

# factair

## F6100 SAFE-AIR MONITOR OPERATING INSTRUCTIONS



Quality Systems  
Approved to ISO 9001



Denotes that  
(where appropriate)  
equipment conforms to  
EEC Directives

FAC QAM 097 Issue E 03/21



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# 1 INTRODUCTION

The F6100 Safe Air Monitor is designed to provide continuous monitoring of breathing-air and compressed-air systems. Once set up the instrument will continue to monitor and data log the air quality at user defined intervals, validating the air quality against a range of alternative international standards. For breathing-air in the UK this ensures complete compliance with the relevant requirements of COSHH L5.

The instrument has an intuitive touch screen display, making set up and retrieval of previous test results easy and quick to complete.

The F6100 has built in electrochemical cells for carbon monoxide and oxygen and an infrared LED sensor for carbon dioxide. Moisture levels within the breathing air are measured by a dewpoint sensor. The instrument then displays the moisture content in pressure or atmospheric dewpoint levels, as well as providing the concentration in mg/m<sup>3</sup>. It also includes digital airline pressure and ambient temperature readings.

Periodic oil measurements are completed using the Draeger Impactor, which is inserted into the test port on the instrument. The F6100 provides a prompt to the user whenever an oil Impactor test is required and the time interval can again be defined by the user in the set up. The Impactor has no glass or hazardous components and can test for all known synthetic and mineral oils. This port is also compatible with a range of additional Draeger chemical reagent tubes, with test times which can be programmed via the menu, to quantify other potential contaminants.

## **Calibration and Warranty**

Safe-Air Monitors leave our factory with a 12-month warranty and calibration certificate. Our standard turnaround on annual calibration is 10-15 working days providing there is no major damage that requires an extensive rebuild. *Note:- Please download all stored data before returning the Tester to Factair.*

### Temperature Parameters

Storage: -10/+50°C                      Operating Range: +10/+35°C

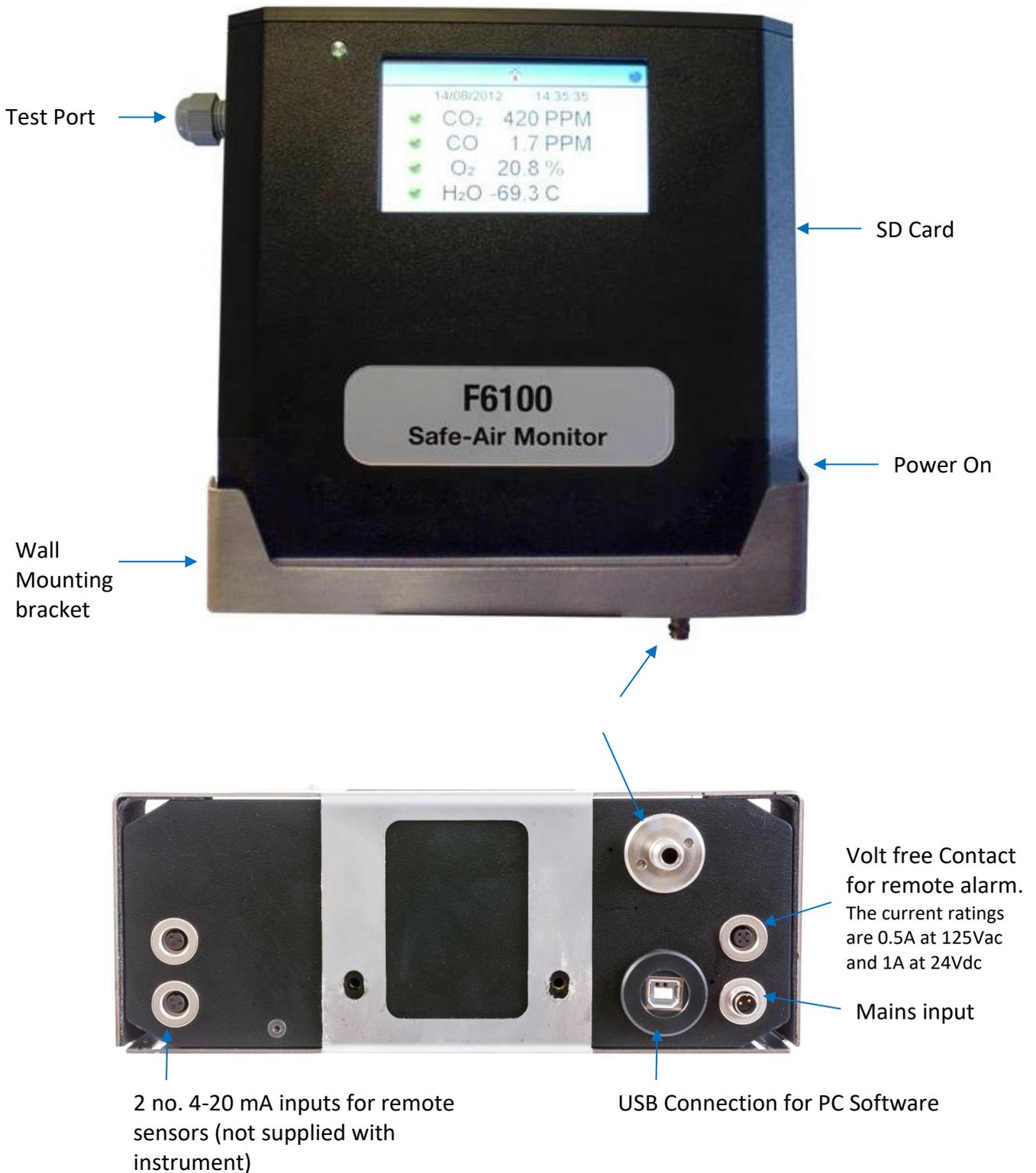
This monitor's test port is calibrated for the following approved reagent tubes/Impactor.

Test		Draeger ref.	Factair Part No:	Sensitivity
Oil (Impactor)		8103560	TUB0053	0.1 mg/m <sup>3</sup>
Oil (chemical reagent tube)*		6728371	TUB0003	0.1 mg/m <sup>3</sup>
Nitrous Fumes	NO <sub>x</sub>	8103661	TUB0068	0.2-6 ppm
Sulphur Dioxide	SO <sub>2</sub>	6728491	TUB0014	1-25 ppm
Polytest		CH28401	TUB0017	Sensitivity dependant on compound present

- *The tester can also be used with the old type Draeger reagent tube for oil, ref.6728371. (Refer to Appendix 2 at the rear of the manual for instructions.)*

**IMPORTANT – IT IS RECOMMENDED THAT YOUR SAFE-AIR MONITOR IS RETURNED FOR RECALIBRATION AND SERVICING WITHIN 12 MONTHS FROM THE ISSUE DATE OF ITS CALIBRATION CERTIFICATE**

## 2 DIAGRAM & EQUIPMENT LIST



### Additional Items Supplied with F6100

- a. Stylus Pen
- b. USB Connection Lead
- c. DVD Training Video
- d. USB Memory Stick with PC

### **3. INSTALLATION**

The F6100 is supplied with a mounting kit which enables the instrument to be wall mounted at the most suitable location to test your breathing-air / compressed-air supply. The test location needs to be as close to the breathing-air supply point as possible, in a well ventilated area free from dust and with a mains power supply available. To install the bracket mark the hole locations on the wall and check with a spirit level. Ensure you use the correct fixings to suit the wall.

Once you have installed the bracket mount the F6100 in place and connect the power supply. It is important the unit is free from vibration during use.

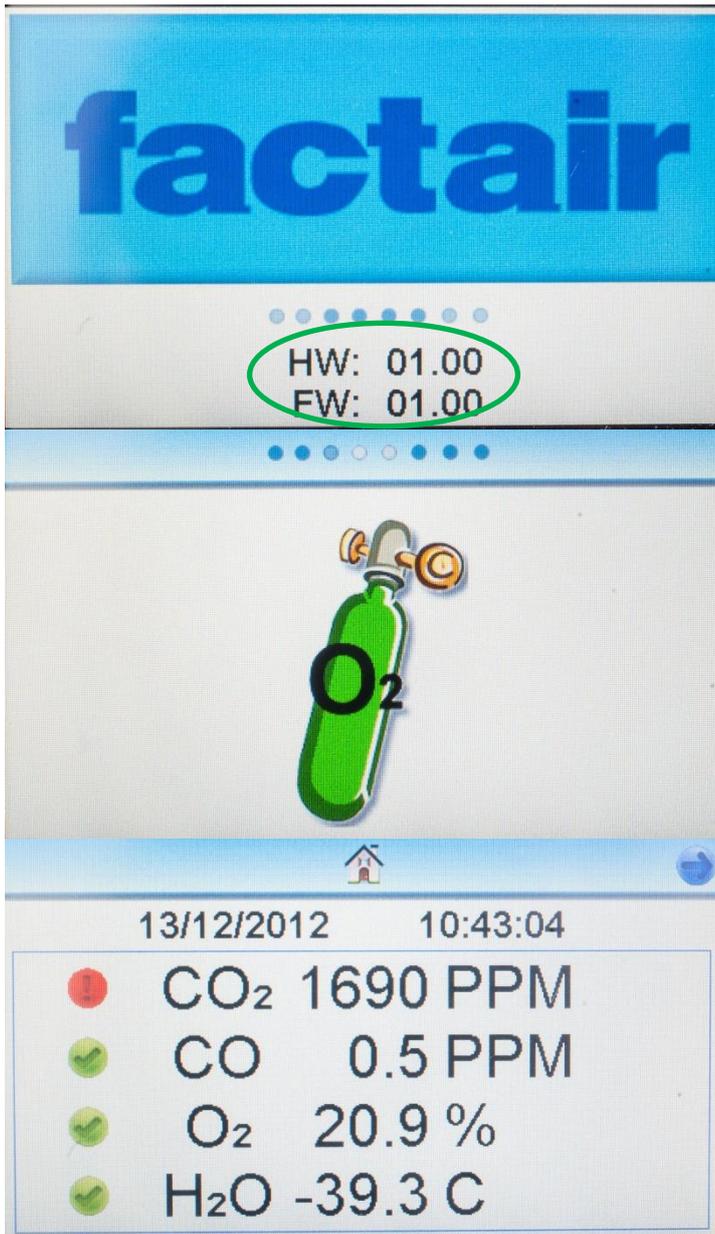
### **4 BATTERY AND POWER SUPPLY**

The F6100 is mains powered via an adaptor (220-240V, 9V output) which is supplied with the unit, in case of a power failure an inbuilt rechargeable battery back-up system will provide an additional 30 minutes operating time.

*Note: Ensure the unit is switched off prior to connecting and disconnecting the mains power supply.*

## 5 OPERATING INSTRUCTIONS

### 5.1 START-UP



To start up the instrument press and holding the green “on” button, located on the right-hand side the unit, for approximately 3 seconds. A splash screen will be displayed which shows the instruments hardware and firmware versions. Periodically the firmware is upgraded as part of the recalibration process as improvements are identified.

The unit will then automatically calibrate the oxygen cell against the surrounding atmosphere; the unit therefore needs to be in a well ventilated area.

*Note:- If the temperature is greater than 40°C inside the instrument the calibration will operate for an extended period to stabilise the Oxygen cell.*

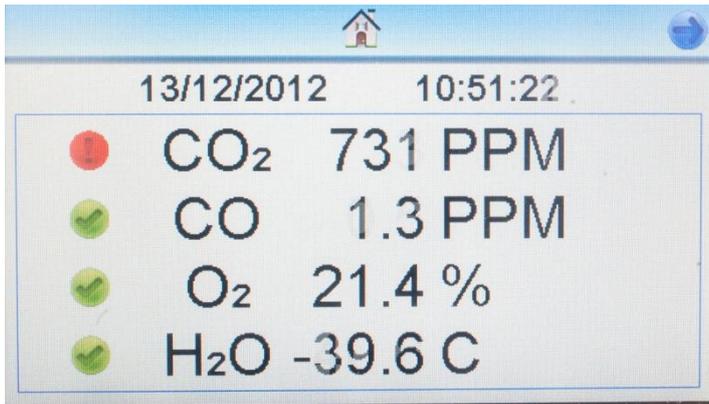
Once the oxygen cell has calibrated the instrument will then display the ‘home’ screen.

At this point you can then connect the breathing-air supply to the air inlet.

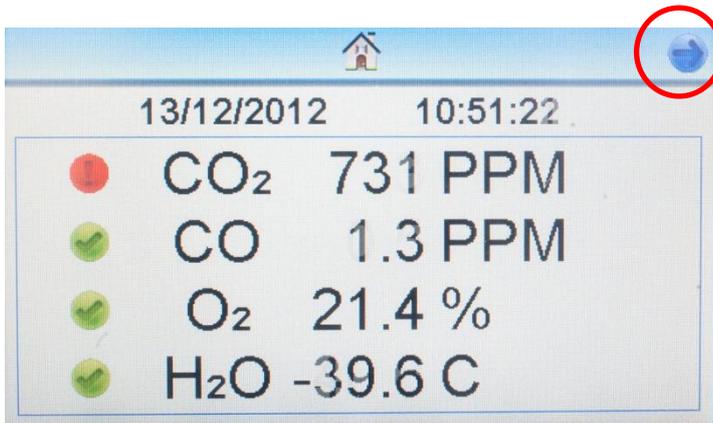
Please note that the tester can be piped to any pressure between 2 and 10 bar. If the unit is over-pressurised it will automatically shut down and display an overpressure warning; it will then need returning to the manufacturer for checking and resetting. For high pressure systems the F6100 should be used in conjunction with the F3002 HP regulator.

**Please note when the unit is first supplied or has been disconnected from the air supply for any period of time then you need to allow at least 30 minutes for the instruments cells to have sufficient time to purge, adjust and provide accurate readings of the supplied air conditions. For very dry air the dewpoint meter reading make take longer, this can be monitored on screen to confirm when it has stabilised.**

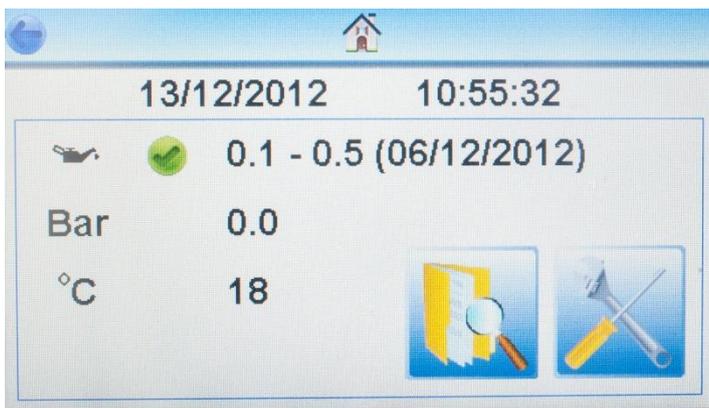
## 5.2 F6100 SCREEN MENUS



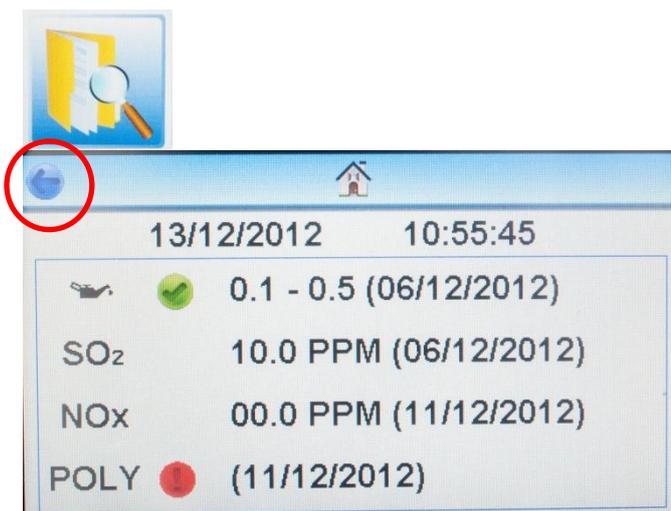
On the home screen the unit displays the date and time together with the current reading for carbon dioxide, carbon monoxide, oxygen and moisture. A green tick or red exclamation mark next to each of these confirms whether they are meeting the selected breathing-air standard. Details on how to choose the breathing-air standard and configure this display are provided later in this manual.



A stylus pen is provided for use with the touch screen. To enter the sub menu for the configuration settings or to perform a Draeger Impactor or tube test, press the arrow key in the top right hand corner.



The sub menu displays the date when the test port was last used and the result. The 2 buttons at the bottom of the screen allow you to review previous tests and enter the configuration and test port menu. To check the configuration settings press the right hand button. After a few seconds the instrument automatically reverts to the home screen.

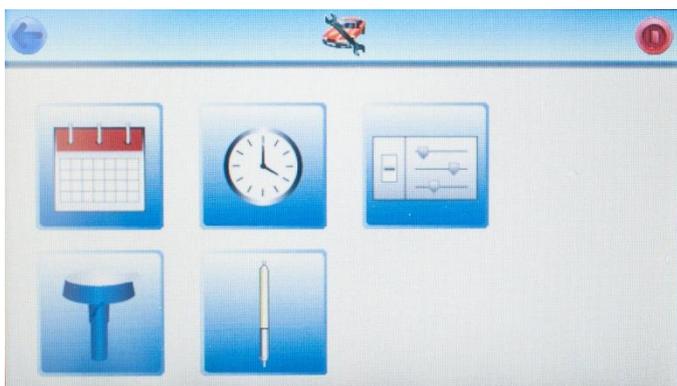


To see previous tests for all the tube options available please the review button.

This then opens a new screen with the results. To return to the sub menu press the arrow key in the top right hand corner of the screen.



To enter the configuration section, from the sub-menu, press this button.



In the configuration menu the top row has 3 buttons available, from left to right these are:  
*Set Date*

*Set Time (the instrument uses a 24 hours clock)*

*Set units of measure and date format.*

The date and time are set prior to the unit being supplied but they can be adjusted as necessary.

### 5.3 USING THE TEST PORT

The F6000 test port can also be used a range with the following Impactors/tubes listed below:

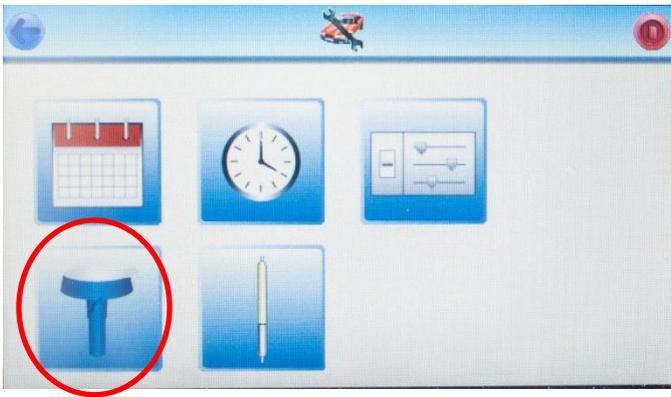
Test		Draeger ref.	Factair Part No:	Sensitivity
Oil (Impactor)		8103530	TUB0053	0.1 mg/m <sup>3</sup>
Oil (chemical reagent tube)		6728371	TUB0003	0.1 mg/m <sup>3</sup>
Nitrous Fumes	NO <sub>x</sub>	8103661	TUB0068	0.2-6 ppm
Sulphur Dioxide	SO <sub>2</sub>	6728491	TUB0014	1-25 ppm
Polytest		CH28401	TUB0017	Sensitivity dependant on compound present

To prepare the tubes Factair recommends the F2187 Draeger tube tip cutter, this is not supplied as standard.

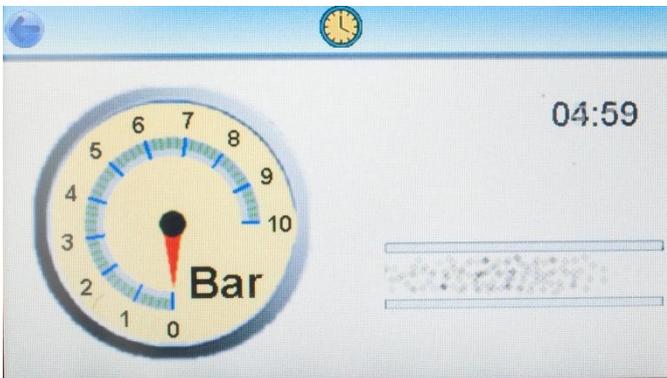
If you have another Draeger tube, which you wish to use with the instrument, contact Factair for technical advice on its suitability.

To complete a tube or Impactor test from the home screen click on the arrow in the top right hand corner then press the configuration menu button.

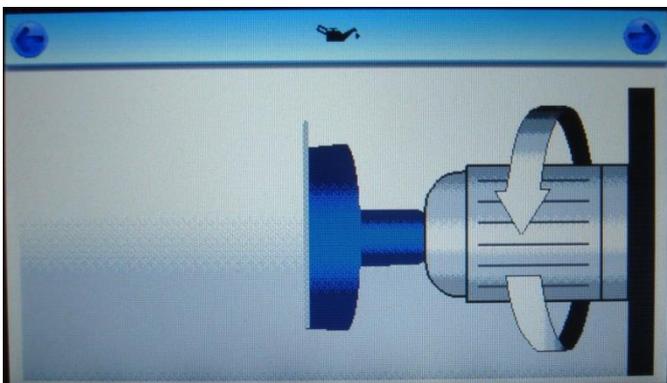
#### Draeger Oil Impactor Test



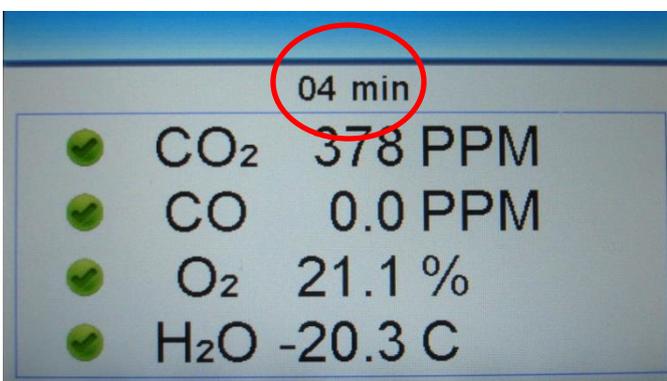
To complete an Impactor test click on the button.



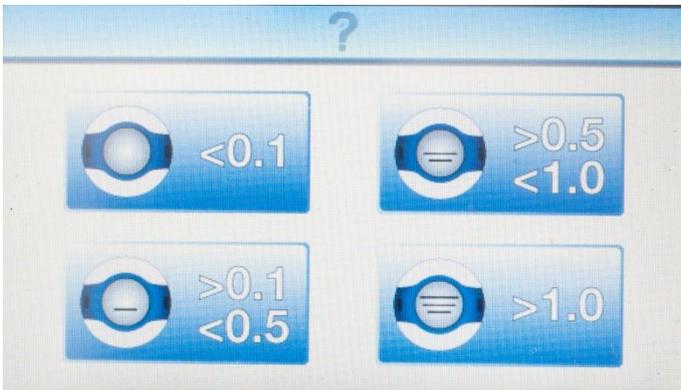
The instrument will now begin a 1-minute purge sequence, during which time an airflow will be passed through the test port. This clears contaminants from previous tests and ensures that a representative sample is being tested.



Once the purge has finished, the Draeger Impactor should be inserted into the test port and tightened firmly; ensure the Impactor has an intact protective seal. This seal must remain in place for the duration of the test. Press the button in top right hand corner to start the test.



The instrument will then revert to the home screen and a countdown will show the test time left. Once the countdown reaches zero the instrument automatically shuts off the flow to the port.

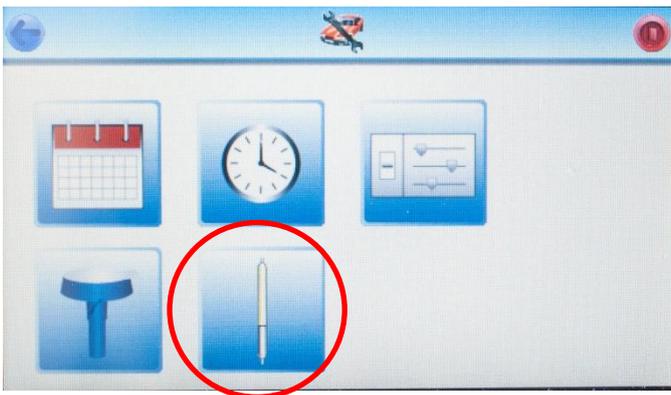


At the end of the test the Impactor can be removed and evaluated.

To enter the results press the corresponding icon on the screen. The result is then automatically recorded on the SD card.

*Note:- Instructions on reading the Impactor can be found in Appendix 3 at the back of the manual.*

## Draeger Tube Tests



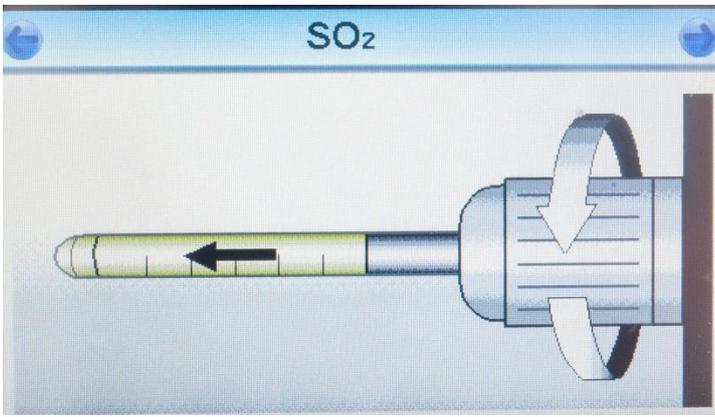
To complete a tube test from the configuration menu click on the button.



In this sub menu you will then be able to choose from oil, sulphur dioxide, nitrous fumes or the polytest tube.

If you are intending to complete an oil tube test then you will need to input the test time. If you can determine with a high degree of certainty the specific compressor lubricant being used, then refer to the “test times” chart provided on Factair’s website marked for the F6000.

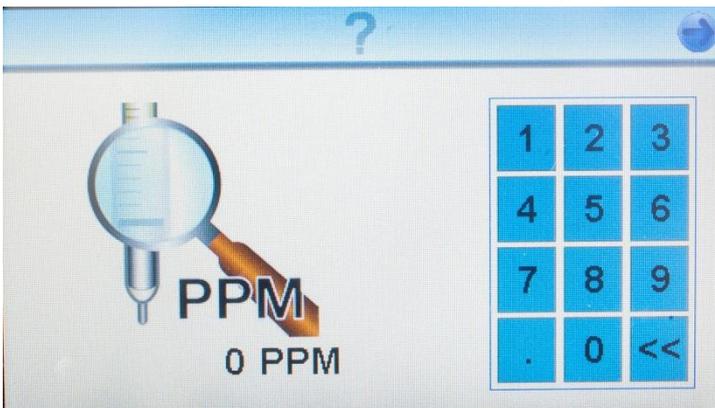
If you have no knowledge of the type of compressor lubricant being used in the breathing-air system then Factair recommends 15 minutes as this covers the vast majority of lubricants. Once you have selected the tube to tested follow the testing process as described earlier in the manual.



Once you have selected which tube you wish to test the instrument will complete its purge sequence after which you will be prompted to insert the appropriate tube into the test port and tighten firmly.

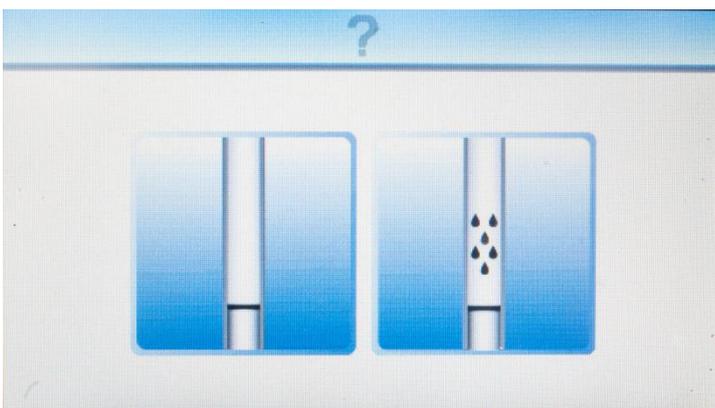
*Note: Both ends of the tube should only be cut immediately prior to the test. Ensure the arrow printed on the tube is pointing away from the instrument.*

Press the arrow in the top right corner to proceed.



The test will proceed as described in section 3 and at the end of it you will be prompted to enter the result from the tube.

For the Nitrous fumes and Sulphur dioxide tubes enter the result using the numeric pad. Then press the arrow in the top right hand corner.



For the oil and polytest tubes select the appropriate pass or fail icons.

## 6 F6100 PC SOFTWARE

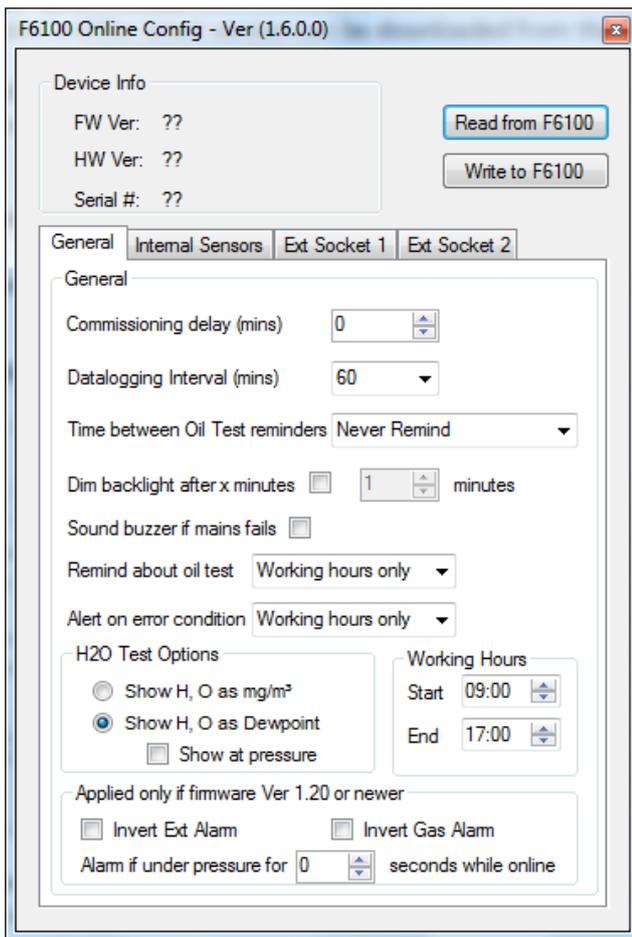
### 6.1 INSTALLING THE SOFTWARE

The PC software program (F6100 Configuration Software) is available to download from the Factair website:

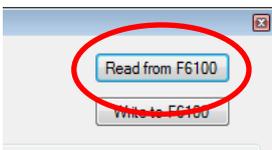
<http://www.factair.co.uk/downloads/>

### 6.2 USING THE SOFTWARE

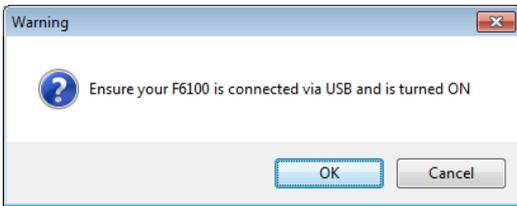
Once the software is installed when you run the application the following screen will be displayed:



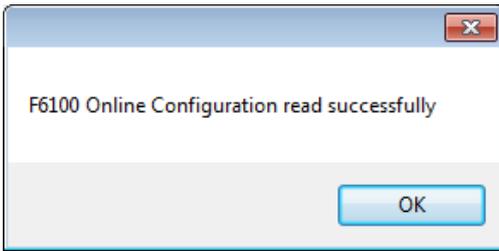
Once installed on your computer run this program and then with the USB cable provided connect your PC or laptop to the instrument.



Click on the “Read from the F6100” button you will be able to download the current configuration settings for the instrument. You will then be able to review these and update the settings to suit how you want the instrument to operate.

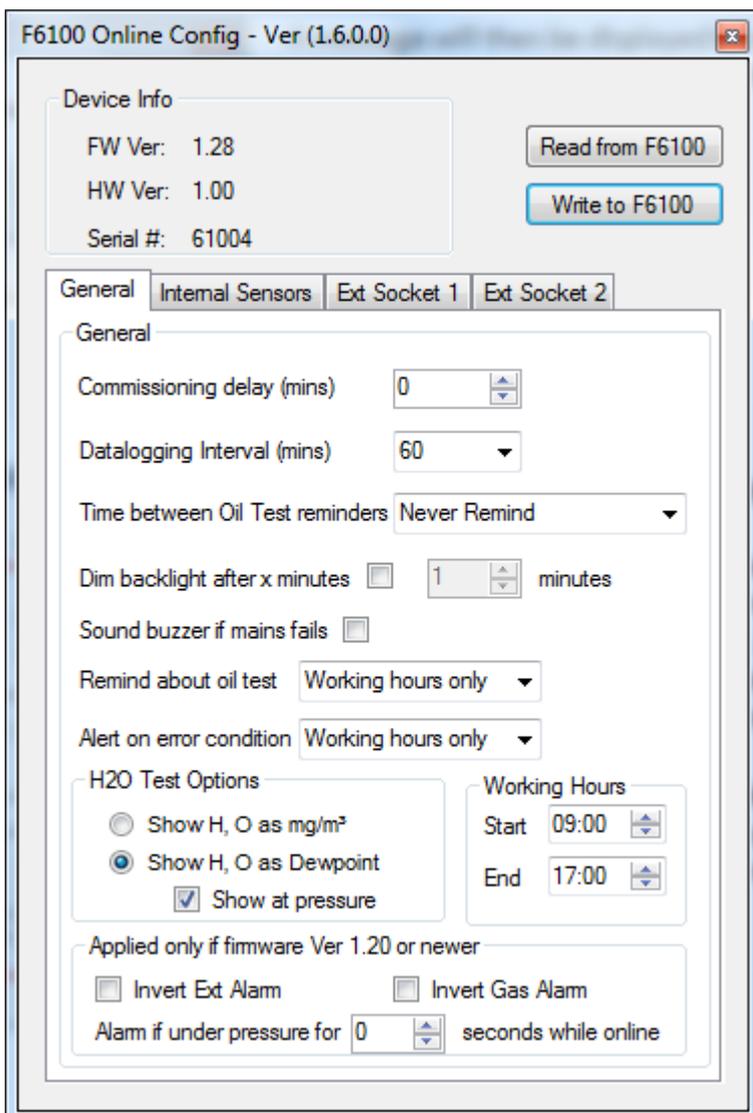


A message will then be displayed to confirm you have connected the cable, press ok to proceed.

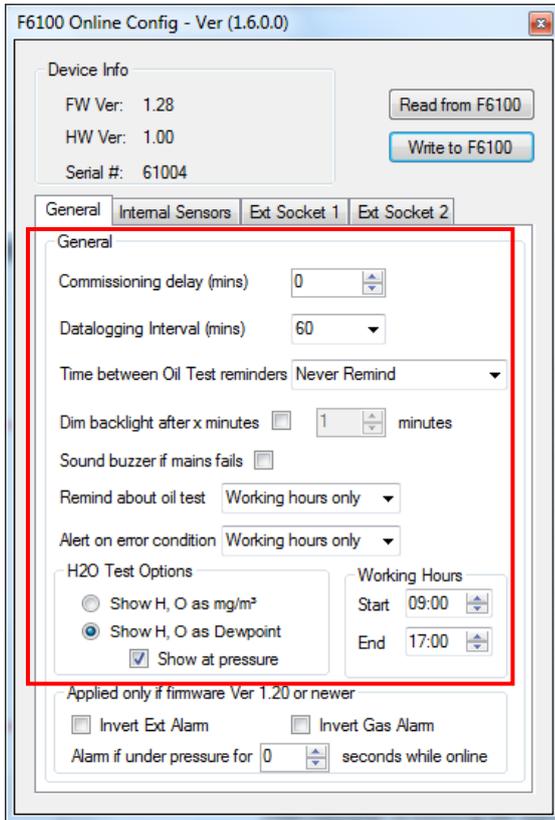


A message will then be displayed to confirm the settings have been downloaded into the software, click ok to proceed.

A typical example of a configuration is shown below:



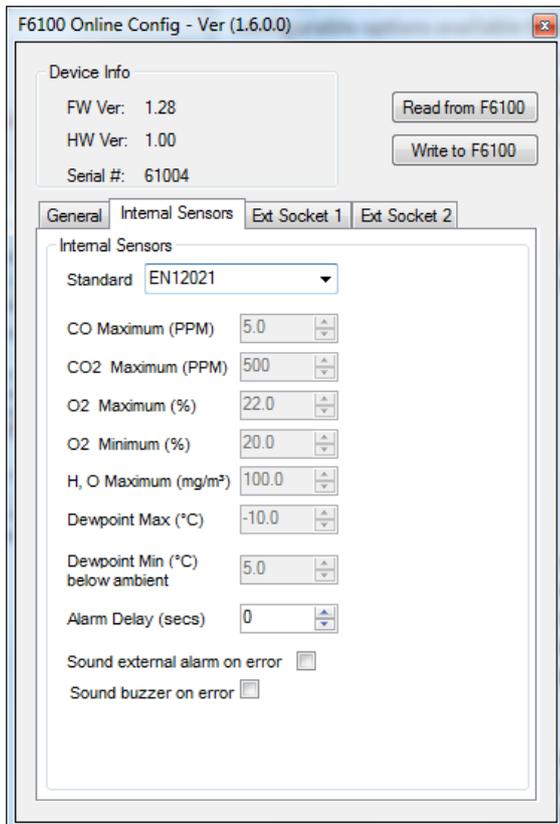
## General



In the General section there is a range of configurable options available these include:

- A commissioning delay you want which will then allow time for the sensors to stabilise before the alarm is activated.
- The datalogging interval allows you to choose how frequently test results are being saved to the instrument's SD card.
- Time between oil test reminders which allows you to define how frequently you want the instrument to display an onscreen reminder for an oil Impactor test.

## Internal Sensors



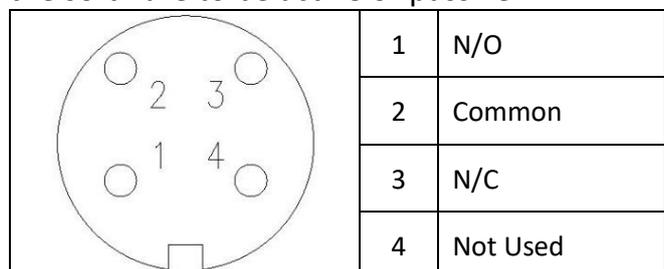
In the Internal Sensors section you can select from a range of international breathing-air standards. The menu display the current test standard and you will be able to select a range of alternatives from the drop down menu or by choosing custom input your own criteria.

At the bottom of this column there are also tick boxes available to activate the internal alarm buzzer or the volt free contact for an external alarm (not provided as standard).

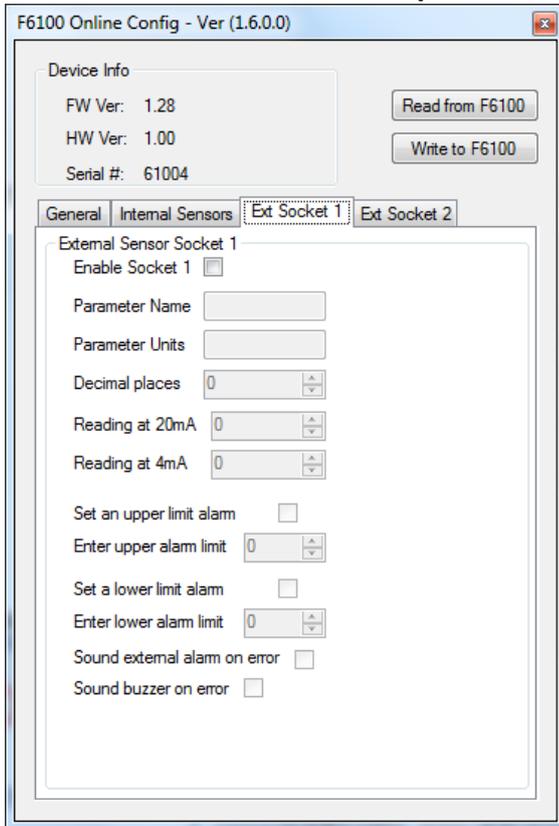
The ratings for volt free contact are 0.5A at 125Vac and 1A at 24Vdc

The socket is shown here from outside the unit.

The action of the contacts can be adjusted in the software to be active or passive.



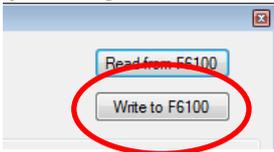
## Ext Sockets 1 & 2 - 4-20 mA Inputs



In the two right hand sections there are settings for the 2 external inputs. This allows you to connect devices such as the F6300 Oil Vapour Monitor. Results from external devices are then also automatically recorded on the F6100's SD card.

For further assistance in configuring these sockets please contact Factair.

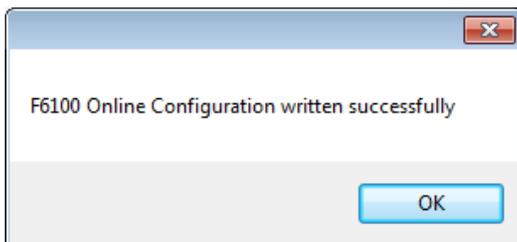
## Updating the F6100 settings



Once you have made all the required changes click on the 'Write to F6100' button.



A message will then be displayed to confirm you have connected the cable, press ok to proceed.



A message will then be displayed to confirm the settings have been uploaded into the F6100, click ok to proceed.

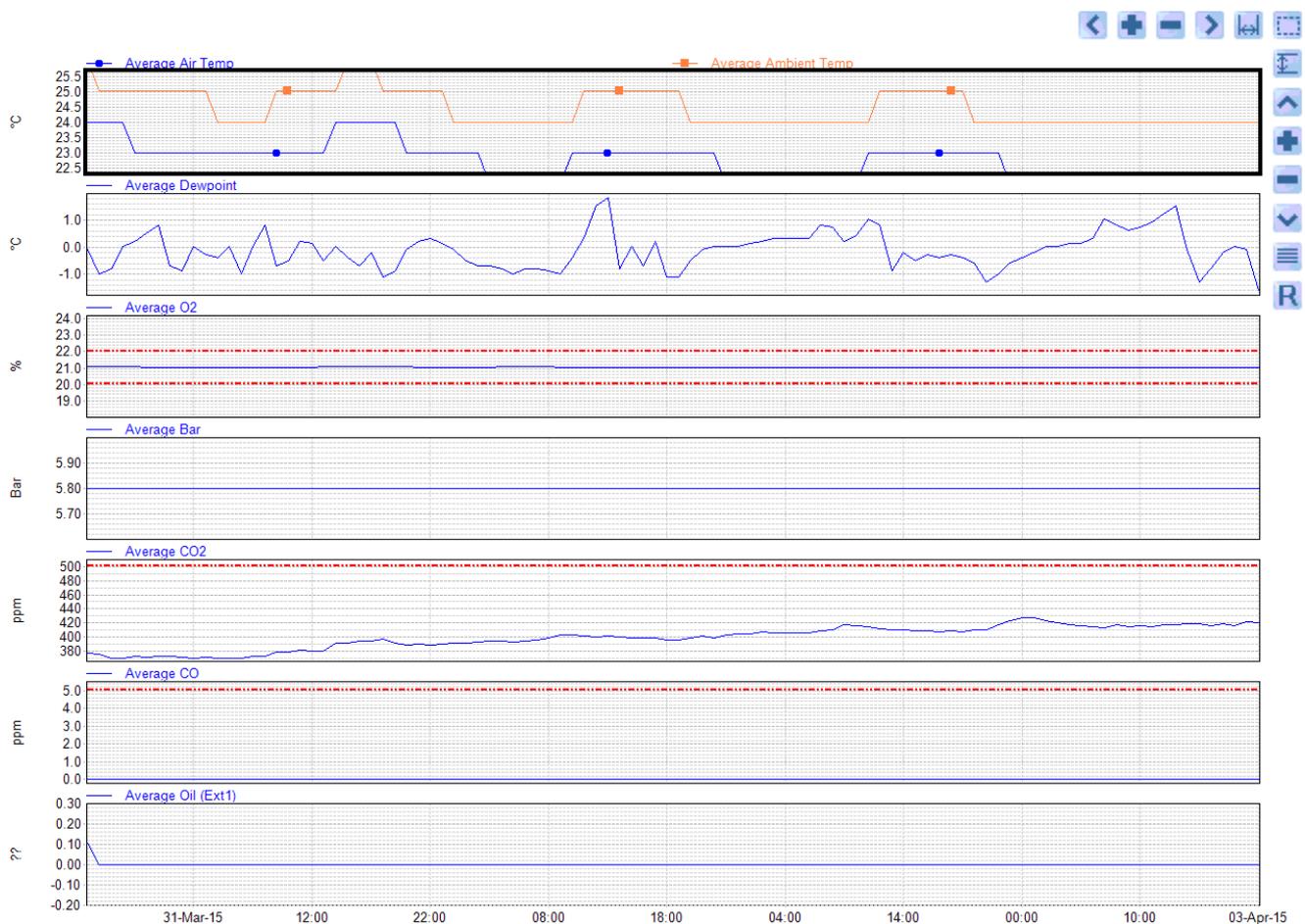
The software can then be closed by clicking on the red X in the top right hand corner of the screen.

## 7 DATALOGGED RESULTS

Test results are recorded in a CSV format on the instrument's SD card. These results can be read using Microsoft Excel, alternatively a free of charge software program to analyse results is available from Factair and can be downloaded from the website (F6100 Data Monitoring Software):

<http://www.factair.co.uk/downloads/>

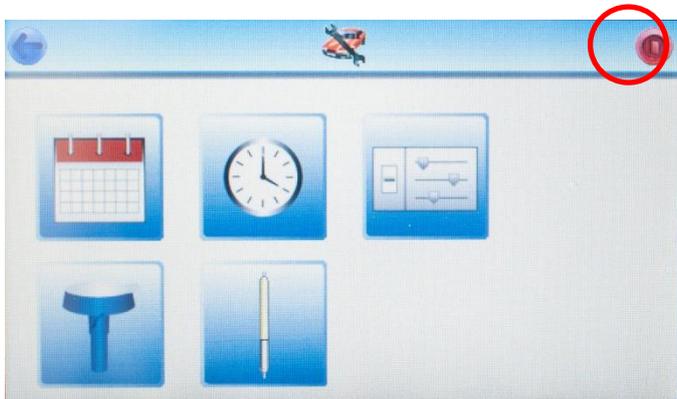
The datalogging software makes it easy to analyse results, identify trends and exceptions. Results can be imported into the software and then individual or a range of sensor readings reviewed across a selectable date range. The screen dump from the following page is an example of the how the software displays the results.



Further details on how to use this software are available from Factair.

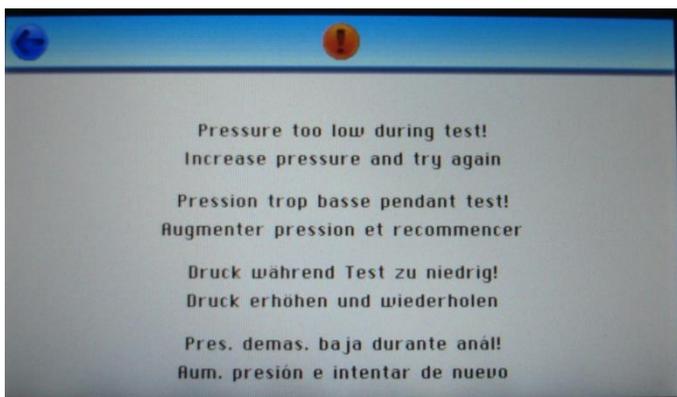
**HELPFUL TIPS**

- Never connect to a non-regulated supply from an HP cylinder or compressor.
- Maximum inlet pressure to the Safe-Air Monitor is 10 bar. If exposed to an overpressure the instrument will display an overpressure warning necessitating its return to the manufacturer for checking and resetting.
- The off button is located within the configuration menu and is deliberately not available on the home screen or sub menu to prevent accidental powering down the unit.



To turn the instrument off press the button in the top right hand corner of the screen.

- The following warning will be displayed if there is insufficient pressure being supplied for the tube test



The instrument requires a minimum of 2 bar to operate, if this warning is displayed there may also be insufficient pressure for the electronic sensors to operate correctly.

- For any additional advice and information please contact the manufacturer (see details on manual cover).
- 1 minute prior to the test results being saved onto the SD card a blinking icon will be displayed on the home screen. This icon will continue to blink if the SD card is not in the instrument and the F6100 has been unable to save the results.

**Draeger Tube Tip Cutter**

***Note: This item is not supplied as standard with the F6100.***

The F2187 is especially designed to prevent glass from falling out of the opener by accident. The reservoir for the broken-off tips is easy to empty.

**Instructions**

1. Place the end of the tube between the 3 blades, and turn to score the end.



2. Push the tube at an angle to break the tip.



3. Repeat steps 1 and 2 with the other end of the tube

**Reading the Draeger Oil Impactor and Chemical Reagent Tubes**  
**Oil Impactor**

With a standard measurement range of 0.1 to 1.0 mg/m<sup>3</sup> the Impactor has a limit of detection of 0.05 mg/m<sup>3</sup>. The Impactor features a series of 3 horizontal lines, each formed by a series of precision manufactured nozzles. These horizontal lines of nozzles are calibrated to a different concentration of oil. When air is passed through these nozzles any oil present in the air is deposited on the glass plate prior to the air being exhausted by vents around its circumference, this allows the user to easily and quickly identify minute quantities of oil.

For tests that pass with an oil concentration of less than 0.05mg/m<sup>3</sup>, the screen will remain blank. For tests above that read as follows:

The bottom line represents an oil concentration of 0.1 mg/m<sup>3</sup>. When the oil deposited forms a continuous line then the concentration is in excess of 0.1 mg/m<sup>3</sup>. The middle line represents a concentration of 0.5 mg/m<sup>3</sup>, again when the oil deposited forms a continuous line the concentration is in excess of 0.5 mg/m<sup>3</sup>. The top line represents a concentration of 1.0 mg/m<sup>3</sup>, again when this forms a continuous line the concentration is in excess of 1.0 mg/m<sup>3</sup>.



Each pack of tubes has its own instruction leaflet but the following notes should help you take readings after the tests have been completed.

### Oil (67 28371)

**REQUIREMENT** - FOR BS EN12021 BREATHING-AIR SHOULD HAVE A MAXIMUM OIL CONTENT OF 0.5 MG/M<sup>3</sup> AND SHOULD BE WITHOUT SIGNIFICANT ODOUR OR TASTE.

1. Using the Tube Tip Cutter, place the ampoule section in the platform at the bottom. Note: Make sure the tube is against the back wall of the cutter. Line up the black dot nearest the end of the tube with dot on the cutter.



2. With one hand holding the cutter, the other holding the tube and with your thumb against the base of the cutter, apply pressure to the tube, this should break the inner tube.



3. Place your used detector tubes in the F2154 Travel Container (not supplied as standard), until they can be disposed of properly as "sharps" or glass.



Ensure the oil tube is kept vertical throughout this process.

Satisfactory test: - The white crystals will turn translucent and show at worst a slight discoloration.

Failed test: - (Mineral oil) - The white crystals will show a light brown or darker discoloration.  
- (Synthetic oil) - The white crystals will show a yellow discoloration [Note: best seen by comparing with an unused tube].



### Water (H<sub>2</sub>O) (67 28531)

**REQUIREMENT S** - FOR AIRLINES BELOW 40 BAR THE PRESSURE DEWPOINT TO BE 5°C BELOW THE LIKELY LOWEST TEMPERATURE. WHERE THE LIKELY LOWEST TEMPERATURE IS NOT KNOWN THE PRESSURE DEWPOINT SHOULD NOT EXCEED -11°C.

- FOR HIGH-PRESSURE CYLINDERS THE FOLLOWING UPPER LIMITS APPLY: - 40 TO 200 BAR = 50MG/M<sup>3</sup>, ABOVE 200BAR = 35MG/M<sup>3</sup>
- FOR HIGH-PRESSURE CYLINDER CHARGING COMPRESSORS THE UPPER LIMIT = 25MG/M<sup>3</sup>

A reddish brown discoloration will show the extent of the water content, which is read from the scale printed on the tube in mg/m<sup>3</sup>.

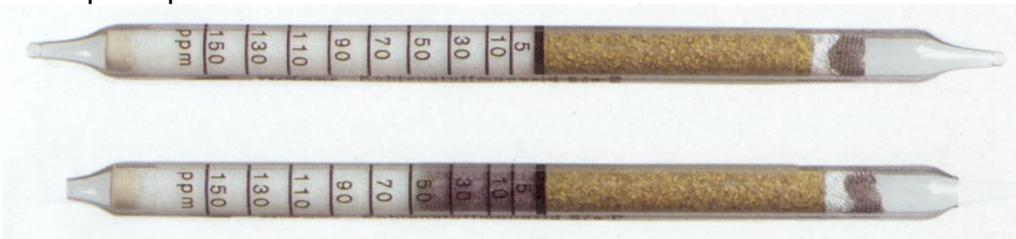
When using the 50-2000 range setting, the tube reading is multiplied by a factor of 10, i.e. a tube reading of 150mg/m<sup>3</sup> becomes 1500mg/m<sup>3</sup>. To establish the pressure dewpoint refer to the graph on the back of the Safe-Air Tester Result Sheet.



### Carbon Dioxide (CO<sub>2</sub>) (67 28521)

**REQUIREMENT** - MAXIMUM READING OF 500 PPM.

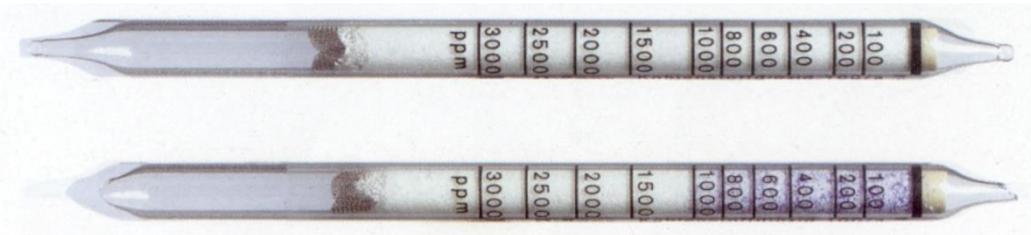
The media in the detector tube will discolour to show the presence of carbon dioxide. The total length of the discoloration read from the printed scale at that point is a measure of the concentration in parts per million.



### Carbon Monoxide (CO) (67 28511)

**REQUIREMENT** - MAXIMUM READING OF 5 PPM.

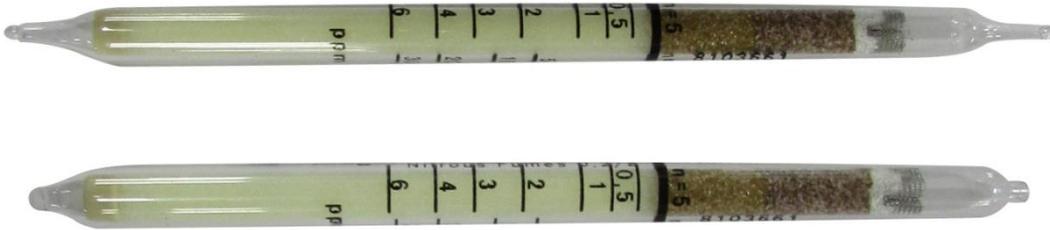
The media will discolour to show the presence of carbon monoxide in the air sample. The total length of the discoloration is the measure of concentration read directly from the scale in parts per million.



## Nitrous Fumes (NO<sub>x</sub>) (8103661)

REQUIREMENT - MAXIMUM READING OF 2 PPM.

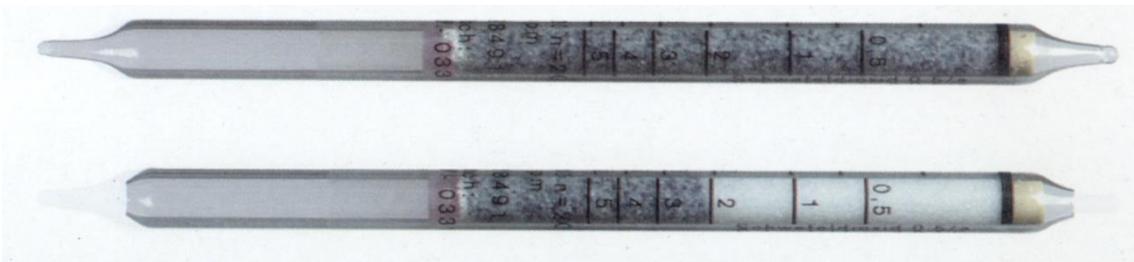
The media in the detector tube will discolour to show the presence of nitrous fumes. The total length of the discoloration is the measure of concentration read directly from the scale in parts per million.



## Sulphur Dioxide (SO<sub>2</sub>) (67 28491)

REQUIREMENT - MAXIMUM READING OF 1 PPM.

The media in the detector tube will change from grey blue to white to show the presence of sulphur dioxide. The total length of the white section is the measure of concentration read directly from the 1-25ppm scale in parts per million.



## Polytest (CH 28401)

REQUIREMENT - NO DISCOLORATION.

The media in the detector tube will discolour to provide qualitative determination of easily oxidizable substances in air. Refer to Polytest data sheets for more specific information.

If discoloration occurs further investigation will be required to determine the source of the contamination.



**IMPORTANT – IT IS RECOMMENDED THAT YOUR SAFE-AIR MONITOR IS RETURNED FOR RECALIBRATION AND SERVICING WITHIN 12 MONTHS FROM THE ISSUE DATE OF ITS CALIBRATION CERTIFICATE**

## *Dräger*

### Disposal of Draeger-Tubes

When Draeger-tubes have been used, or unopened tubes have exceeded their expiry date, they should be disposed of using one of the following methods :

#### **Used Tubes**

- 1 Submerge the tube(s) in a beaker or metal container filled with water and allow to soak for 24 hours. Treat the residual water in accordance with local authority waste regulations (some tube aqueous waste may require neutralisation prior to disposal). Place the tubes in a “sharps” or glass bin wearing protective gloves and safety spectacles. Dispose of the bin via the company’s normal industrial waste disposal method(s) ie: landfill or incineration.

OR

- 2 Place the tubes in a “sharps” or glass bin wearing protective gloves and safety spectacles. Dispose of the bin via the company’s normal hazardous waste disposal method(s) ie: landfill or incineration.

OR

- 3 Place the tubes in a “sharps” or glass bin wearing protective gloves and safety spectacles. Dispose of the container via incineration.

#### **Unused Tubes**

Open the Draeger-tube at both ends using the special tube opener or the cutter on the hand pump. Break any ampoules where applicable. Dispose of the tubes as stated in Methods 1, 2 or 3.

**NOTE** : *As an alternative a local authority approved waste disposal contractor can be employed to collect used and unused tubes from site and dispose of them in a safe manner.*

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