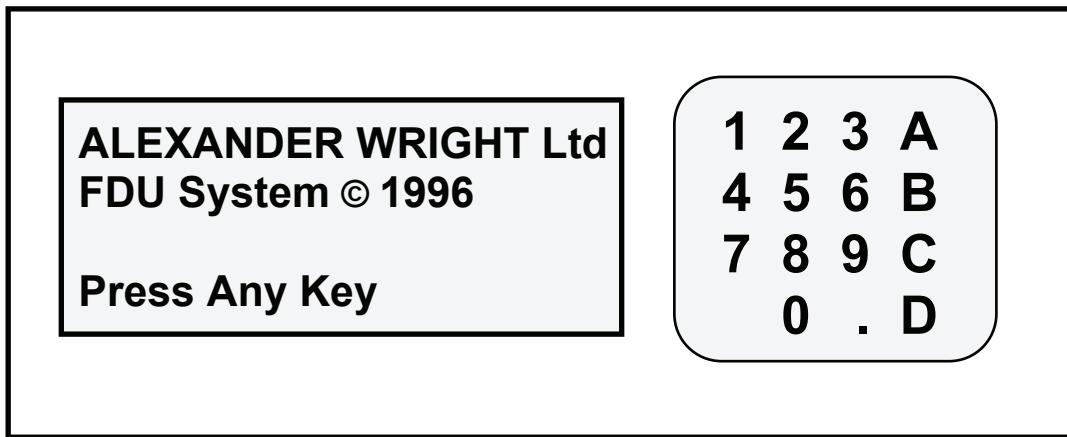


The G H Zeal Ltd FDU

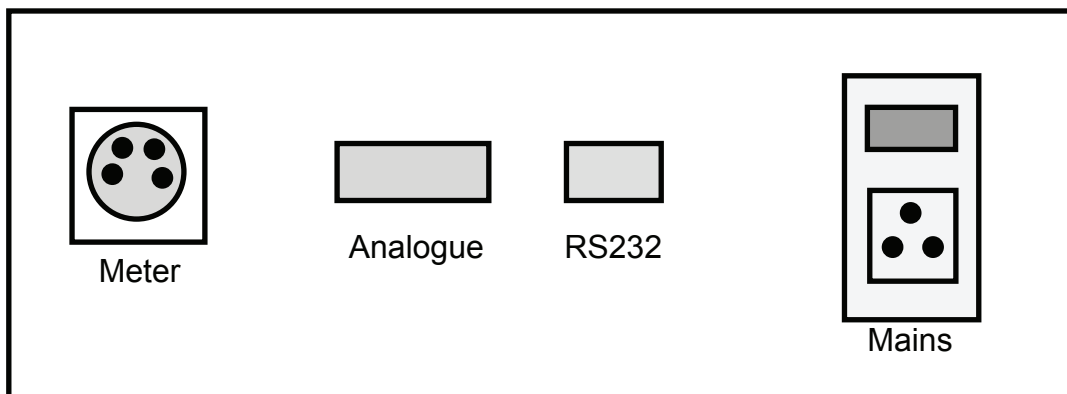
Basic User Guide

Revision 1.3 December 1998

Front Panel Layout



Rear Panel Layout



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Introduction

The FDU is supplied with the following accessories:

- 1 off 220/240V Mains Lead
- 1 off Flowmeter to FDU connection lead
- 1 off RS232 Lead (9 pole 'D' connector each end)
- 1 off Analogue Output Connector (15 way 'D' plug)
- 2 off Software Disks

Notes

1. For UK use the FDU is supplied with a 220/240V Mains Power Lead complete with a standard UK Plug, fitted with a **1 Amp** fuse.
2. For use outside the UK the Mains Power Lead is supplied without a Plug and the wiring colour code for the lead is as follows:

BROWN	=	Live
BLUE	=	Neutral
GREEN & YELLOW	=	Earth or Ground

3. In those countries using a 110V supply a power converter is supplied at no extra charge

Important

As the FDU is not fitted with an internal Fuse, it is essential that a Fuse rated at 1 Amp is fitted in the Mains Power Supply.

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Interfacing and Communicating with the FDU

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0.0 Basic Overview

- The FDU (Flow Display Unit) has been designed to interface with any Wet Type Gas Flowmeter from the Alexander Wright range that has the Optical Shaft Encoder facility.
- The units for Volume display are Litres (L), cubic centimetres (cc), cubic feet (cuft) and cubic inches (cuin). For flow these become L/hr, cc/min, cuft/hr, cuin/min.
- There are the following alarms conditions: High flow, Low flow, Total Volume, Total time, Overrange.
- On line viewing of current Maximum, Minimum and Average Flow.
- Data logging may be enabled or disabled, and Data Log may be viewed locally and Downloaded.
- Battery Backed Memory for retention of data and programmed parameters.

1.0 System Modes

There are two modes to the operation of the FDU. One is the Operational Mode and the other is the Programming Mode. In the Operational mode the FDU receives a signal from the Shaft Encoder in the Flowmeter and calculates the flow of Gas based on the Flowmeter type being used.

In the Programming Mode the operator sets up the required parameters on which the calculations are based, such as the type of Flowmeter, units etc.

It should be noted that the FDU will remember the settings that have been programmed into the system. Thus the Programming mode may be skipped if no changes are to be made to any parameters that the system uses.

1.1 Power on

The FDU will display the following message.

**Alexander Wright Ltd
FDU System © 1996**

Press any key

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1.2 Normal Entry Point

When any key is pressed the display will show:

<p>Press A for Menu Press 0 to Proceed</p>
--

Note that the system will issue a short beep whenever a key is pressed. This provides a feedback to the user that the key has been recognised by the system. In addition the backlight on the display will illuminate for a period of 5 seconds.

This point may be called the normal entry point for the system. There are two allowable routes, the Normal Mode and the Programming Mode.

If the '0' key is pressed, the FDU will enter the Normal mode where measurements are taken and displayed, (see section 2.0).

If the 'A' key is pressed, the FDU enters the Programming mode, (section 3.0).

2.0 Normal Operational Mode

All readings are reset and the FDU will then start to measure the flow of gas using the current parameters that have been programmed into the system (see section 3.0).

The display will show the following details:

Meter	DM3A
Flow	NN.NN L/hr
Volume	NN.NN L
Time	HH:MM

The units displayed are taken from the programmed parameters (section 3.0). In addition, note that all comparisons and entered data are based on the units selected here.

2.1 Explanation of Display

Meter: The type of Flowmeter that the FDU has been programmed to display.

Flow: This is the current Flow Rate of the Gas passing through the Flowmeter. This is updated (as is the rest of the display) every minute.

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Volume: This is the Total Volume of the Gas that has passed through the Flowmeter since the start of the Normal mode (when the '0' key was pressed).

Time: The time since the start of this Normal operational mode.

2.11 Displaying the Alternative Data

If the 'D' key is pressed the display will show the alternative set of data namely Maximum, Minimum and Average in the units selected for the system as a whole:

Meter	DM3A
Max	N.NN L/hr
Min	N.NN L/hr
Avg	N.NN L/hr

This display format will last for 5 seconds, at which time the display will reset to the normal format.

2.2 Operation of Alarm Conditions

2.21 High or Low Flow Rate Alarm

If the flow alarm is enabled, and the flow rate exceeds the high flow limit or drops below the low flow limit, then the buzzer will sound indicating an alarm condition and the display will show (in the case of High Flow):

ALARM: Upper Flow Press Any Key
--

Pressing any key on the keypad will silence the buzzer, clear the Alarm condition and the display will then show:

Meter	DM3A
Max	N.NN L/hr
Min	N.NN L/hr
Avg	N.NN L/hr

Where the units displayed are the same as the units used for the general display of data i.e. those programmed into the system.

When the 'C' key is pressed, the display will show:

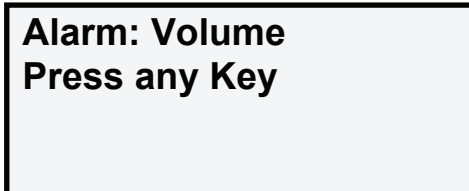
Press A for Menu Press 0 to Proceed
--

Pressing the 'A' key will cause the system to enter the Programming mode and pressing the '0' key will start the meter running with the same parameters. The same comments apply for the Low flow Alarm.

2.22 Volume Passed Alarm

If the volume alarm is enabled, and the Total Volume exceeds the volume limit, then the buzzer will sound indicating an alarm condition.

The display will show:

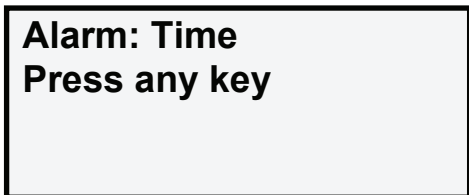


Pressing any key on the keypad will have the same effect as 2.21 paragraph 3 (Pressing any key.....) onwards.

2.23 Time Alarm

If the time alarm is enabled, and the elapsed time exceeds the time limit, then the buzzer will sound indicating an alarm condition.

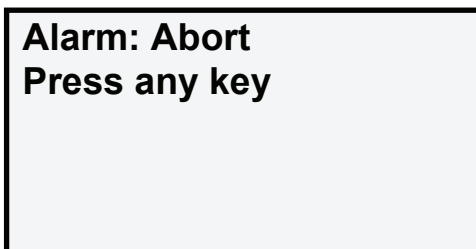
The display will show:



Pressing any key on the keypad will have the same effect as 2.21 paragraph 3 (Pressing any key.....) onwards.

2.3 Aborting the current Measurement

To abort the current Measurement, the 'BLANK' key is pressed and held down for 5 seconds. The buzzer will sound as in any alarm condition and the display will indicate:



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Pressing any key on the keypad will have the same effect as 2.21 paragraph 3 (Pressing any key.....) onwards.

3.0 The Programming Mode

On entering the programme mode, the display will show the following:

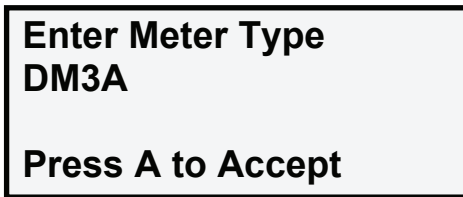


SI is the default setting, if the Flowmeter connected to the FDU is part of the DM3 (**SI** or Metric) Group, press the 'A' key to accept this setting. Alternatively, if the Flowmeter is part of the CF3 (**Imperial** or cubic foot) Group, press the '2' key to select **Imp**, and the 'A' key to accept this setting.

Note: Pressing the '1' key will re-select **SI**,

3.1 Meter Type

The next menu item is Meter Type Value. The display shows:



DM3A is the default setting, alternative Meters may be selected as follows:

SI Flowmeters:	Midget	=	key '0'
	DM3A	=	key '1'
	DM3B	=	key '2'
	DM3C	=	key '3'
	DM3D	=	key '4'
	DM3E	=	key '5'
	DM3F	=	key '6'
	DM3G	=	key '7'
	DM3H	=	key '8'
Imp Flowmeters:	CF3A	=	key '1'
	CF3B	=	key '2'
	CF3C	=	key '3'
	CF3D	=	key '4'
	CF3E	=	key '5'
	CF3F	=	key '6'
	CF3G	=	key '7'

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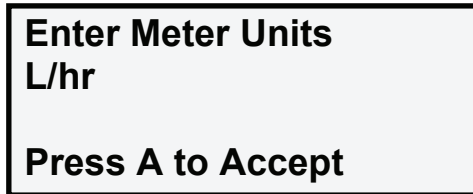
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CF3H = key '8'

Enter the required number and the 'A' key to accept.

3.11 Meter Units

The next menu item is Meter Units. The display shows:



L/hr is the default setting, alternative units may be selected as follows:

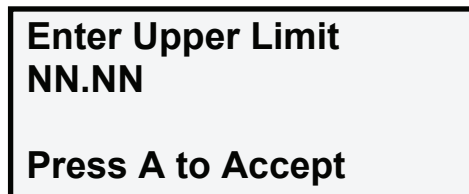
Available units are: 1 = L/hr
2 = cc/min
3 = cuft/hr
4 = cuin/min

3.2 Flow Alarm Functions

The next menu item is Flow Alarm functions.

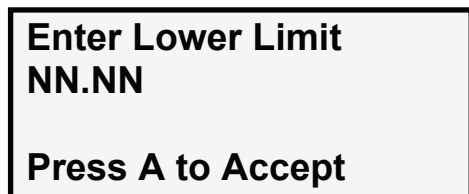


If the 'A' key is pressed the Flow Alarm flag is enabled and the display shows:



Where NN.NN is the current stored value. Enter the new value and press the 'A' key.

The display then shows to the following:



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Where NN.NN is the current stored value. Enter the new value and Press the 'A' key.

If the 'C' key was pressed at the prompt for the flow alarm functions (3.2), then the flow alarm flag is disabled and the system moves to the next menu item.

3.3 Volume Alarm Function

The next menu item is the Volume Alarm function. The display shows:

Press A for Volume
Press C to Cancel

If the 'A' key is pressed the Volume Alarm flag is enabled and the display shows:

Enter Volume Limit
NNN.NN
Press A to Accept

Where NNN.NN is the current stored value. Enter the new value and press 'A' to accept. The display then moves to the next menu item.

If the 'C' key is pressed in 3.3, the Volume Alarm flag is disabled and the system moves to the next menu item.

3.4 Time Alarm Function

The next menu item is the Time Alarm function. The display shows:

Press A for Time
Press C to Cancel

If the 'A' key is pressed the Time Alarm flag is enabled and the display shows:

Enter Time Limit
NN.NN
Press A to Accept

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Where NN.NN is the current stored value. Enter the new value and press 'A' to accept. The display then moves to the next menu item.

If the 'C' key is pressed in 3.4, the Time Alarm flag is disabled and the system moves to the next menu item.

3.5 Data Logging Functions

The data log is a single ended memory buffer, when the log has filled up, the logging is stopped. The log is capable of storing 5000 readings.

**Press A for Logging
Press C to Cancel**

If the 'A' key is pressed the display will show the following:

Data Logging

1 = Enable, 0 = Disable
A = Accept

where ***** is the current status.

If the 'C' key is pressed the logging status is unaltered.

If the logging status is enabled and there is data in the log that has not been downloaded, then the display will show the following:

Log in use (NNNN)
0 = Empty, 1 = Download
2 = Display

Where NNNN is the number of readings in the Log at the present time.

3.51 Clearing the Log

Pressing the '0' key will clear the log and the display will show the following:

**Press 0 to Proceed
Press B for Menu**

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Pressing the '0' key will cause the system to enter the Normal Operational Mode, while pressing the B key will cause the system to go back to the programming mode (3.0) to allow the operator to review the programmed parameters.

3.52 Displaying the Log

If the '2' key is pressed the user will be prompted to press any key, upon which the display will show (typically):

```
Logged Data
Meter    DM3A
FlowNN.NN L/hr
Rec: NNNN
```

To view the data press the 'A' key to advance through the log, press the 'B' key to go back through the log. To exit the display press the 'C' key. The display will then show (as previously).

```
Press 0 to Proceed
Press B for Menu

Log in Use (NNNN)
```

Proceed as in 3.51

3.53 Downloading the Log

The Disks supplied contain a utility programme that will download the logged data and save it an appropriate file. This programme will run on a PC under Windows® 3.1 or Windows® 95. Pressing the '1' key causes the FDU to prompt the user thus:

```
To Download Log
Prepare Host ..
Press Key A
```

At this stage the PC programme should be ready to operate and would indicate when initialised that is was ready to accept data. If no communication is received from the host PC, the display indicates a time out condition.

When the 'A' key is pressed, the display shows:

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**Downloading Log..
Please Wait**

Record No.

As the data is downloaded the display indicates the record number.

At the end of the download the display will indicate:

**Download Complete
Press any Key**

Pressing any key will return the user to the main prompt.

**Press 0 to Proceed
Press B for Menu**

Interfacing and Communicating with the FDU

1.0 Overview

The FDU features the following interfaces

RS232 Asynchronous serial

0 - 10V Analogue

4 - 20 mA Analogue

The RS232 port is a 9 way 'D' type socket connector, and the Analogue Output connector is a 15 way 'D' type socket, positioned on the back of the Instrument (see Rear Panel layout below).

The following data applies to the interface connectors:

RS232 Port

Received Data	Pin 2
Transmitted Data	Pin 3
Common	Pin 5

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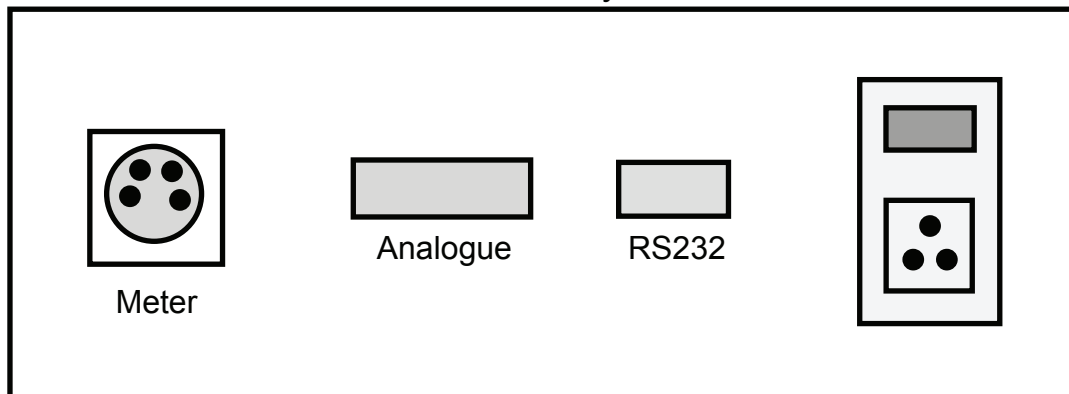
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protocol: 9600bd, no parity, 8 data bits, 1 stop bit.

Analogue Output Connector

0 -10V dc	Pin 1
0V dc	Pin 2
0 - 20 mA dc Source	Pin 13
Sink	Pin 14

Rear Panel Layout



2.0 Operation of Interfaces

The following describes the operation and use of the Interfaces

2.1 RS232 Serial Port

The RS232 serial port provides a method of downloading the FDU.

The Disks supplied contain a utility programme that will download the logged data and save it an appropriate file. This programme will run on a PC under Windows[®] 3.1 or Windows[®] 95. The data may then be viewed or placed into a database or spreadsheet programme for analysis by third party software. In addition data is transmitted from the port during normal operation of the meter. This data is the same as that which is displayed on the display. This allows for the connection of a remote serial printer or terminal.

2.2 Analogue Output

This port will provide outputs of **0 - 10V dc** and **0 - 20mA dc** as follows:

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0 - 10V dc

This is calibrated so that the Normal Hourly Rate (NHR) of the meter provides an output of 5V. (See below for details of the NHR for each Flowmeter.)

0 - 20mA dc

This is calibrated so that the Normal Hourly Rate (NHR) of the meter provides an output of 10mA. (See below for details of the NHR for each Flowmeter.)

2.3 Normal Hourly Rates

SI Flowmeters:	Midget	=	30 dm ³
	DM3A	=	60 dm ³
	DM3B	=	120 dm ³
	DM3C	=	240 dm ³
	DM3D	=	600 dm ³
	DM3E	=	1.2 m ³
	DM3F	=	2.4 m ³
	DM3G	=	6.0 m ³
	DM3H	=	12.0 m ³

Imp Flowmeters:	CF3A	=	2.4 cuft
	CF3B	=	12 cuft
	CF3C	=	30 cuft
	CF3D	=	60 cuft
	CF3E	=	120 cuft
	CF3F	=	180 cuft
	CF3G	=	240 cuft
	CF3H	=	300 cuft

3.0 Using the Download/DataGraph Software supplied

Important: Please see Software Notes (5.0) before running this Software

The FDU is supplied with 2 Disks containing the 'FDU/LFM300 Download Software', which will run in Windows[®] 3.1x or Windows[®] 95.

To install the software run the programme '*setup.exe*' on Disk 1, the set-up will ask questions about installation directories.

The programme '*download.exe*' will be found in the chosen directory, together with the appropriate Icon.

The FDU should be connected to the Computer using the cable provided. The male 9 way 'D' connector is connected to the RS232 port on the FDU and the female 9 way 'D' connector to the 'COM Port' on the Computer, a note should be made of the 'COM Port' number that is used.

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Note: A 9 way 'D' to 25 way 'D' converter may be needed to connect to some Computers.

When the option '*Download*' is selected from the FILE menu, the user can enter name of the file. On selecting 'OK' the '*Wait for Download*' option is shown. Selecting 'OK' sets the programme expecting data from the FDU. There is a 30 second time out on this programme in order to prepare the FDU for download.

Consult the relevant section of this Manual for instructions on preparing the FDU for download.

The programme will indicate the status of the download, and will inform the user when it is complete, as will the FDU.

3.1 Data Storage Format

The data from a download is stored in ASCII format for easy display. The following is a sample of a typical download. This could be placed in an Excel programme for analysis.

```
0009:DM3A :L/hr
0001:59.91:L/hr
0002:59.97:L/hr
0003:59.94:L/hr
0004:59.97:L/hr
0005:60.00:L/hr
0006:60.00:L/hr
0007:60.00:L/hr
0008:60.03:L/hr
0009:59.97:L/hr
```

The first record is the number of records, type of meter, and units of measurement. Subsequent records give the record number and the value as well as the units.

4.0 Using the Data Graph Programme

The program allows the user to select the file to display using the standard file dialogue box, options allow the user to select either *.lfm* or *.fdu* type files. Once selected the software displays the data in a graph format. Any number of data graphs can be loaded into the client window and displayed alongside each other. These graphs can then be printed directly or the graphs can be copied to the clipboard so that they can be embedded into other program files such as Word[®] for Windows[®] documents. The document to be printed or copied to the clipboard is the one displayed in the client window with the current focus.

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The program also allows the user to change a number of parameters such as the graph colour etc.

Function

The software offers the following options through use of the toolbar:

Download Data

This allows the user to download data from the logger. The file name is chosen with a file dialogue box and then the data is downloaded.

Cancel

This allows the user to cancel a download.

Comms. Port

This sets up the comms port to be used during a download.

Device type

This sets the type of data file to be downloaded.

Draw Graph

This option presents the standard windows file dialogue box to the user. The file to be drawn should be selected. More than one graph can be displayed in the client window, this is only limited by the practical ability to display each graph.

Print current graph

This allows the user to print the currently selected graph window. Print options are selected from a print dialogue box, these should be set the appropriate printer, in landscape etc.

Copy current graph

This allows the user to copy the current graph to the clipboard. Thus the graph is then available to embed in other windows files such as Word[®] documents. It should be noted that because the document is copied in vector format the embedded graph becomes fully scaleable without loss of quality.

Graph Options

This allows the user to select options for displaying the graph. The data colour is the colour of the data to be displayed. Max, min and average values can be selected to be switched off. It is recommended that when a graph is printed the background is displayed in white using the background options, to save on printer toner. The transpose X axis option causes the x axis to be transposed to a division of 1.1 times the min. value to allow windowing of the graph.

Exit

This causes the programme to terminate.

Menu Options

Distributor :



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The following menu options mirror their toolbar equivalents:

Draw Graph *File/Open*
Print current graph *File/Print*
Copy current graph *Edit/Copy*
Exit *File/Exit*

Window

This option allows the user to control the display of the graph windows that have been drawn. They can be cascaded, tiled horizontally or vertically, arranged as icons when minimised or selected from a list of current windows.

5.0 Software Notes

Due to a bug in the Graph Plotting Programme that handles the FDU data the **Total Volume** shown on the Graph plots in **L/hr or CuFt/hr**, is incorrect. The **Total Volume** should be divided by **60** to give the correct value.

Please note that this applies to the Total Volume in L/hr & CuFt/hr only.

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