked?	Press the right and left arrows together to release the lock.

81

7. MAINTENANCE PROCEDURES

Table 3 Summary of the Warning Messages

Warning Ref.	Warning Text	Reason for Warning	Refer To Section
1001	Sensor Failed to Zero	Displayed when a sensor cannot be zeroed (Quick Cal), either because of a faulty sensor or the sensor output is not within the zeroing range.	6.3
1002	Unable to Log. Log is Full	Displayed when the log memory is full and either the **LOG** or **STORE** button is pressed.	4.1
1003	Unable to Add New Site/Loc. List is Full	Displayed when the combined number of Sites and Locations is at a maximum, and the **LOG** button is pressed to initiate logging to a new Site or Location.	4.2.3
1004	Unable to Add New Site/Loc. List is Full	As Warning 1003, but the **STORE** button is pressed.	4.2.3
1005	Unable to Add New Site/Loc. List is Full	As Warning 1003, but Menu mode is used to try to add a new Site or Location.	4.2.3
1006	Site/Loc. Exists. Please Enter New Name	Displayed if you try to add a Site (or Location at a Site) that already exists.	4.2.3
1007	Name is Blank. Please Enter New Name	Displayed if you try to add a blank name as a Site or Location.	4.2.7
1008	Site Exists. Please Enter New Name	Displayed if you try to rename a Site (or Location at a Site) the same as one that already exists.	4.2.3
1009	Name is Blank. Please Enter New Name	Displayed if you try to rename a Site or Location with a blank name.	4.2.3
1010	No data is logged at this location.	Displayed if you try to view log data from a Location where data has not been logged or has been deleted.	4.4.2

7. MAINTENANCE PROCEDURES

Table 3 Summary of the Warning Messages (Cont.)

Warning Ref.	Warning Text	Reason for Warning	Refer To Section
1011	No data is logged at this location.	Displayed if you try to print log data from a Location where data has not been logged or has been deleted.	4.4.1
1012	All Channels are now Disabled	Displayed if you try to disable all available channels.	2.4.3.4
1013	Sensor Failed to Calibrate	Displayed when a sensor cannot be calibrated, probably because of a faulty sensor.	6.1
1014	Instrument Clock Not Set	Displayed if the clock has never been set. Normally only seen during production.	2.3.3.2
1015	BATTERIES FLAT PLEASE REPLACE	Displayed if the batteries reach a critical low voltage. Only the **ON/ OFF** button can be used.	1.3
1016	User has removed a Probe	Displayed in the Menu mode when a probe is disconnected. **Probe is not Connected** prompt is displayed in Meter mode when a probe is disconnect.	1.7
1017	User has attached a Probe	Displayed in Menu mode when a probe is connected. **Probe is not Connected** prompt display in Meter mode is removed when a probe is connected.	1.7
1018	Autostart Datalogging Commenced	Displayed when the set start time of Autostart datalogging is reached. Press **ACCEPT** to carry on using Menu mode while datalogging takes place.	4.3.4

83

7. MAINTENANCE PROCEDURES

Table 3 Summary of the Warning Messages (Cont.)

Warning Ref.	Warning Text	Reason for Warning
1019	Autostart enabled or running.	Displayed when manually trying to log a reading whilst logging is running.
1021	Invalid probe detected.	Probe is not supported by the instrument.
1022	No data points recorded.	Displayed when trying to view duct averaging results when no data has been logged.
1023	Averaging session initiated.	

8. SPECIFICATION

8.1   DIMENSIONS AND WEIGHT

Depth: 40 mm (1.57 inches).
Width: 130 mm (5.12 inches).
Length: 260 mm (10.24 inches).
Weight (Including Batteries): 893 g (31.5 oz).

8.2   DISPLAY

Liquid Crystal Display (LCD): 128 x 64 point dot matrix.
Viewing Area: 65 mm (2.55 inches) x
                                    40 mm (1.6 inches).

8.3   SERIAL INTERFACE (PRINTER)

Baud Rate: 9600.
Data Bits: 8.
Parity: none.
Stop Bits: 1.
X On/Off: Not used.
DTR Polarity: Not used.

8.4   HOUSING

Material: ABS moulded plastic.
                                    Rubber grip.
                                    Nylon and rubber hand strap.

Sealing: to IP54 (NEMA4).

8.5   BATTERY LIFETIME AT 20°C

                                    Typical Life, pressure and
                                    thermocouple

Alkaline: up to 150 hours

8. SPECIFICATION

                        Typical Life Using 2300AHTS
                        3-function Probe

Alkaline: up to 75 hours

8.6   ENVIRONMENTAL

Operation Range: -10°C (+15°F) to +55°C
                             (+131°F).
                             0 to 100% rh (non condensing)

Storage Range: -20°C (-5°F) to +60°C (+140°F)
                             0 to 100% rh (non condensing)

8.7   ELECTROMAGNETIC COMPATIBILITY
     (EMC)

8. SPECIFICATION

C€   Within the limits of EMC Directive 89/336/EEC, the design of the instrument has been tested to EN 50270:1999 and is compliant with respect to RFI, ESD and RF emissions.
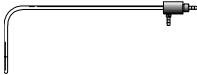
8.8   MEASUREMENT RANGES

Quantity to be Measured	Recommended Probe	Measurement Range
Relative Humidity	2300AHTS Multi-function Probe	0 to 100% rh.
Dewpoint Temperature	2300 AHTS Multi-function Probe	-33°C to +70°C. -50°F to +160°F.
Air Temperature .	Type K Thermo-couple probe .	-80°C to +1100°C. -112°F to +2012°F.
Airspeed	2300 AHTS Multi-function Probe	0 to 12 m/s. 0 ft/min to 2500 ft/min.
Airspeed □	Differential Pressure	0 to 100 m/s. 400 ft/min to 20000 ft/min.
Differential * Air Pressure	Differential Pressure	±7000 Pa. ±30 in. H_2O.
Volumetric Flow Rate	2300AHTS Multi-function Probe	0 to 1198 M^3/min. 0 to 19.98 M^3/sec. 0 to 42,300 ft^3/min. 0 to 2,540,113 ft^3/hr.

*   Fitted as standard (±5000Pa)
□   When used with a pitot static tube (not supplied)

8. SPECIFICATION

9. PROBES AND ACCESSORIES

9.1 PROBES AVAILABLE FOR USE WITH THE ZEPHYR INSTRUMENTS

1	Hotwire Anemometer(discontinued)	129MSS	
2	Vane Anemometer (discontinued)	228MSS	
3	Pitot Static Tube	229MS	
4	Optical Tachometer (discontinued)	327TMS	
5	Particle Counter (discontinued).	1401PCS	
6	2300AHTS Multi-parameter Probe %RH, Temperature & Airspeed	2300AHTS	

9. PROBES AND ACCESSORIES

9.2 GRAYWOLF ACCESSORIES AVAILABLE FOR USE WITH THE ZEPHYR INSTRUMENTS

1	Carrying Case (included)	PCC-30-CL
2	AC Adaptor (USA)	ACC-AA2-CL
3	PC Cable (included w/Zephyr II+)	ACC-CA1-CL
4	Printer Cable	ACC-CAP-CL
5	Printer	ACC-PR1
6	Power/Comms Y Adaptor Cable	ACC-ADY125-CL
7	Gas Calibration Kit (CO/CO_2)	CA-GCK4-CL
8	Relative Humidity Calibration Kit	CA-HC4-CL
9	1.5m dual tubing (included)	ACC-TU6
10	CF Serial Card kit for directly interfacing Zephyrs to DirectSense Mobile PC kits	ACC-SCCF

10. PITOT STATIC TUBES AND ACCESSORIES

10.1 GRAYWOLF PITOT STATIC TUBES

The pitot static tube type PIT-50-4 is a portable instrument set with four easily assembled sections, which provide pitot tube lengths up to 1.3m (51 inches). The nose and head form are designed to internationally recognised standards, with a short tip/stem ratio and a wide yaw angle tolerance. All four sections of the pitot static tube type PIT-50-4 are constructed in stainless steel tubing throughout. Standard accessories include:

a.   Sliding spring clip markers on the head section, to indicate the depth of head insertion at the measurement location.

b.   Two direction pointers, which can be fitted to the pitot tube sections and used to indicate the pitot head orientation.

c.   Flexible tubes, which are pre-fitted to the total (clear tube) and static (dark tube) outputs, and are suitable for connection to the pressure ports.

d.   Marker pen, which can be used as an alternative to the spring clip depth markers.

e   Pitot nose protector.

The PIT-229EXT pitot tube is telescoping. Other pitot static tubes (types PIT-229MS, PIT-229MM and PIT-229ML) are of fixed length construction.

10. PITOT STATIC TUBES AND ACCESSORIES

10.2 SPECIFICATIONS

Note: Unless stated otherwise, the following details apply to all the pitot static tubes.

10.2.1 Nose and Head Section

Type:	NPL MENC, all welded construction.
Design Standard:	BS 1042 Pt 2A 1973.
Calibration Coefficient:	Typically 0.997 to 0.998 at air speeds more than 1.5m/s.
DP Error:	Less than 1% for yaw angles up to 24°.

10.2.2 Rigid Tubes Types 229MS, 229MM, 229ML

Material:	Stainless steel, type 304

10.2.3 Flexible Tubes Types 50-4, 229EXT

Material:	Stainless steel, type 304.

10.2.4 Dimensions and Weight (Type 50-4)

Fully Assembled Length:	1.3m (51 inch).
Weight:	0.43kg.

Dimensions (other pitot static tubes):

Type 229MS:	267mm long x 4mm diameter.
Type 229MM:	500mm long x 8mm diameter.
Type 229ML:	1000mm long x 8mm diameter.

10. PITOT STATIC TUBES AND ACCESSORIES

APPENDIX A GLOSSARY OF TERMS AND ABBREVIATIONS

The following terms and abbreviations are used in this Manual or are associated with surveys of Indoor Air Quality:

AHU	Air handling unit.
Alarm condition	Condition that exists when an alarm level has been exceeded, but which is ignored unless the channel has been enabled. Associated measurement flashes on and off, and bleeper sounds (if enabled for that alarm).
Alarm level	Two levels that are available for most channels, which can be preset from the instrument but which are stored in the probe: **High** above which an alarm condition exists **Low** below which an alarm condition exists.
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers.
atm	Atmospheric pressure.
Auto Log	Another name for Autostart.
Autostart logging	Continuous logging that has a specified start and finish time/date.
Autorange	Automatic selection of measurement range.
Auto zero	Automatic zeroing of the pressure sensors.
Bleep	Momentary audible sound.
Button	**LOG/F1**, **STORE/F2**, **ACCEPT**, **MENU/ METER**, **CANCEL** and **ON/OFF** switches are referred to as buttons.
Calibration date	Date at which a particular measurement channel was last calibrated.
Channel	One measurement, which may be derived from more than one sensor. eg. Dewpoint is derived from temperature and humidity.
Clock time	Time and date .
Columns	Printer function, determined by the width of the printer paper. Most A4 printers use 80 columns.

APPENDIX A GLOSSARY OF TERMS AND ABBREVIATIONS

Configure	Set the instrument parameters, such as the alarm limits.
Continuous logging	Repetitive storing of measurement data at the logging time interval. Started and finished, by pressing the **LOG** button.
Countdown	Delayed switch off to avoid accidental use of the **ON/OFF** button.
Cursor key	4-way switch on the Zephyr instruments front panel.
Datalogging	Storing measurement data within the Zephyr instruments under controlled conditions.
Datalogging session	Log data identified by a Site Code.
Dewpoint	Temperature at which the moisture held in the atmosphere condenses.
Duration	Difference between the start and finish times of Autostart logging.
EC	Electrochemical Cell.
EMC	Electromagnetic compatibility.
ESD	Electrostatic discharge.
Factory setting	Default values of calibration and alarm levels that are set into a probe during manufacture.
Hg	Mercury.
Highlight	Indication in white on a black background.
HVAC	Heating, ventilation and air conditioning.
IAQ	Indoor Air Quality.
Instrument setup	Instrument options set for a particular application.
K	Kelvin.
Key	Four way cursor switch.
Keypad	General term that includes the 4-way cursor switch and the instrument buttons.
Keypad lock	Security facility that disables all the instrument switches, except for the left and right cursor keys.

APPENDIX A GLOSSARY OF TERMS AND ABBREVIATIONS

kp/cf	Kilo particles per cubic foot.
LCD	Liquid crystal display.
Line feed	Printer function, to move to the next line. Most printers have line feed as an automatic function.
Location	Reference for logged measurements. Sub division of a Site.
Log data	Stored information for each channel that was enabled during a logging session.
Logging interval	Time between repetitively storing measurement data. Applies to Continuous logging as well as Autostart logging.
Logging session	Log period from start to finish, which includes Continuous logging and Autostart.
Measurement screen	Pressure, velocity or volume flow rate.
MENC	Modified ellipsoidal nose configuration.
Menu mode	Mode in which the Zephyr instruments can be configured or retained data can be viewed. Press **MENU/METER** when in Meter mode.
Meter mode	Mode in which the probe measurements are displayed. Press **MENU/METER** to change to Menu mode.
Navigate	Use the cursor key to move the highlighted selection around the displayed information.
NDIR	Non-dispersive Infrared.
NiCd	Nickel cadmium rechargeable battery.
NiMH	Nickel metal hydride (rechargeable battery).
OSHA	Occupational Safety and Health Administration.
Out of range	Measurement that is outside the channel specification. Usually occurs while the probe is warming up, either after switch on or when a probe has been changed.
Overrange	Measurement exceeds the selected range.

APPENDIX A GLOSSARY OF TERMS AND ABBREVIATIONS

Pa	Pascals (pressure).
PC	Personal computer.
Probe	Measurement device that can be attached to the Zephyr instruments and which contains up to four sensors.
RFI	Radio frequency interference.
rh	Relative humidity.
Site	Reference for logged measurements. Sub divided into Locations.
Site Code	4-digit code, used to identify the site location
Software version	Refers to the software within the Zephyr instruments.
STP	Standard temperature and pressure.
Store	Datalogging IAQ measurements (either as a result of spot checks or continuous logging).
Time-interval datalogging	Datalogging at user-selected time intervals
Toggle	Sequential selection of two functions.
Underrange	Measurement is less than the selected range.
VFR	Volume flow rate.
WolfSense PC Software	GrayWolf software system that enables the Zephyr II+ instrument to be configured from a PC, and also to display logged data in various formats.
Y adaptor	Connector that allows the Zephyr instruments to be connected to both a PC and an ac adaptor.

APPENDIX B USEFUL CONVERSIONS

B1.   PRESSURE CONVERSIONS

**Useful
Approximations**

1 Pascal	0.010 mbar	7.501×10^{-3} mm Hg	0.01 mbar
	0.102 mm H_2O	1.451×10^{-4} psi	0.1 mm H_2O
	0.004 inch H_2O	9.869×10^{-6} atm	10×10^{-6} atm
1 mbar	100.0 Pa	0.750 mm Hg	100 Pa
	10.20 mm H_2O	0.014 psi	10 mm H_2O
	0.402 inch H_2O	9.869×10^{-4} atm	0.4 in H_2O
1 mm H_2O	9.806 Pa	0.074 mm Hg	0.04 in H_2O
	0.098 mbar	1.423×10^{-3} psi	10 Pa
	0.039 inch H_2O	9.678×10^{-5} atm	0.1 mbar
1 in H_2O	249.1 Pa	1.868 mm Hg	250 Pa
	2.491 mbar	0.036 psi	25 mm H_2O
	25.40 mm H_2O	2.458×10^{-3} atm	2.5 mbar
1 mm Hg	133.3 Pa	0.535 inch H_2O	0.5 H_2O
	1.333 mbar	0.019 psi	0.02 psi
	13.60 mm H_2O	1.316×10^{-3} atm	133 Pa
1 psi	6892 Pa	27.67 inch H_2O	700 mm H_2O
	68.92 mbar	51.70 mm Hg	50 mm Hg
	702.8 mm H_2O	0.068 atm	0.07 atm
1 atm	101.3 Pa	406.78 inch H_2O	15 psi
	1013.2 mbar	760 mm Hg	100 kPa
	10330 mm H_2O	14.696 psi	400 in H_2O

B2.   VELOCITY CONVERSIONS

1 m/s	197 ft/min
1 ft/min	5.08×10^{-3} m/s

B3.   VOLUME FLOW RATE CONVERSIONS

1 m³/s	2.12×10^3 cfm	10^3 l/s
1 cfm	5.08×10^{-3} m³/s	0.47 l/s
1 l/s	13.2 gal/min	792 gal/hr

GrayWolf Sensing Solutions, LLC
12 Cambridge Dr.
Trumbull, CT 06611
Phone: 203-416-0005
Fax: 203-416-0002

GrayWolf Sensing Solutions, LTD
Tuamgraney Industrial Estate
Tuamgraney, Co Clare, Ireland
Phone: (353)61921736
Fax: (353)61921528

Distributor:

GrayWolf Sensing Solutions

advanced environmental measurements

www.WolfSense.com