

9ENG8008 GFM436 User Manual

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1 Handheld Gas Analyser for Landfill



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2

WARNINGS

The manufacturer reserves its right to update the contents of this manual, in line with the evolution of the product.

Text and pictures in the manual are not binding.

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3

GFM436

The GFM436 gas analyser is part of the GFM range, designed and manufactured by Gas Data Ltd.





4 GFM436 General Information

4.1 Introduction

The Gas Data GFM436 handheld series of analysers is designed specifically for monitoring and analysing gas content of landfill, biogas and contaminated land sites. It measures the methane, oxygen and carbon dioxide content of site gases, gas pressure or vacuum, and gas velocity.



Operation is extremely simple, yet the readings obtained are highly accurate. The instrument uses Gas Data's proprietary infra-red methane and carbon dioxide sensors and a combination of industry standard electrochemical gas sensor cells. A variety of external sensors can be plugged in, e.g. vane anemometer to measure gas velocity or a temperature probe for ambient and other temperatures.

The GFM436 series has rechargeable Nickel Metal Hydride batteries giving around eight hours use between charges. A battery charger and mains unit is supplied with the instrument and a field replaceable battery pack is also available as an optional extra.

4.1.1 Features

- Up to 7 gas analysis channels.
- 4 Wavelength optical infra-red analyser.
- Atmospheric pressure.
- Powerful sample pump.
- User replaceable sample filter.
- Field replaceable/rechargeable battery pack.
- Optional flow, pressure and temperature.



4.2 Spares List

Category	Description	GD order code
Spares	GFM internal Filters 15mm	18811
	GFM external Filters 25mm	18810
	GFM external Filters 50mm	18818
	GFM/Click! Sample Pipe Connector (Male Metal)	18812
	Chrome Plate Brass Coupling 1/8" ID Hose St.Thru	20710
	GFM/Click! Sample Pipe Connector (Male plastic)	18934
	GFM426 and GFM526 Sample Pipe	20726
	GFM Sample Pipe	17227
	GFM43x Sample Tube	17226
	GFM43x/610 Flow Tube	16480
	GFM426 and GFM526 External Filter Housing Assembly - Black ABS	20838
	GFM Drilled Battery Cover, Black, ABS	17214
	GFM Spares Kit	14265
	Inlet housing	17204
Power	Battery pack	16457
	AC Mains Battery charger	16455



	Universal DC In-Car Multi Voltage Power Adaptor	21266
	GFMxxx North America Charger Foot (Blue Bag)	22626
Accessories	USB Download cable	16501
	Brass Temperature Probe	16503
	Leather cover	16781
	GFM Vane Anemometer Probe 0.5 - 40m/s	16502
	Black carry case	17111





5 Safe Use of the GFM436

This instrument has been designed to operate in typical field environments where flammable gases may be present.

All 'Special Conditions for Safe Use' as detailed on the ATEX, UKEX and IECEx certificates (see the appendices) must be adhered to.

⚠ The following points must be observed:-

- The instrument must be recharged in the non-hazardous area.
- The instrument must be checked for normal operation prior to carrying it into the hazardous area:
- BEFORE entering a known hazardous zone, switch on the instrument and make sure the display is visible and that the keys respond correctly.
- BEFORE entering a known hazardous zone, check that the sample pump can be operated.
- The instrument must be inspected for damage prior to use and the instrument must not be used if the case is damaged:
- BEFORE entering a known hazardous zone, check the instrument for damage. Pay particular attention to the keyboard and aspirator.
- The instrument must be carried in the leather case to avoid the risk of electrostatic discharge:
- BEFORE entering a hazardous zone make sure that the instrument is securely enclosed in its leather case.

IMPORTANT: Failure to comply with the safety warnings in this chapter can be potentially hazardous to the user and others.

5.1 Important Safety Related Points

The safest medium to sample a gas line with the instrument is to connect it to an isolated sample line, accessible by a ball valve (or another suitable alternative).

Sampled gas will be discharged from the 'sample out' port of the instrument at a rate of approximately 500ml/min.

i IMPORTANT: Make sure this gas will not create a hazardous zone worse than ZONE 1. See the appendices for a full description of hazardous zones.

- Flush the instrument with clean air before sampling to prevent mixing potentially reactive mixtures of gas within the instrument.
- Verify instrument calibration before and after use to minimise the risk of falsely determining an atmosphere as hazardous or safe.
- **Do not** connect the instrument to gas sources at greater than +50 mbar above atmospheric pressure.
- **Do not** operate the instrument in ambient temperatures outside the range of -10 to +40 °C (14°F to 104°F)



- **Do not** attempt to dismantle the instrument outside of the instructions in this manual.
- **Do not** operate the instrument if it is damaged in any way (i.e. loose front panel, missing screws etc.).
- **Do not** connect or remove electrical connectors on the top of the instrument in the hazardous area.
- **Do not** use (i.e. power on) the instrument while charging.
- Only charge the batteries in a safe well ventilated area using the charger supplied.
- Ensure correct filter is used on the Gas In port – If any doubt please contact the manufacturer
- Use only the manufacturer's spares and accessories – See spares list.

For further information please refer to the appendices on *Understanding Instruments For Use In Flammable Atmospheres* and *ATEX, UKEX and IECEx Certification*.

i **IMPORTANT:** The manufacturer cannot accept any liability for loss or damage due to its usage. Satisfy yourself that the unit is suitable for the application that you intend to use it for. If in doubt about the suitability of this instrument for a particular application call the manufacturer for further advice.



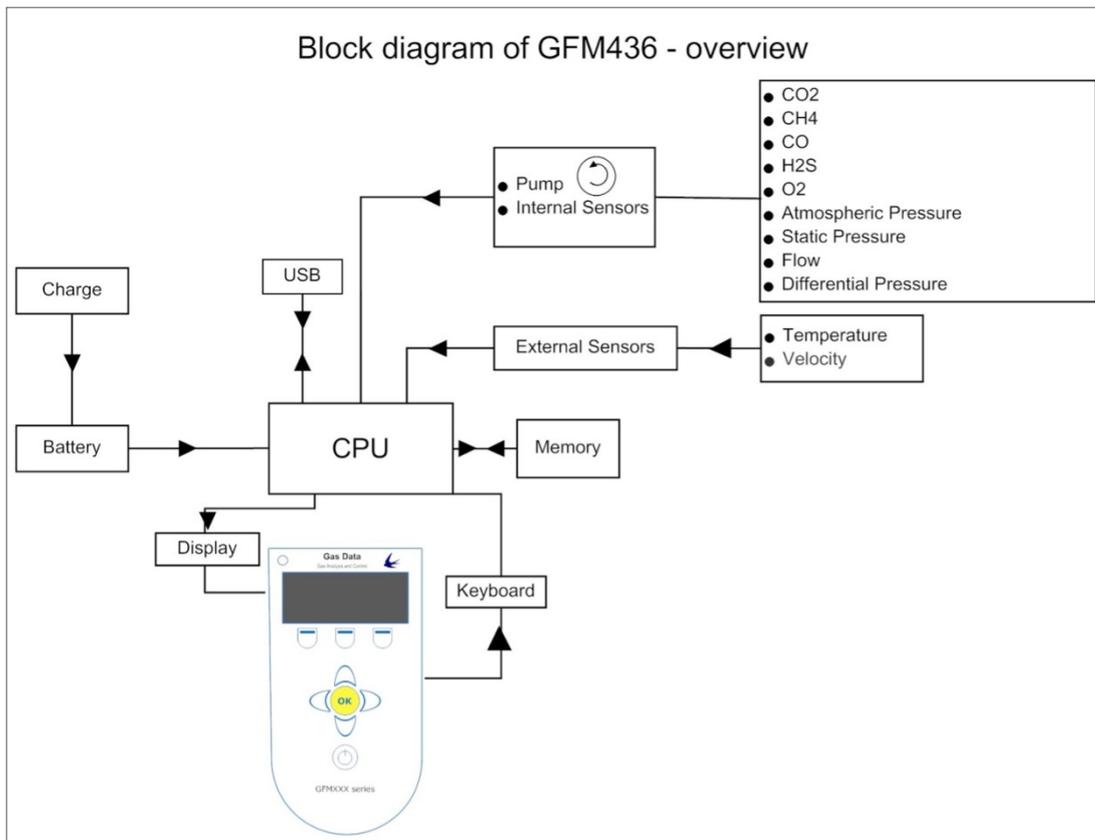


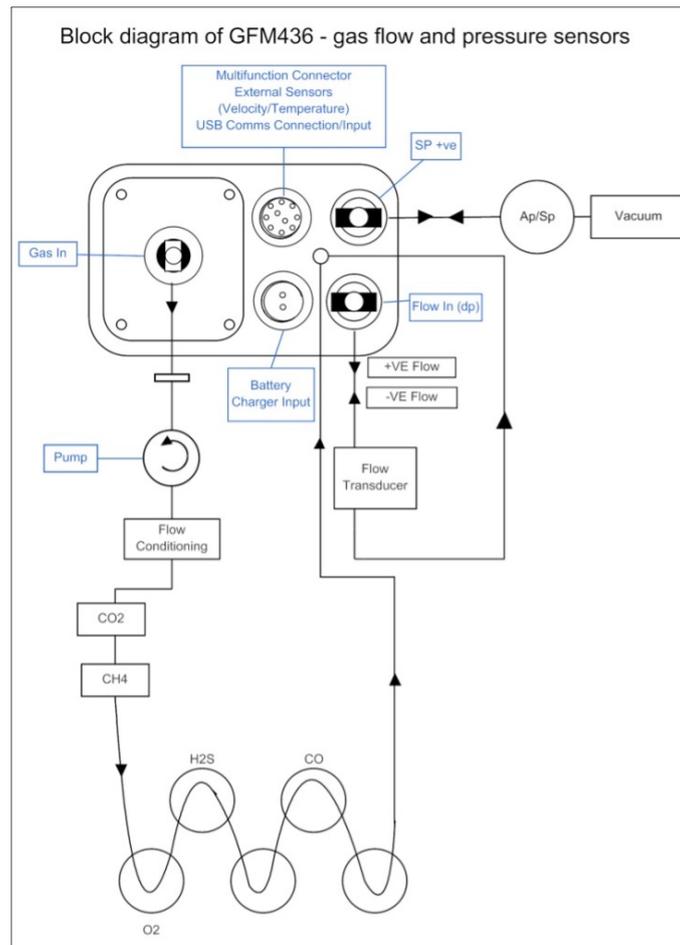
6 GFM436 Product Specification

6.1 Introduction to the GFM436 Functions and Features

The GFM436 is an ATEX accredited hand-held gas analyser designed specifically for monitoring and analysing soil gas parameters in greenfield and brownfield (contaminated land) sites and landfill sites.

It is lightweight, small and robustly manufactured in a weather resistant case making it suitable for use even in challenging field applications. It measures the methane, carbon dioxide, oxygen, hydrogen sulphide, hexane and carbon monoxide content of the gas sample. It also has internal sensors for the measurement of gas pressures (or vacuum) and flow. External sensors can be attached for the measurement of temperature and gas velocity.





Operation is extremely simple, yet the readings obtained are highly accurate. The instrument uses Gas Data's proprietary infra-red methane and carbon dioxide sensors and a combination of industry standard sensors for the other parameters.

The GFM436 has a rechargeable Nickel Metal Hydride battery pack giving around eight hours use between charges. A universal input mains battery charger unit is supplied with the instrument. Additional field replaceable battery packs and an in car 12V DC powered charger are also available as optional extras.

To help conserve battery life, the GFM436 features an auto power off facility. It will switch itself off after 15 minutes if no keys are pressed or there is no USB communication activity. During unattended data logging, it can be set to shut itself down after taking a sample and turn itself back on to take the next sample. The instrument will also switch off if the battery voltage is too low for it to operate.

The GFM436 features data storage with three-layer alphanumeric labelling of sample points and unattended data logging capability. Data is stored in non-volatile FLASH memory with a capacity of approximately 3000 data sets



including the time and date it was stored and a 32-character alphanumeric label. Using Gas Data's SiteMan5 program data and labels can be transferred to and from a PC via a USB connection cable.

6.2 GFM436 Instrument Specification

General	
Ex. Rating to:	II 2 G Ex ib IIB T1 Gb
Ambient Temp Range	-10 to 40 °C (14 °F to 104 °F) [N.B. the instrument is EX certified to -20 °C / -4 °F, but the sensors are only calibrated to -10 °C / 14 °F]
Battery Life	8 hours typical
Battery charge time	2 to 4 hours
Aspiration Rate	300 ml/min
Storage Capacity	>3000 Readings
Protection Rating	IP65
Dimensions	200 x 100 x 60 mm
Weight	1kg typical





GFM436 Channels

Channel	Range	Typical Accuracy	Typical Response
Methane	0 to 100% (0.1)	0.3% @ 5%, 3.0% @ 60%, 3.0% @ 100%	20s
	0 to 100% LEL (0.1)	4% LEL	30s
Carbon Dioxide	0 to 100% (0.1)	0.3% @ 5%, 3.0% @ 40%, 3.0% @ 40%	20s
Oxygen	0 to 25% (0.1)	0.5%	20s
Atmospheric Pressure	800 to 1200 mbar	5 mbar, 1 mbar resolution	20s
H2S	2000 ppm (10.0)	5% of fs	30s
CO	2000 ppm (1.0)	5% of fs	30s
Static Pressure	-200mbar - +200mbar	+/- 1 mbar	10s
Flow Range	+100 to -60 l/hr	+/- 0.1l/hr to +/-3l/hr	10s
Flow Resolution	0.1 l/hr		



Differential Pressure	+1250/-1250 Pa	+/-3Pa to +/- 250Pa	10s
Optional Channels			
Temperature	-10 to 100°C	+/-1.0°C	60s
Velocity	0-40m/s	+/-0.51 m/s resolution	30s
<p>Accessories</p> <p>Battery charger, Carry Case, Sample Pipe, Manual, Calibration Certificate, Download Cable</p> <p>Optional extras: Temperature probe, Vane Anemometer</p>			

6.3 Specialist Functionality

6.3.1 Lower Explosive Limit

The instrument calculates and displays the Lower Explosive Limit (LEL) of Methane. This function is intended for use where methane has become mixed with air i.e. where oxygen is still present in normal atmospheric proportions with respect to atmospheric nitrogen. This is the worst case so if the gas sample is taken from a location where the oxygen content is depleted e.g. due to biological demand, then the LEL indication will be higher than expected.

6.3.2 Managing Hydrocarbons Using the Hexane Channel

The instrument incorporates an additional Hexane calibration of the infra-red sensor which is used to indicate, quantify and track hydrocarbon gases that would normally make the infra-red methane calibration read excessively high or even over-range rendering the results meaningless. With the GFM436 when and if the methane sensor shows an over-range signal or abnormally high methane value (a good indicator that other hydrocarbons are present in the borehole) the hexane value will remain valid and in range up to 2.000%.





This response range is chosen as it allows typical concentration levels of hydrocarbon vapours that would be found in contaminated ground due to the spillage of common liquid fuels and oils to be quantified on a standard scale as a percentage hexane vapour equivalent. The Hexane signal is taken from the infra-red bench and processed to another output on the instrument display in the scale 0.000 – 2.000%.

It does not need additional gas calibration as the infra-red beam is normalised using the existing methane calibration gas. At 100% Methane concentration the Hexane reading will be typically showing 0.200 – 0.300% and will continue to rise if there is a hydrocarbon problem present. Laboratory sampling is needed to establish a baseline and identify the specific hydrocarbon compound but repeat tests with the GFM436 will allow trends to be determined with great consistency.

Using this technique, the Hexane reading can also be used for an immediate indication that remedial action on the borehole has been successful or not. Boreholes can be re-measured knowing that readings are “in scale” by referencing the original readings taken. No more waiting for samples to come back from the lab!

Boreholes across a site can be compared and peak readings established to indicate those of significant interest, worst case and negligible etc.

6.3.3 PID Compensation Factor Prediction

The PID (Photo Ionisation Detector) is the instrument widely accepted by the industry to quantify other hydrocarbon gases present in ground boreholes. It is a good choice of instrument as it is highly sensitive to a broad range of hydrocarbon gases and it does not directly detect methane. It uses a UV light source to ionise hydrocarbon gases in its sample cell so that they can be quantified using an electronic charge amplifier. However, even small quantities of methane present in a borehole can absorb the UV light thus quenching the ionisation and desensitising the instruments response leading to under measurement or complete non-detection of any hydrocarbon gases present.

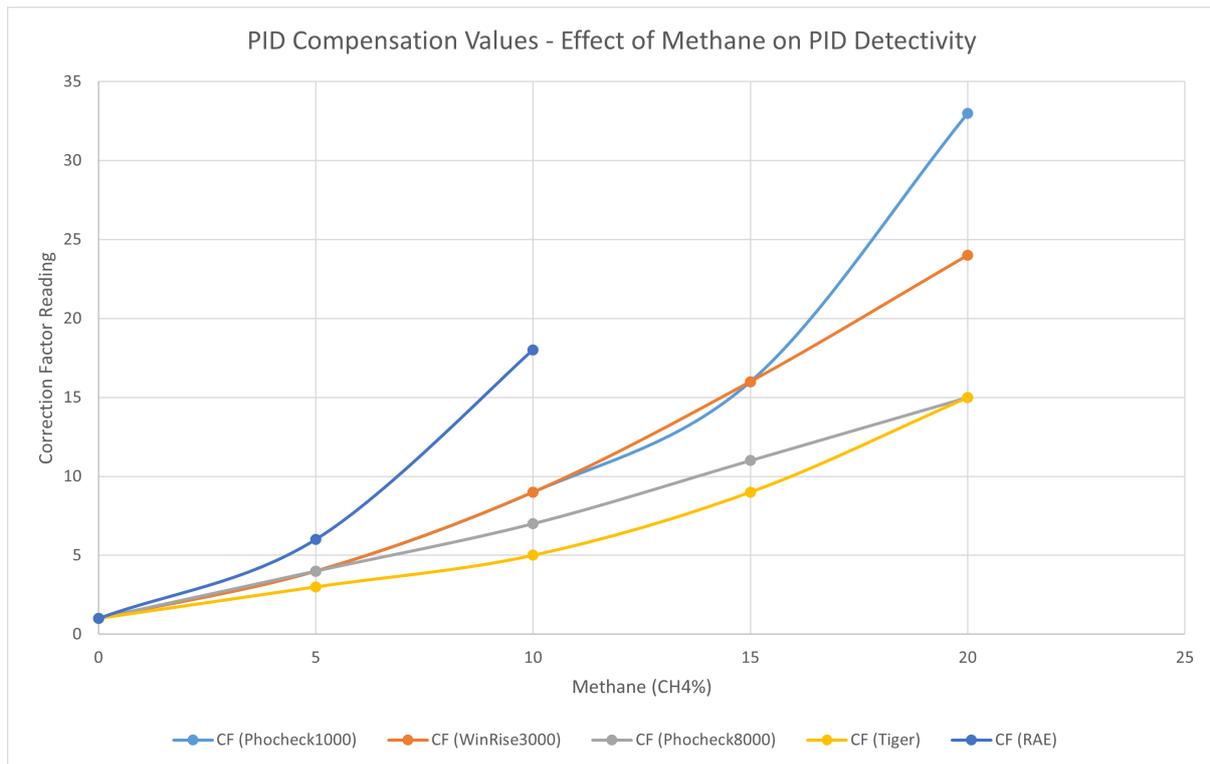


The built in PID Compensation factor in the GFM436 is a figure derived from extensive testing of the non-linear characteristics of this phenomenon and is displayed on the GFM instrument as a number between 1 and 10. This is



used to multiply the PID reading to give an accurate total hydrocarbon value in the borehole. This figure is accurate for the Ionscience Ltd Phocheck range of PIDs up to a value of 10 which occurs at approximately 9% methane in the borehole.

This characteristic varies between PID manufacturers. For example, typically only 5 – 6% of methane will diminish the PID response of a RAE Systems unit to only one tenth of the correct value thus needing a PID compensation factor of 10. Instrument characteristics when subjected to high levels of methane do differ considerably (see chart of typical responses below).



6.4 Third Party Approvals

6.4.1 ATEX, UKEX and IECEx

This instrument is ATEX, UKEX and IECEx Certified under normal operation.

ATEX, UKEX and IECEx accreditation is void under the following circumstance:

- If the instrument is removed from its leather case
- If the instrument is charging or plugged into a computer i.e. not under normal operation





- When the battery cover or inlet housing has been removed or unscrewed

For full information and details see the chapter on safety and the appendix on **ATEX, UKEX and IECEx Certification**.

6.5 In the Case

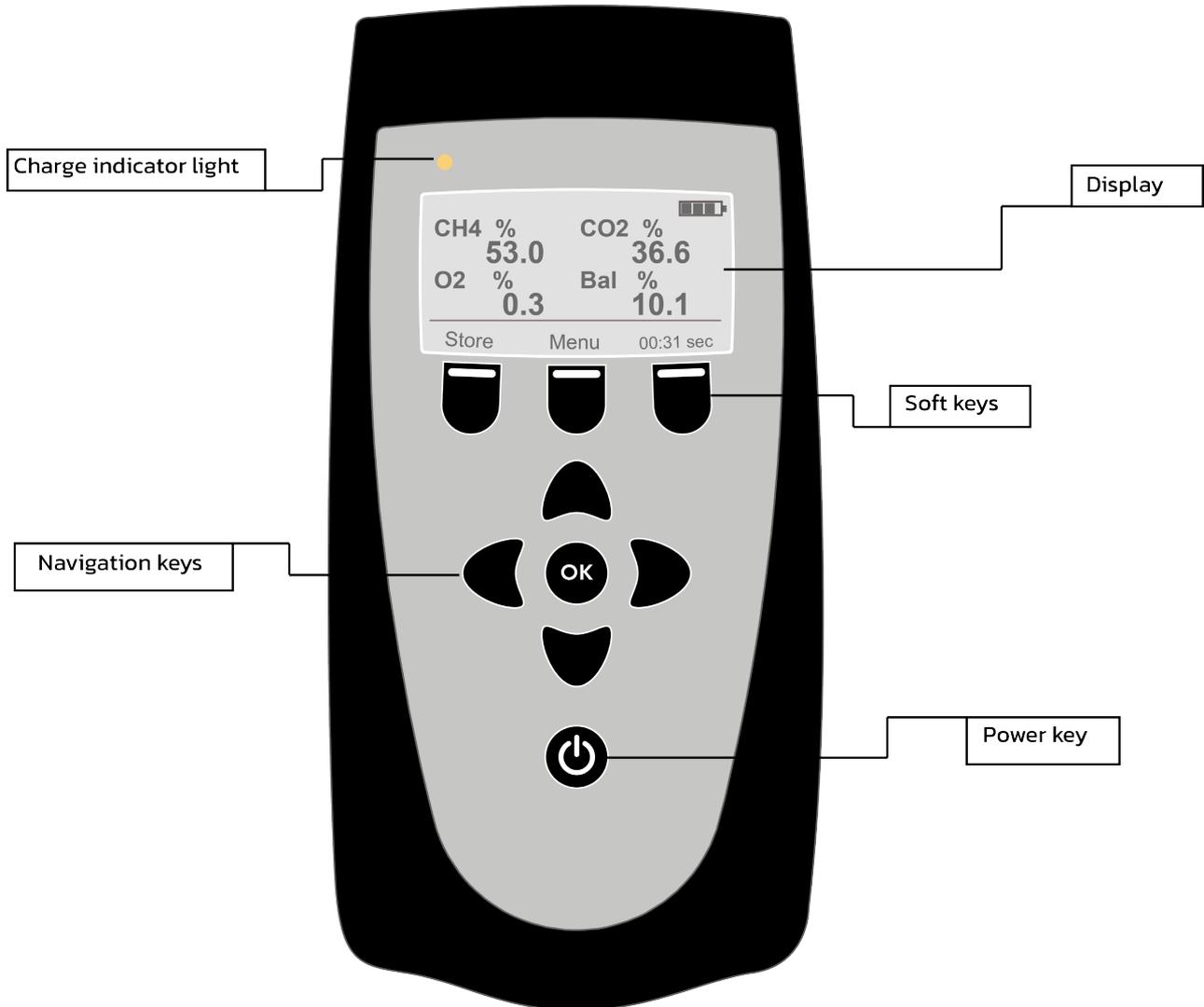
GFM series instruments are supplied in a fitted case containing the following items:







6.6 Front Panel Control Layout

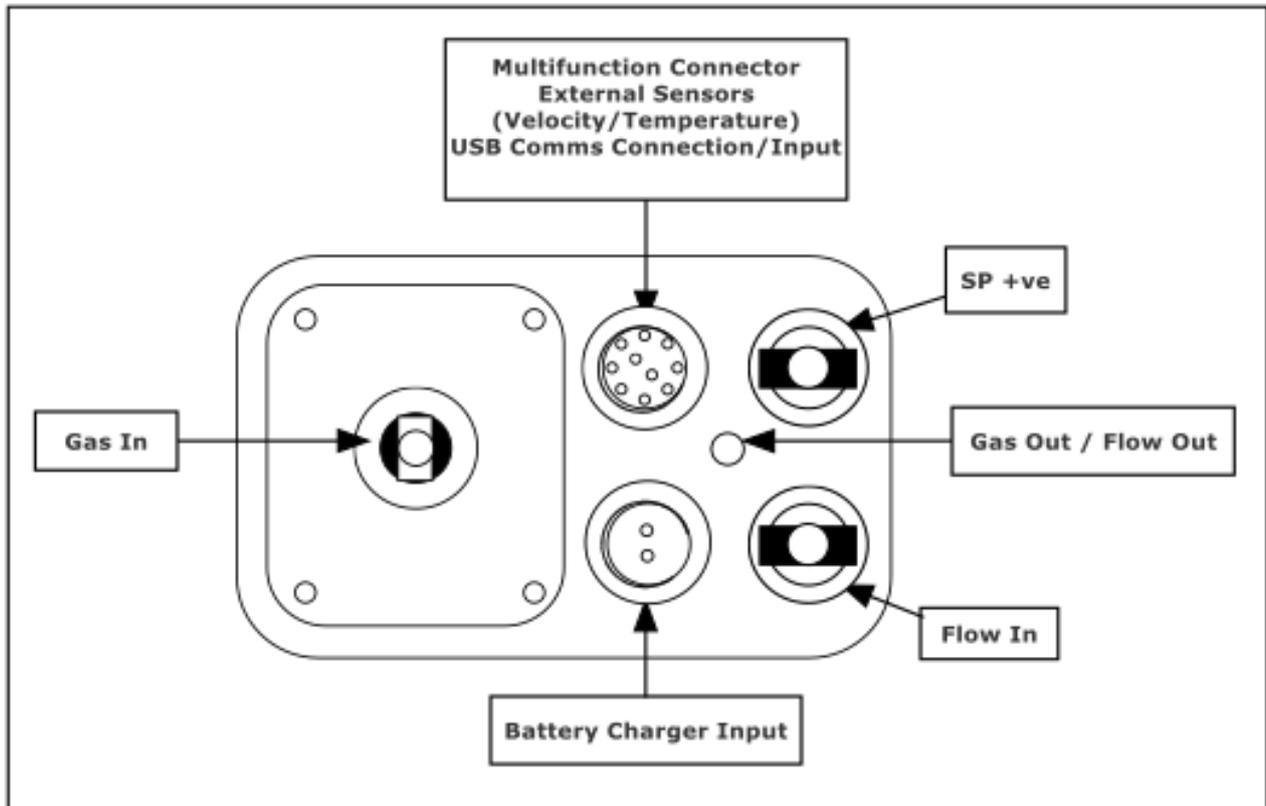


Charge indicator light can be in one of three states:

- **Solid red** – in fast-charge mode (800mA).
- **Solid green** – terminated fast-charge mode.
- **Alternating red & green** – In an indeterminable state not suitable for charging (This is usually due to temperature issue. It is advised to move instrument to well-aired area at room temperature, so that the instrument temperature can stabilise).



6.7 GFM436 Connections





6.8 Optional Extra Accessories

Vane anemometer – **Air velocity** measuring device. Instructions and information can be found in the **Gas Velocity Readings** chapter.



Brass Temperature Probe – Gas line temperature measuring device. Instructions and information can be found in the **Gas Temperature Readings** chapter.





In Car charger – additional power adapter, available for purchase on request.



Gas Cylinder and demand flow regulator – available for User Calibration, see the **User Calibration** chapter.





7 GFM436 Operation

7.1 Starting Up

Press the Power Key to turn the instrument on. When turned on the instrument will take a few seconds to boot up. During this time a 'loading' banner will be displayed. After a few seconds, the instrument will show the display below:



After booting up the instrument commences a warm-up period. This is to allow all the sensors to initialise. During this period the letters 'WRM' appear in the top right-hand corner of the display as shown. Please wait until WRM disappears before proceeding.

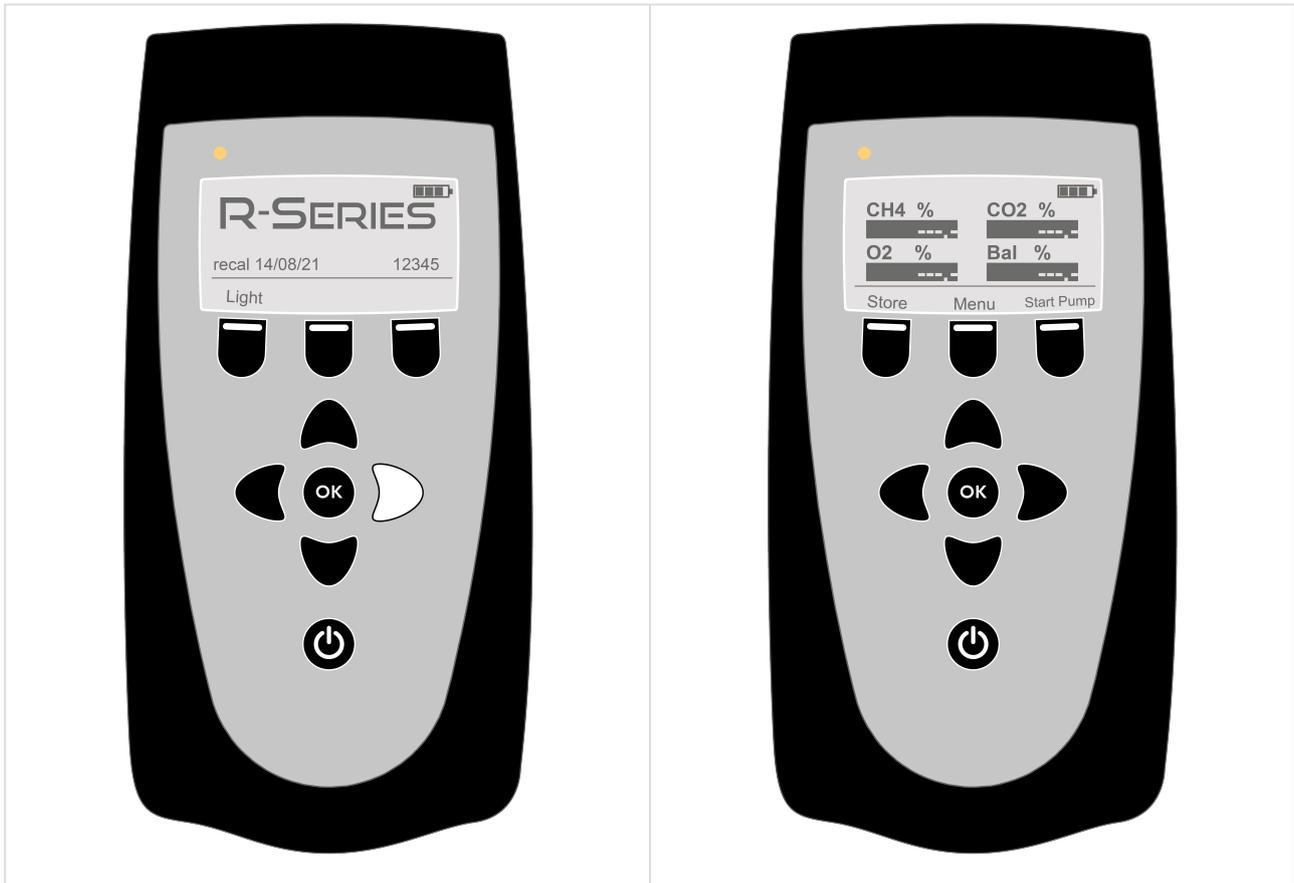
The screen shows the instrument type, its recalibration date, the battery level, and the serial number. If you ever need to contact the manufacturer for assistance with your instrument, please quote the serial number.

IMPORTANT: If the instrument has been stored in a cool place, or hasn't ran a sample for at least a week, then allow the pump to run for at least 10 minutes before trying to take a sample. It is advised to still be wary of readings until the instrument is in a routine of being turned on and ran regularly.



7.2 Navigating the screens

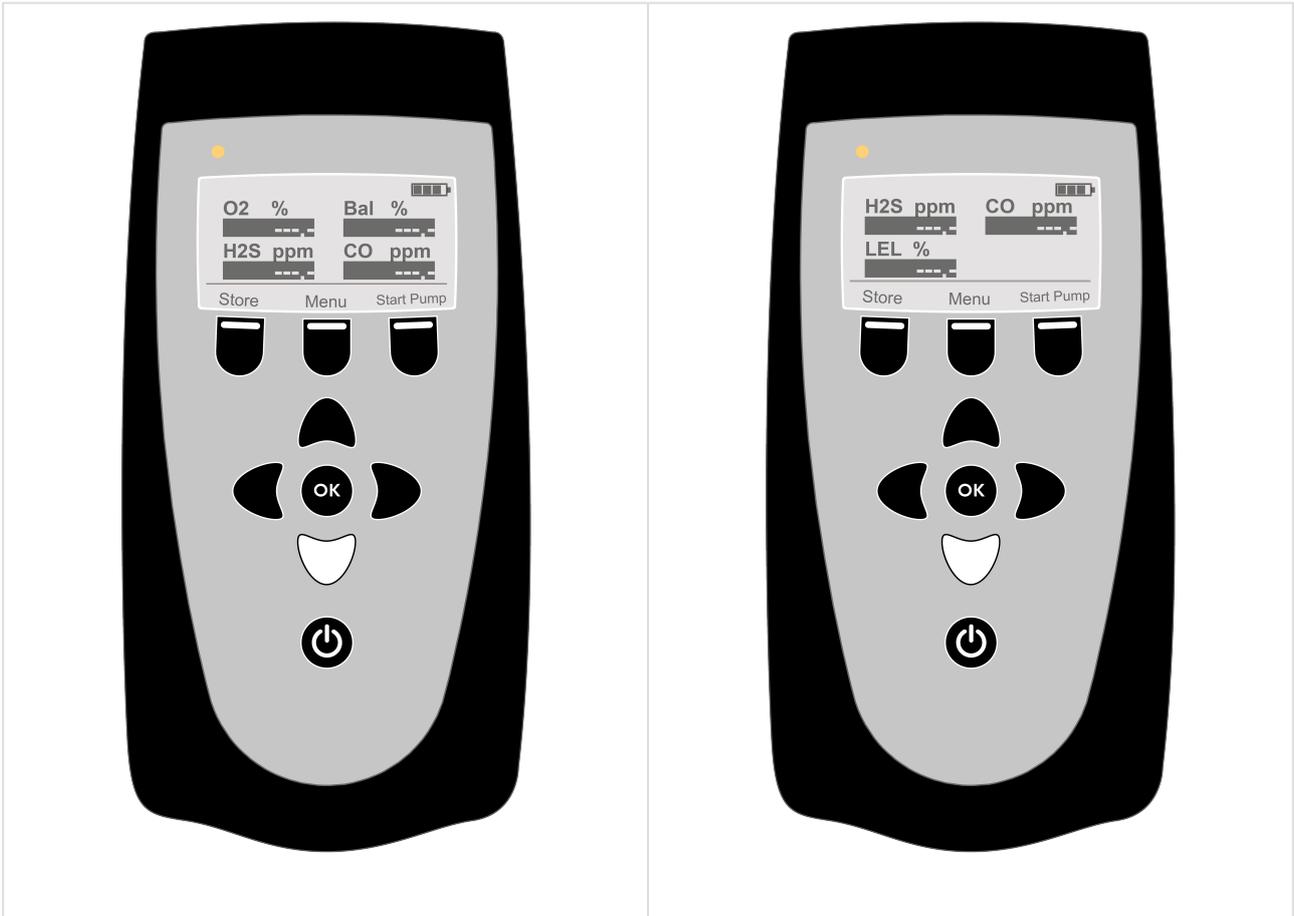
Use the left or right navigation keys to move to the operation screens.



Each operation screen, **Gas, Pressure, Valve comment** and **Velocity & Temperature**, has the following functions:

- Run the pump/sample
- Store readings
- Viewing more options in the menu

Four readings are shown on screen at a time. Pressing the **Up and Down Navigation Keys** will scroll up and down to view the other values.



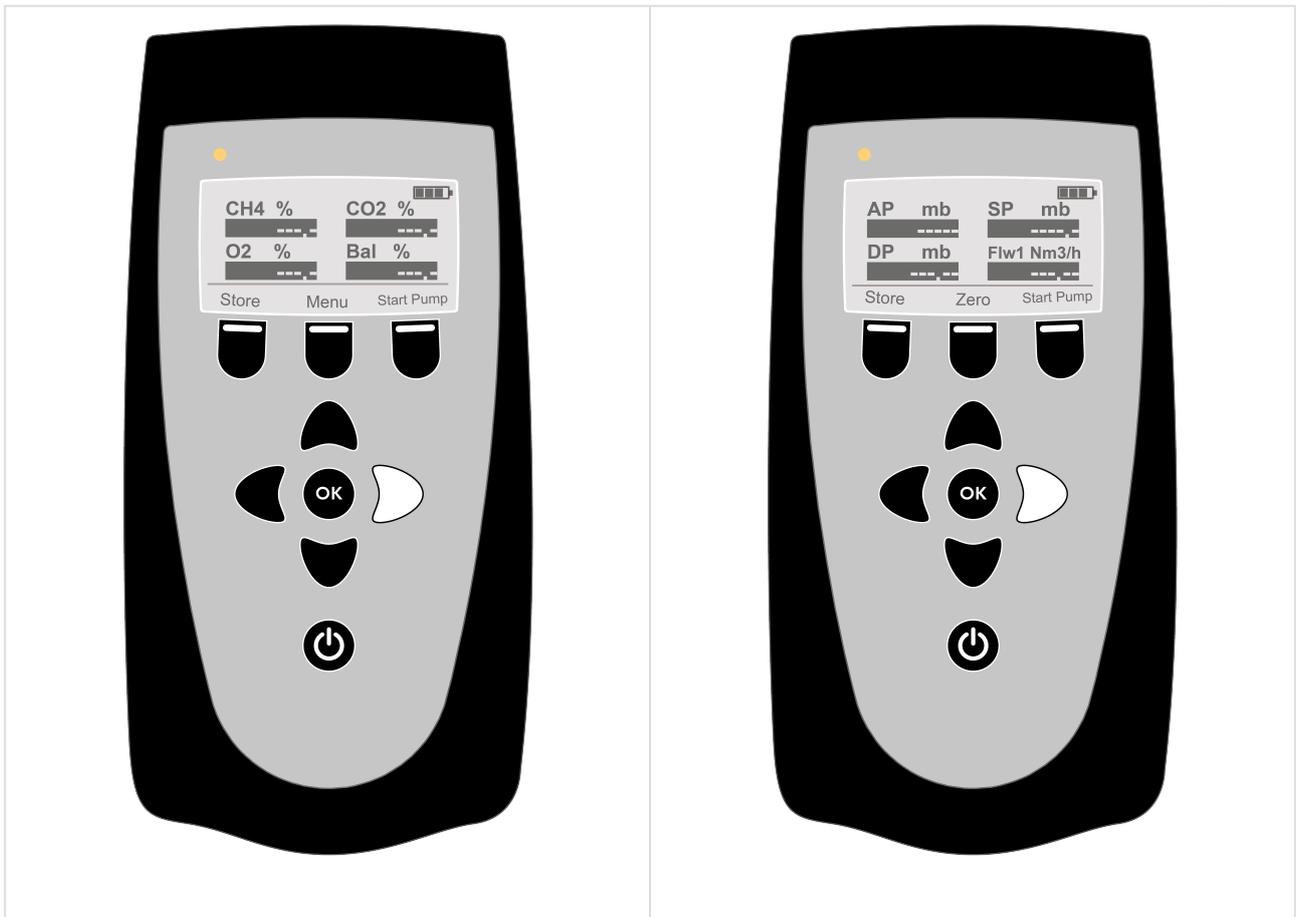
Use the up and down navigation keys to scroll up and down on the display pages.

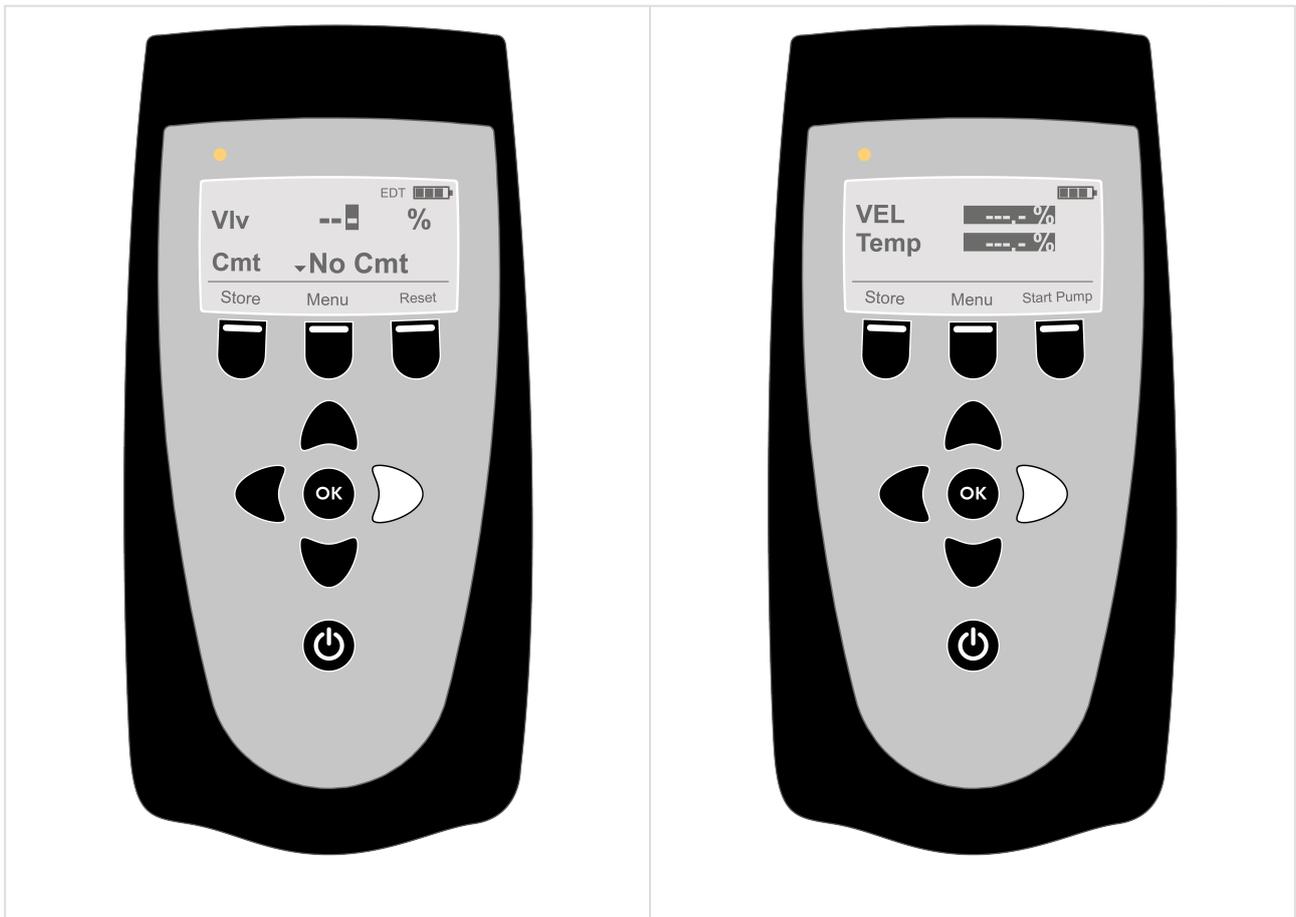
The next sections will describe each operation that can be carried out on the instrument. For information on storing the data please the chapter on **Storing Data**.

7.3 Reading the Displays

Before a sample is first taken, after powering up the instrument, the readings are dashed and blacked out as shown below. You can see this on **Gas Concentration Readings display**, **Gas Pressure Readings Display**, **Valve Comment Input Display** and **Gas Velocity and Temperature Readings Display** by pressing the **Right arrow Key**.

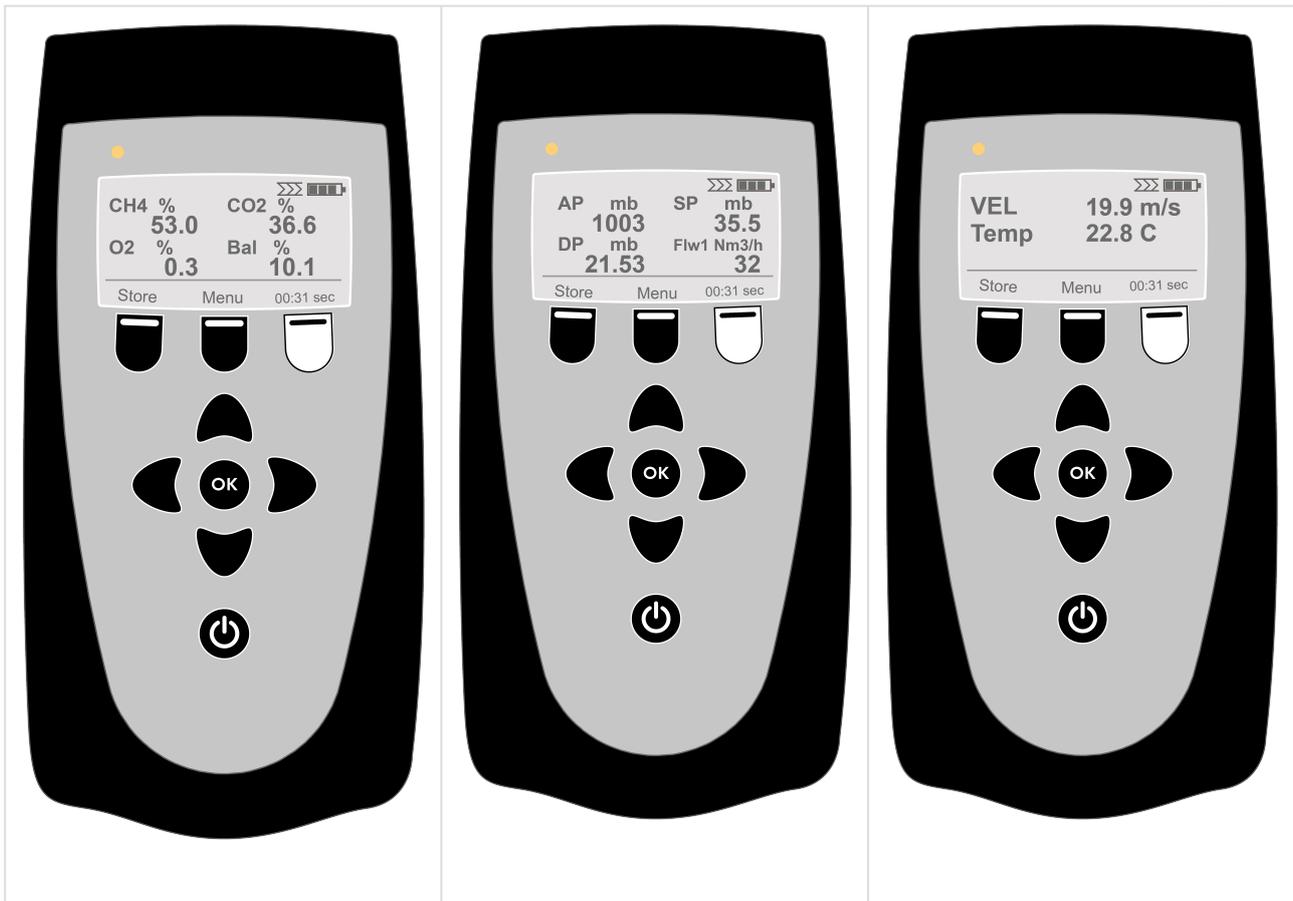






The Right Soft Key will toggle the pump/sample on and off, changing the readings.

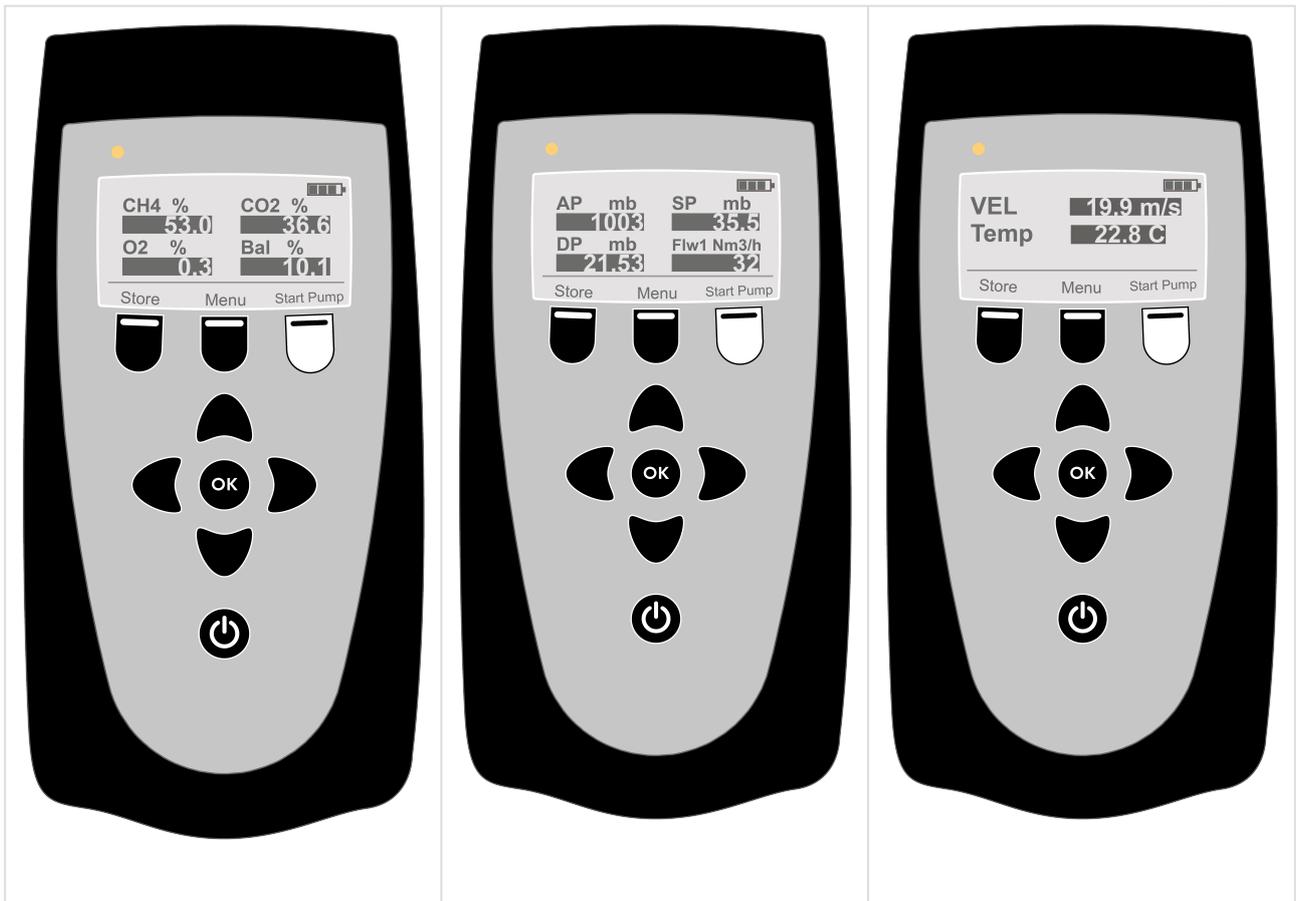




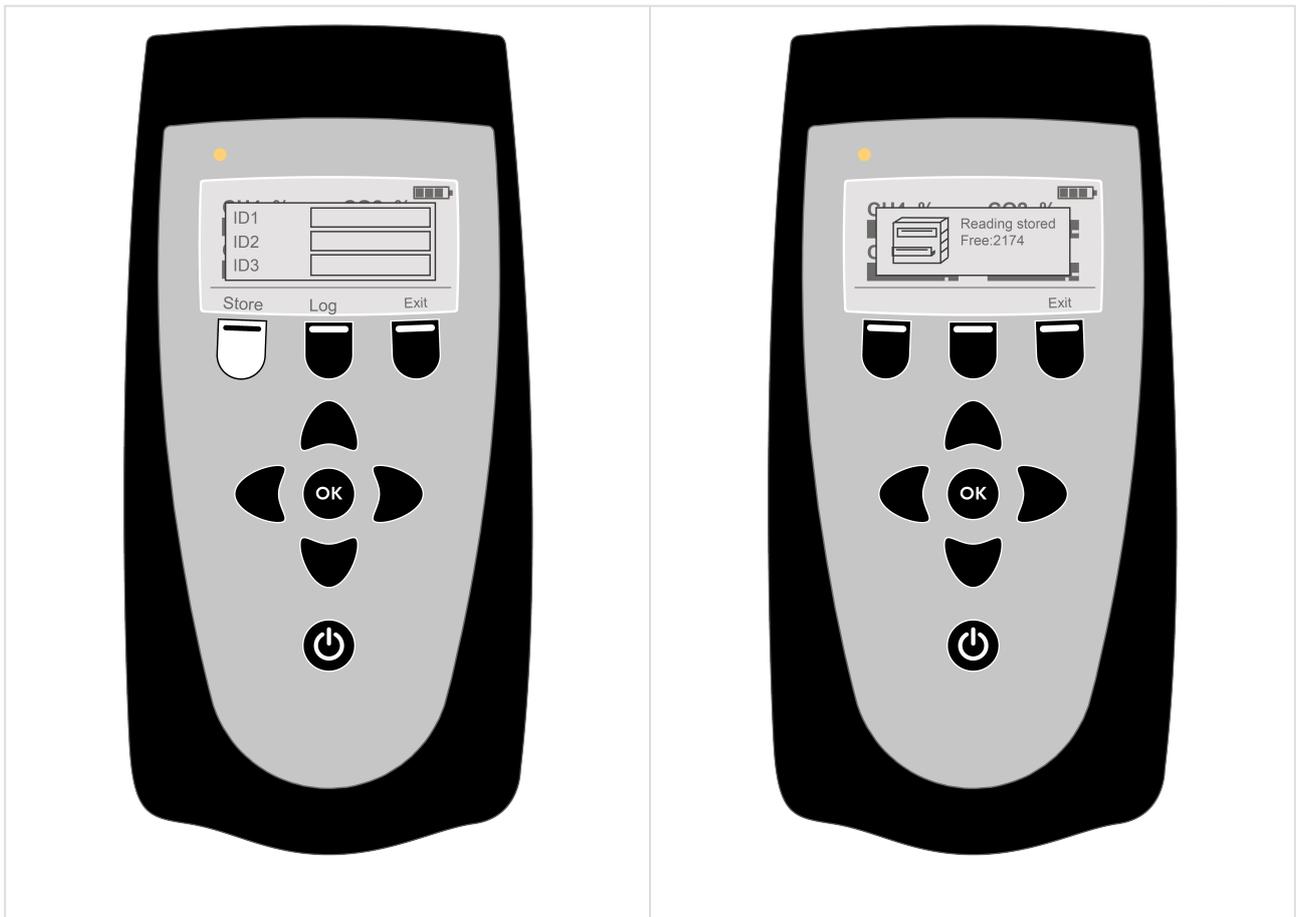
When the pump is running, the screen will display live readings being taken from the Gas Sample line or connected accessory.

Pressing the Right soft key again will stop the pump/sample.

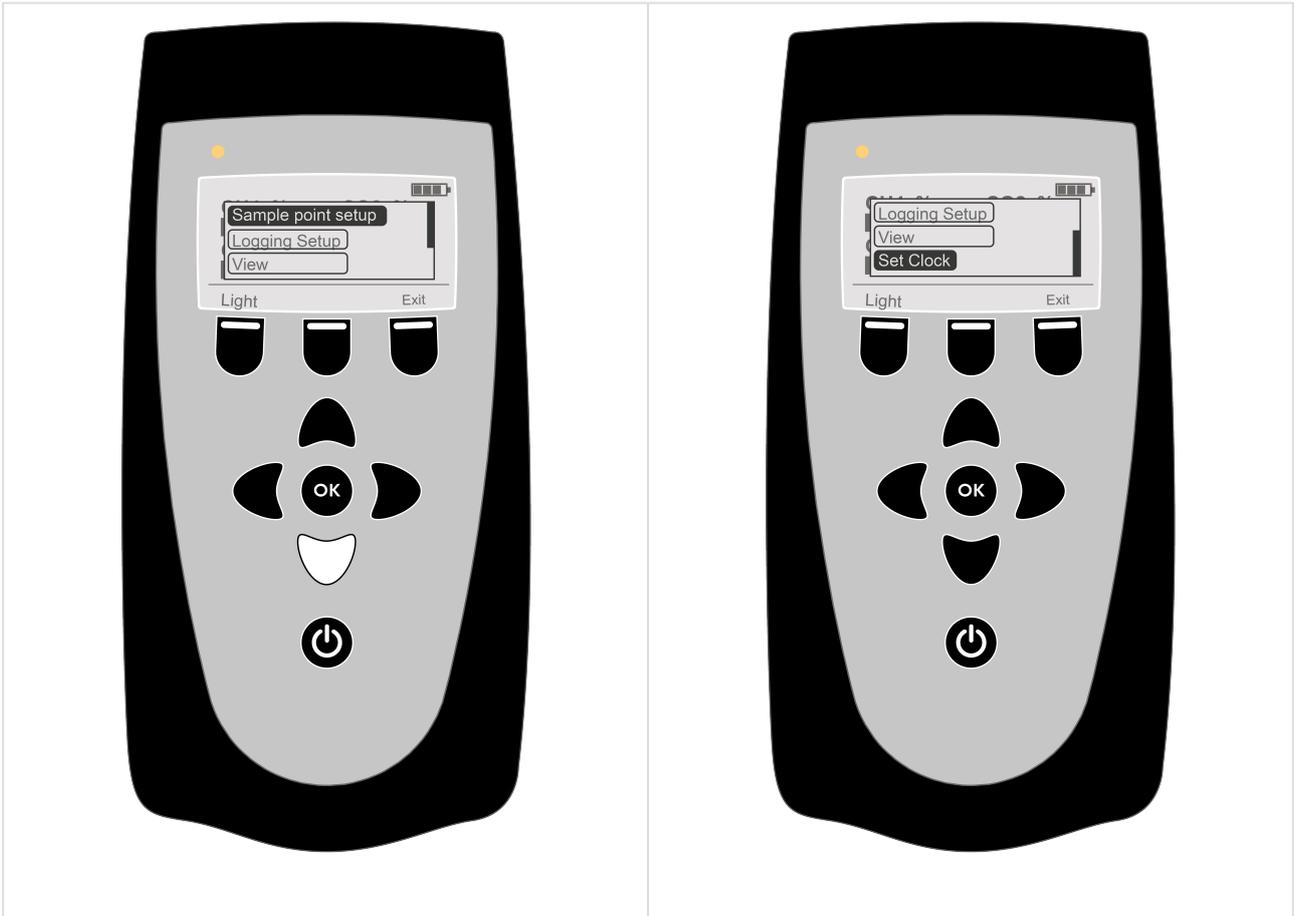
When finished with the sample, turn off the pump and the last reading will latch and be displayed on the screen as shown below.



These latched readings can be stored in the instruments non-volatile FLASH memory by pressing the left soft key. The menu shown below appears.



For information on the **Store** function on this display, see the chapter on **Storing Data**. Pressing the middle soft key will open the menu shown below.



The menu has the following functions:

- Sample Point Setup - Setting up sample points for storing readings through creating an ID structure. Specific instructions for this can be found in the chapter on **Sample Point Set Up**.
- Logging Setup - Setting up a logging sequence for automatic sampling over a specified amount of time. Specific instructions on this can be found in the chapter on **Logging Set Up**.
- View - View readings stored on the instrument. Specific instruction can be found below in the chapter on **View Reading Display**.
- Set Clock - Change the time and date on the instrument. Specific instruction can be found below in the chapter on **Clock Display**.

7.4 View Readings

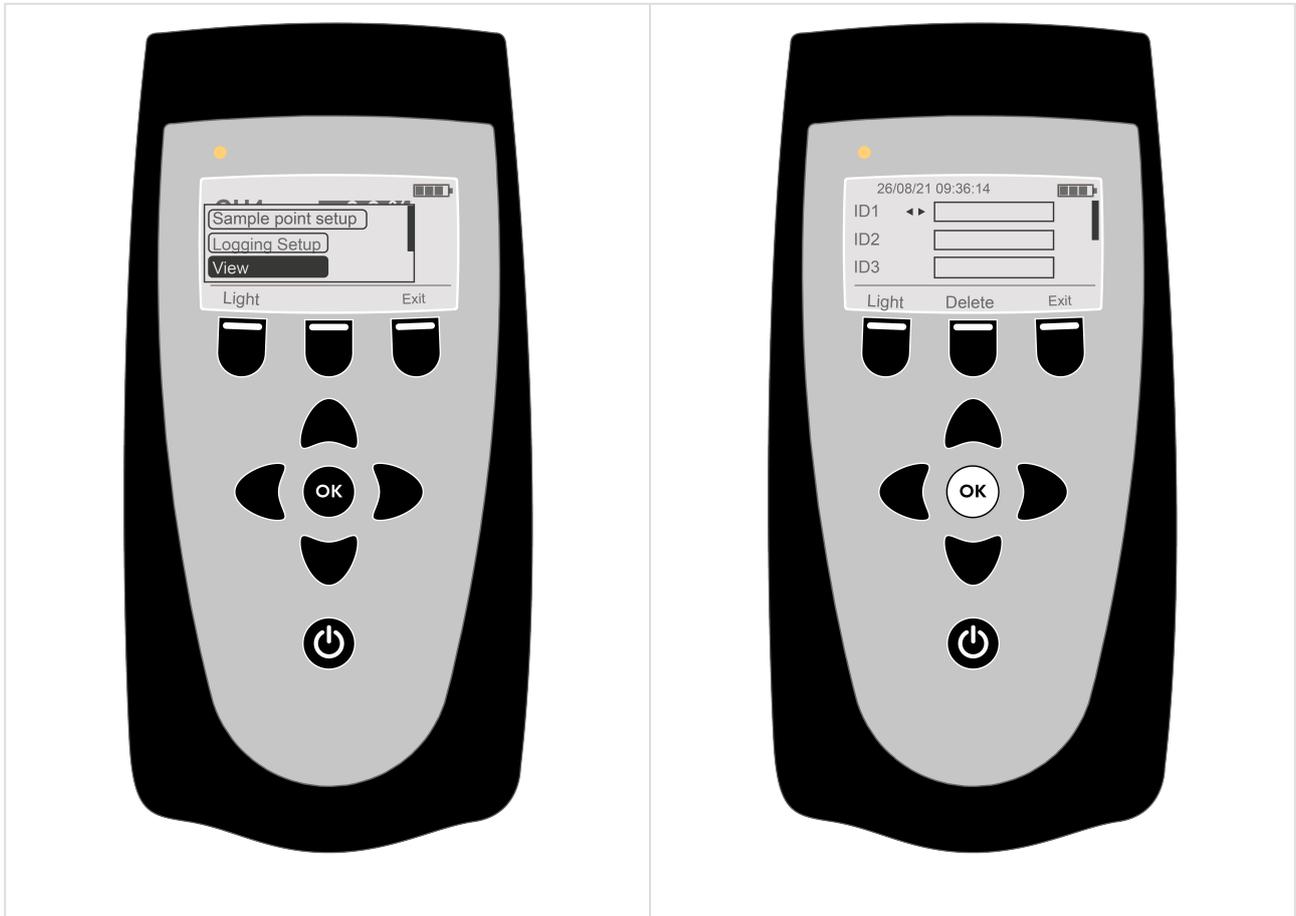
The View Readings Display is a display for viewing and deleting previously stored readings.

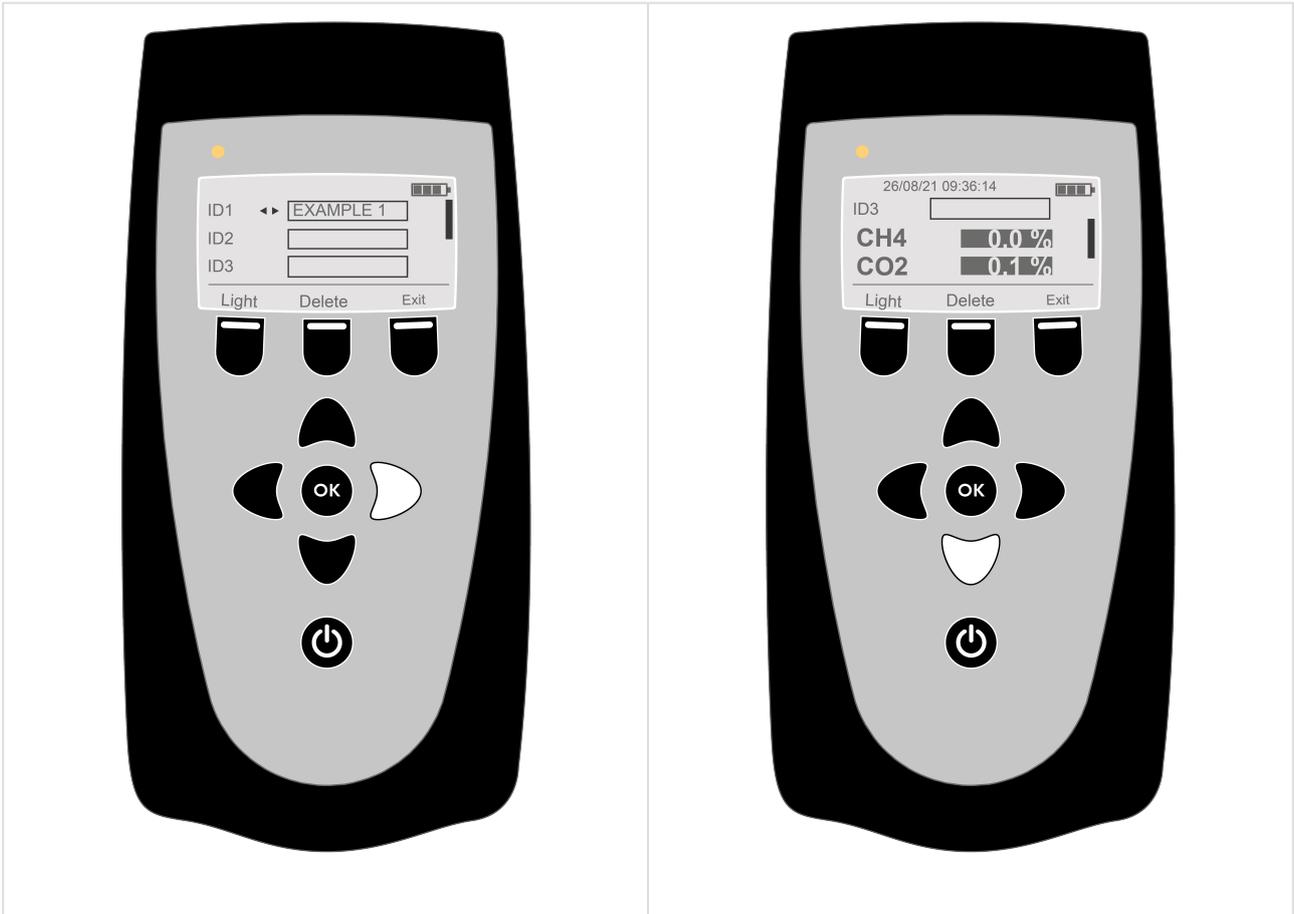
Navigate through the IDs created by selecting the ID row with the ok and then navigating to the required ID using the arrow keys.





For instruction on understanding the ID structure, see the chapter on **Data Storage ID Structure**.





Once the required ID has been selected, scroll down to view the readings.

Readings can be deleted by pressing the middle soft key.

7.5 Clock Display

All stored readings are stamped with the date and time. To change the date or time of the instrument, navigate to the Menu and scroll down to “Set clock” and select OK.





Use the arrow keys to navigate to the desired field. Press the OK key to begin editing. Press the Up and Down arrows to change the field.

Press the left soft key to save changes.

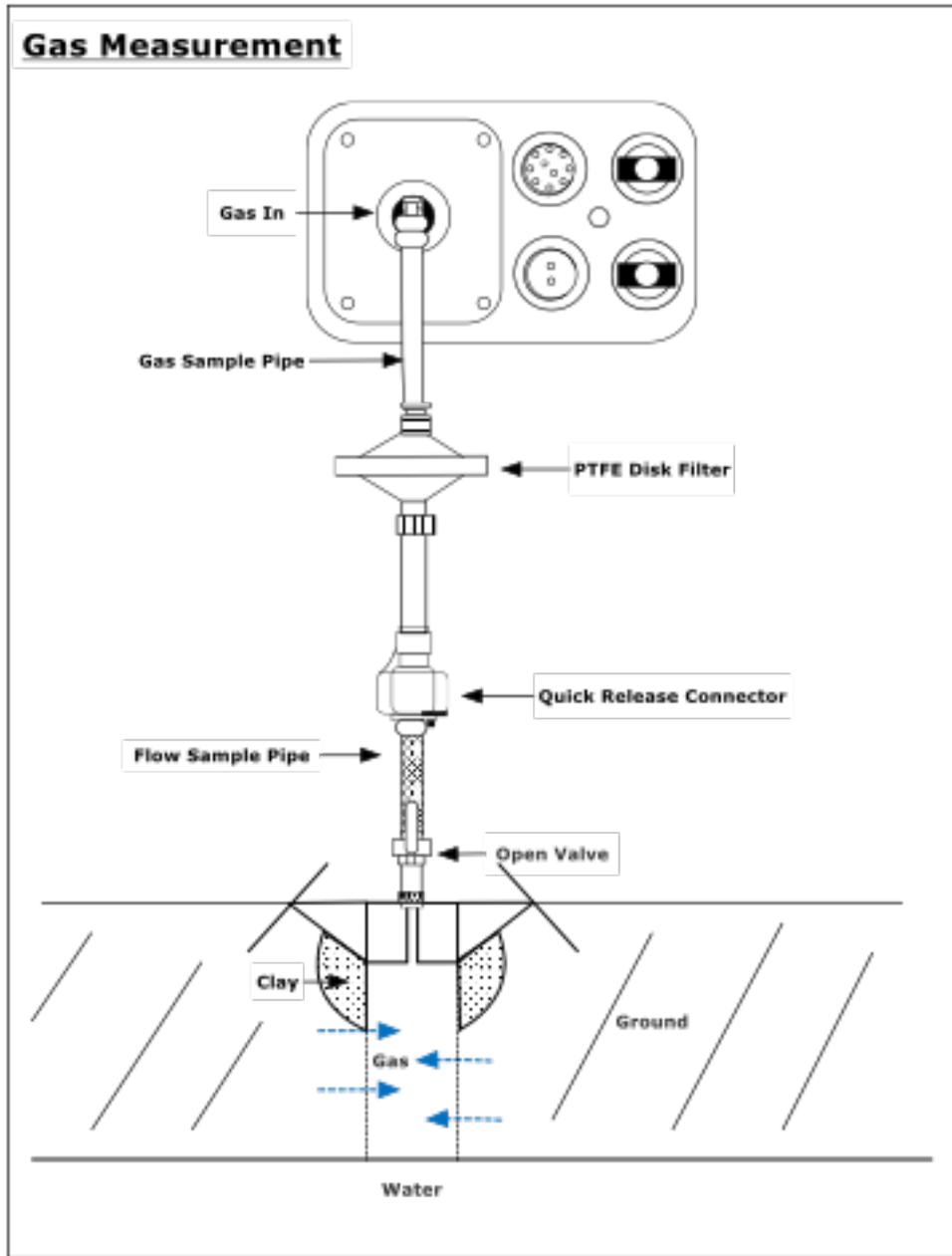
7.6 Connecting the Gas Sample Pipe

To take a gas sample first connect the plastic sample pipe fitted with the filter to the 'Gas In' port at the top of the instrument.

To do this, push the metal latch down then insert the connector at the end of the sample pipe. The port will lock the pipe in place and prevent it from being pulled out accidentally; it can be removed by pushing the metal latch down and pulling out the sample pipe.

Connect the open end of the gas flow tube to the gas tap or sample point on the pipework to be checked.

Open the gas tap and press the Right Soft Key to begin sampling.



The Right Soft Key will toggle the pump on and off and will display “Start Pump” or the elapsed pump run time. When the elapsed time is displayed, pressing the soft key beneath will stop the pump.

When the pump is running the screen will display live readings being taken from the gas.





When the readings have stabilised press the Right Soft Key again to freeze the reading.

When the pump is stopped the values a “frozen” at the last measured value.



The **Right Soft Key** will start the pump and unfreeze the displayed readings. If the pump is already working however pressing the **Right Soft Key** will stop the pump.

Turn off the gas tap and remove the gas pipe.

IMPORTANT: Take great care when connecting the pipe to the gas tap to avoid gas leakage.



8 Gas Readings

8.1 Gas Display

The instrument will now be displaying the readings from the gas sample that has just been taken. This screen is the main display for viewing gas readings.

In a standard configuration instrument, it shows CH₄, CO₂, O₂, LEL, H₂S, CO, C₆H₁₄ (Hex) and PID Cf.

Four readings are shown on screen at a time and pressing the Up and Down Keys will scroll up and down to view the other values

The right arrow key will navigate to Gas Display 2.

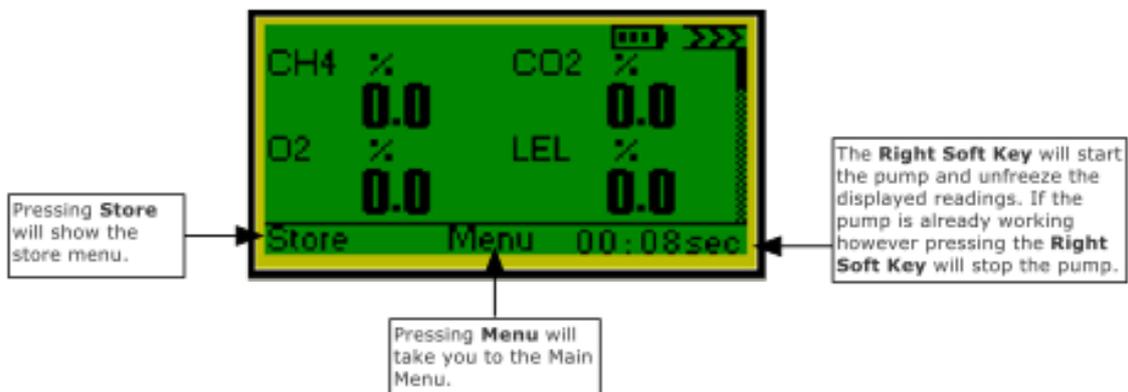
The Right Soft Key will toggle the pump on and off and will display “Start Pump” or the elapsed pump run time. When the elapsed time is displayed, pressing the soft key beneath will stop the pump.

When the pump is running the screen will display live readings being taken from the gas.

When the pump is stopped the values are “frozen” at the last measured values.

Pressing the Left Soft Key, labelled “Store”, or the OK Key will bring up the Store Menu Window. For details of the "Store" function please see page 47.

Pressing the Middle Soft Key, labelled “Menu”, will bring up the menu options used to configure the data storage functions.

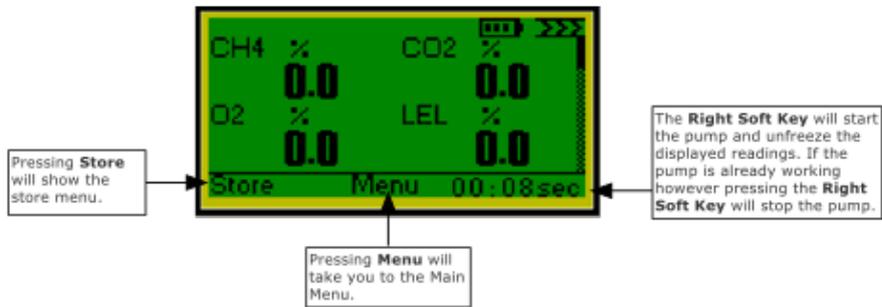




8.2 Gas Display Two

The second gas display show more analysis results from the gas being sampled.

It is accessed by pressing the Right Arrow key.



This display shows CH4, LEL, C6H14 (Hex) and PID Cf all on the same screen at the same time.

The Right Soft Key will toggle the pump on and off and will display “Start Pump” or the elapsed pump run time. When the elapsed time is displayed, pressing the soft key beneath will stop the pump.

When the pump is running the screen will display live readings being taken from the gas.

When the pump is stopped the values are “frozen” at the last measured values.

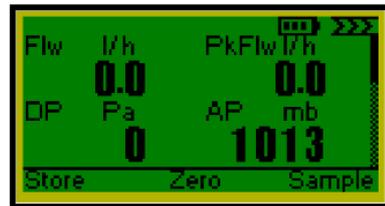
Pressing the Left Soft Key, labelled “Store”, or the OK Key will bring up the Store Menu Window. For details of the "Store" function please see section on [Storing Data](#)⁴⁵.

Pressing the Middle Soft Key, labelled “Menu”, will bring up the menu options used to configure the data storage functions.

Pressing the Left Key will navigate to the first Gas Display screen and pressing the Right Key will navigate to the Flow and Pressure Display.

⁴ <https://gasdataltd.atlassian.net/wiki/pages/createpage.action?fromPageId=536805423&linkCreation=true&spaceKey=IMSM&title=GFM436+Storing+Data>
⁵ <https://gasdataltd.atlassian.net/wiki/pages/createpage.action?fromPageId=536805423&linkCreation=true&spaceKey=IMSM&title=GFM436+Storing+Data>





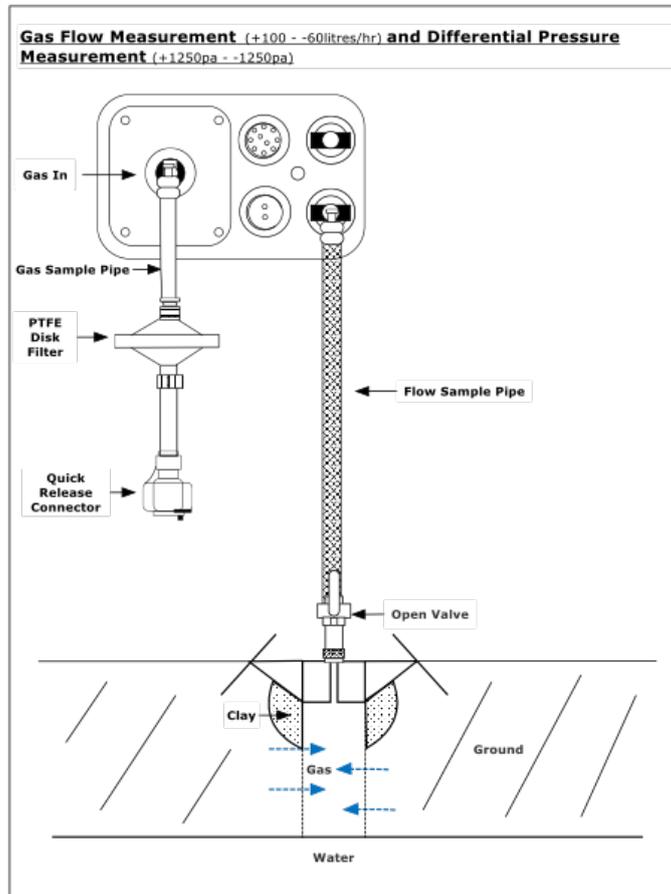
When finished turn off the gas tap and remove the gas pipe.

i IMPORTANT: Take great care when connecting the pipe to the gas tap to avoid gas leakage.



9 Pressure Readings

9.1 Connecting the Gas Flow Pipe



The GFM436 will measure Flow, Peak Flow, DP and AP at the same time. This requires a connection to be made to the Flow In port as shown in the diagram above.

The Flow Sample pipe is the section of pipe without the filter. This can be separated from the Gas Sample pipe at the quick release coupling.

Connect the male fitting to the "Flow In" connection.

Press the right soft key to begin sampling.

Zero the readings by pressing the Middle Soft Key (Zero)



Press the right soft key to stop sampling.

i IMPORTANT: It is important to complete the zeroing in an environment where there is no flow or pressure and ensure that the end of the flow tube is not exposed to any external flows or pressures.

Connect the open end of the gas flow tube to the gas tap or sample point on the borehole.

Open the gas tap and press the Right Soft Key to begin sampling.

The Flow and Pressure display shows the Instantaneous Flow (Flw1), the Peak Flow (Flw2), DP and AP.

The Right Soft Key will toggle the sampling process on and off.

When the sample is active the screen will display live readings being taken from the gas.

When the sample is stopped the values are “frozen” at the last measured values.

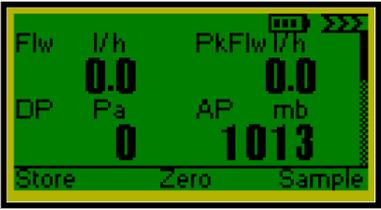
When a sample is restarted the readings are unfrozen and the peak flow will be reset to the current instantaneous flow.

If the instantaneous flow goes over range the peak flow will show over-range until it returns within range.

Pressing the Left Soft Key, labelled “Store”, or the OK Key will bring up the Store Menu Window.

When finished turn off the gas tap and remove the gas pipe.

→ Use the **Up** and **Down** **Keys** to scroll through the readings on the screen.

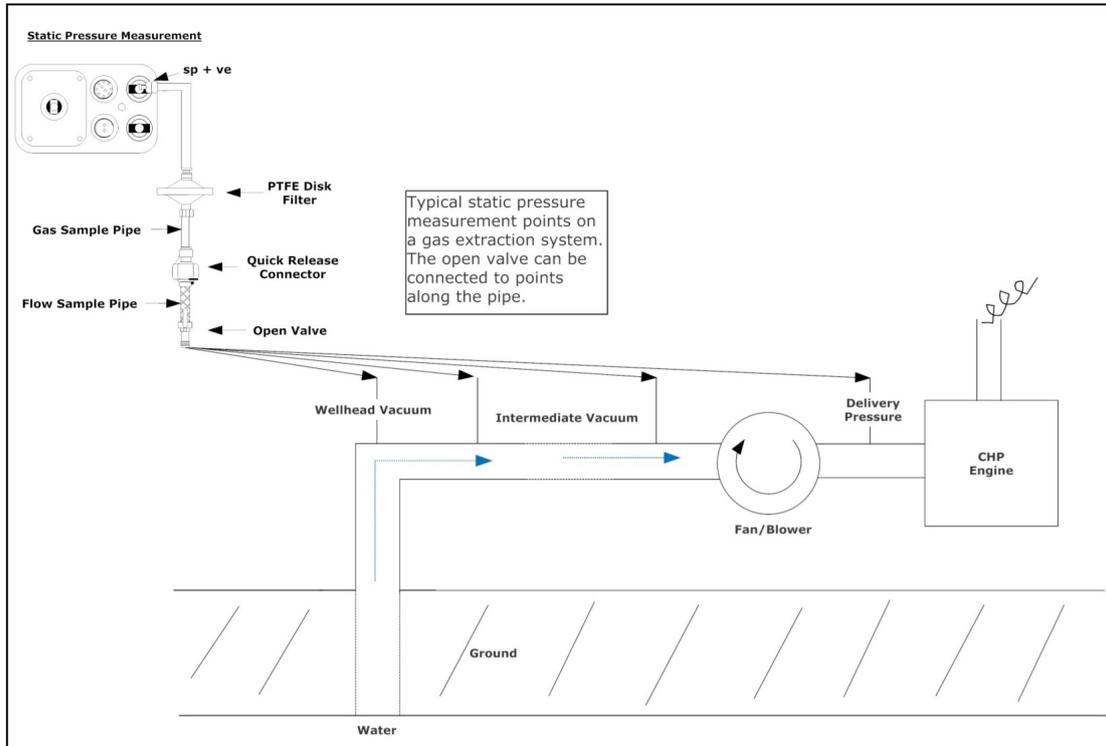


i IMPORTANT: Take great care when connecting the pipe to the gas tap to avoid gas leakage





9.2 Taking a Static Pressure (SP) Measurement



Four readings are shown on screen and pressing the Up and Down Keys will scroll up and down to view the readings. Scroll down to use the SP (Static Pressure) function.

Press the right soft key to begin sampling.

Zero the readings by pressing the Middle Soft Key (Zero).

Press the right soft key to stop sampling.

To measure the Static Pressure connect the Flow Sample pipe to the SP connection as shown in the diagram above.

The flow sample pipe is the section of pipe without the filter. This can be separated from the Gas Sample pipe at the quick release coupling.

Connect the male fitting to the "SP" connection.

i IMPORTANT: It is important to complete the zeroing in an environment where there is no flow or pressure and ensure that the end of the flow tube is not exposed to any external flows or pressures.



Connect the open end of the gas flow tube to the gas tap or sample point on the pipework to be checked.

Open the gas tap and press the Right Soft Key to begin sampling.

The Right Soft Key will toggle the sampling process on and off.

When the sample is active the screen will display live readings being taken from the gas.

When the sample is stopped the values are “frozen” at the last measured values.

Pressing the Left Soft Key, labelled “Store”, or the OK Key will bring up the Store Menu Window. For details of the “Store” function please see page 47.

Pressing the Middle Soft Key, labelled “Zero”, will zero DP and SP readings on the screen.

Pressing the Left Key will navigate to Gas Display 2 and pressing the Right Key will navigate to the Velocity Display.

When finished turn off the gas tap and remove the gas pipe.

i **IMPORTANT:** Take great care when connecting the pipe to the gas tap to avoid gas leakage

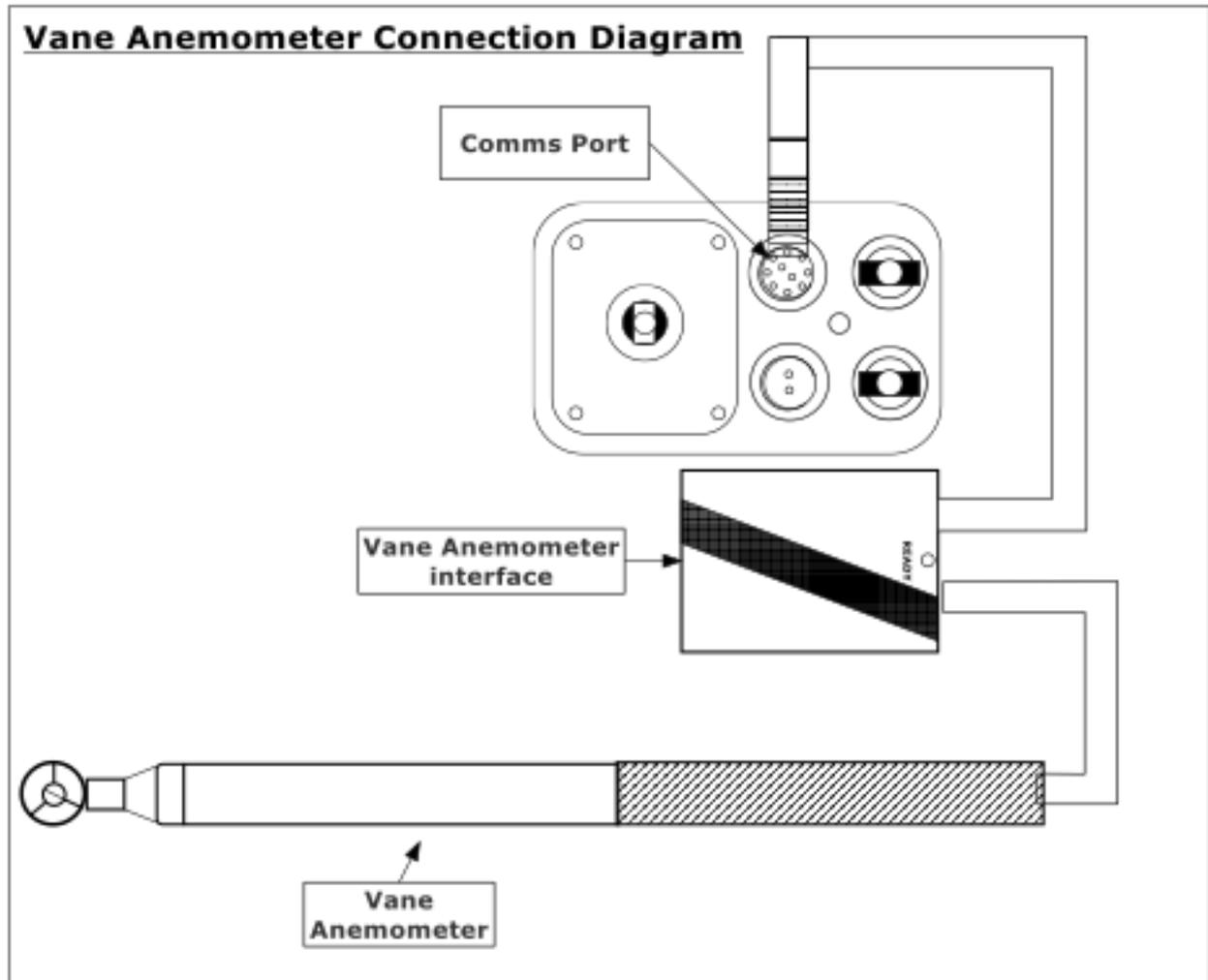




10 Gas Velocity Readings

10.1 Gas Velocity Measurement with Optional Vane Anemometer

Connect the vane anemometer to the Comms port at the top of the instrument.

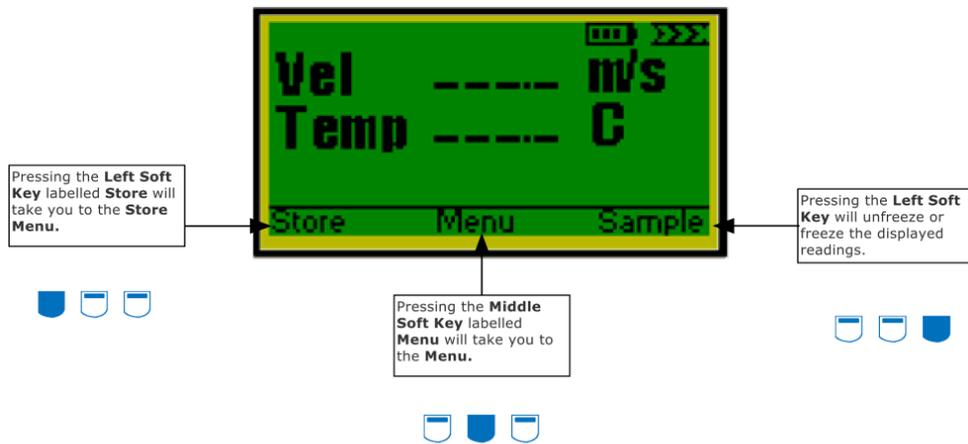


Locate a suitable gland or bung on the pipework and insert the anemometer.

When the anemometer is as far into the gland as possible without opening the tap, open the gas tap.

Finally, push the anemometer into the gland far enough to ensure that the impeller is in the centre of the gas pipe.

Now press the "Sample" key to begin measuring the flow in the pipe.



When the reading has stabilised, press the “Sample” key to retain the reading. The anemometer can now be removed from the pipe.

i IMPORTANT: Take great care when inserting the anemometer to avoid gas leakage.

i IMPORTANT: Take great care when removing the anemometer. In particular, avoid standing with your face in direct line with the gland because gas can be expelled at great force.





11 Gas Temperature Readings

11.1 Gas Temperature Measurement with Optional Temperature Probe

Connect the temperature probe to the Comms port at the top of the instrument.

Locate a suitable gland or bung on the pipework and insert the temperature probe.

When the probe is as far into the gland as possible without opening the tap, open the gas tap.

Finally, push the probe into the gland far enough to ensure that the tip is in the centre of the gas pipe.

Now press the “Sample” key to begin measuring the temperature in the pipe.

When the reading has stabilised, press the “Sample” key to retain the reading. This will return the highlight area around the temperature figure. The temperature probe can now be removed from the pipe.

IMPORTANT: Take great care when inserting the temperature probe to avoid gas leakage.

IMPORTANT: Take great care when removing the temperature probe. In particular, avoid standing with your face in direct line with the gland because gas can be expelled at great force.

11.2 DIP Meter Reading

The DIP Level function on the GFM436 allows two DIP level readings - DIP1 and DIP2 - to be entered and stored for each location ID.

To change the DIP Level, select the field and press OK. Then use the Left and Right Key to highlight the digit to be changed and use the Up and Down Keys to increment or decrement that number. To move to the next digit use the arrow key.

Once you have finished entering the DIP reading press the OK Key to deselect that DIP level. The DIP level will be saved on exiting the display but switching the instrument off without exiting the display may cause entered data to be lost.

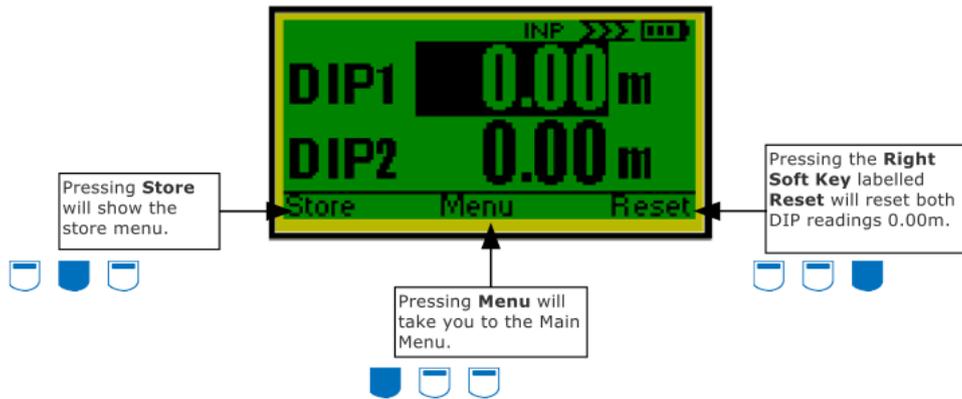
Pressing the Left Key will navigate to the Velocity Display and pressing the Right Key will navigate to the Summary Display.

Pressing the Left Soft Key, labelled “Store” will bring up the Store Menu Window.

Pressing the Middle Soft Key, labelled “Menu”, will bring up the Data Storage Menu Window.

Pressing the Right Soft Key (Reset), will reset both DIP readings to 0.00m.





i IMPORTANT: The DIP level will be saved on exiting the display but switching the instrument off without exiting the display may cause entered data to be lost.



12 Storing Data

This instrument has a built-in, non-volatile, FLASH memory which allows the user to save gas concentration, pressure, velocity and temperature readings at the time and date they are saved. The data is saved in a Comma Separated Value (CSV) format.

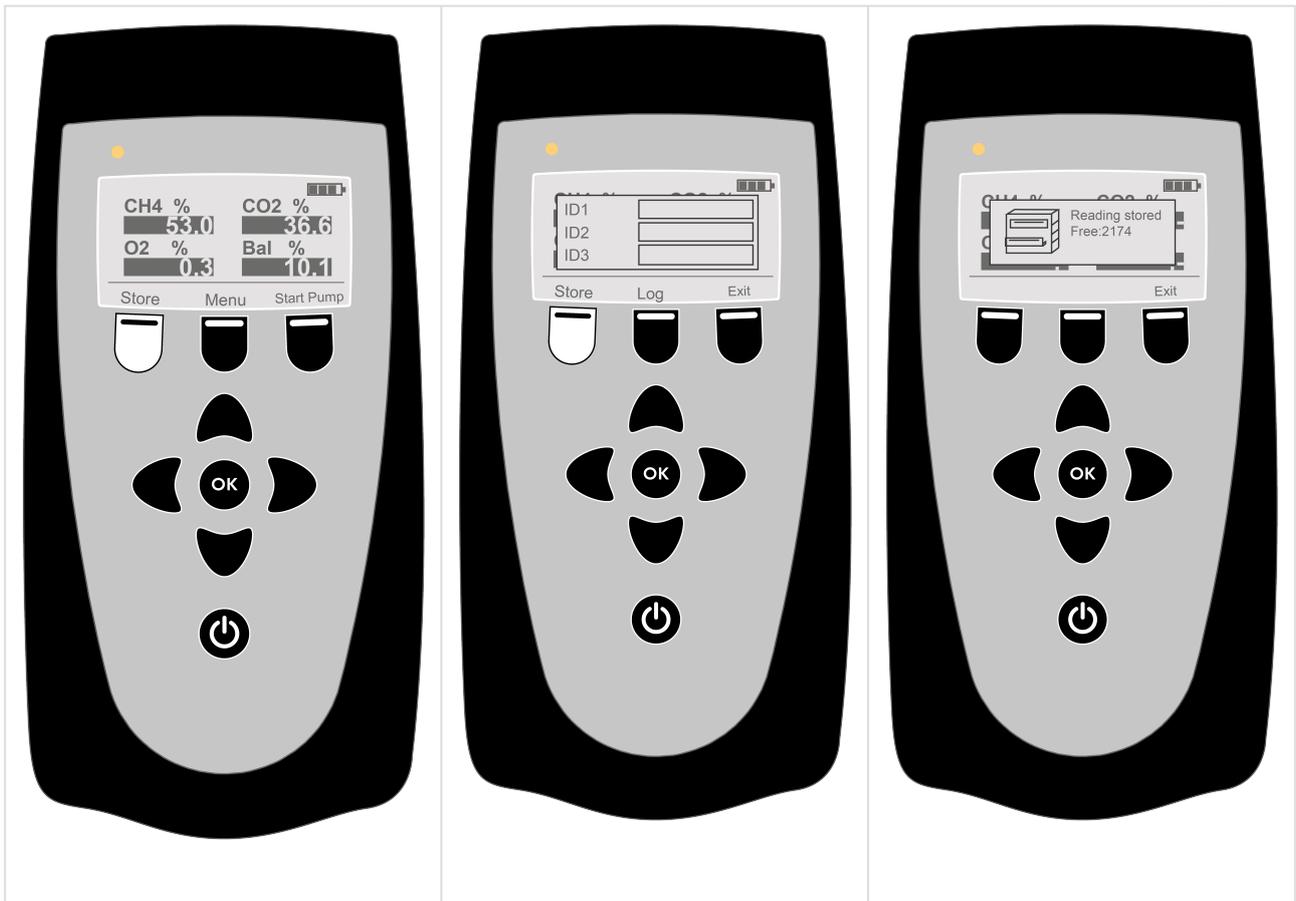
With a brief set up, users can configure IDs for their readings to allow for multiple users, sites, or sample points to be defined.

ⓘ IMPORTANT: Unattended data logging is intended for gas concentration, AP and velocity or temperature measurement. DP and SP may require different piping configurations depending on instrument setup therefore they are not suitable for unattended data logging.

12.1 Storing Data

Once a reading has been taken, or while a reading is being taken, **pressing the left soft key twice**, will save the most recently latched or current reading on the screen.





Up to 3000 readings can be recorded on the instrument. Continuing to store readings this way will add them to device's memory without an ID against them. It will save them against a time and date instead.

12.2 Data storage ID structure

This section will explain how the readings can be marked with an ID with up to 3 different levels. Please note, the following diagrams are examples of the structure behind the filing system. They do not represent any display or visuals of the instrument. The content and meaning behind them however is correct.

The IDs are structured like a **folder system path** on a computer.

If a reading is **stored under no ID**, then they are saved in the **top level**.





System path\
..... Reading 1 - 11/08/2020 11:15:02
..... Reading 2 - 11/08/2020 16:36:14
..... Reading 3 - 17/08/2020 09:42:22

If a reading is **stored within ID1** under a certain name, then it is saved in the equivalent of a **folder within the top level** that is named that specific name.

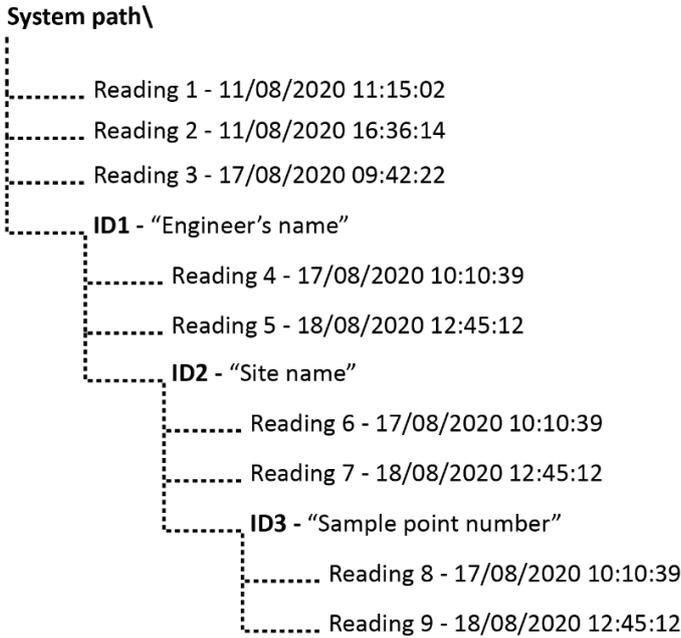
System path\
..... Reading 1 - 11/08/2020 11:15:02
..... Reading 2 - 11/08/2020 16:36:14
..... Reading 3 - 17/08/2020 09:42:22
..... **ID1** - "Engineer's name"
..... Reading 4 - 17/08/2020 10:10:39
..... Reading 5 - 18/08/2020 12:45:12

And so, if the reading is stored under an ID1 and an ID2 then it is the equivalent of being stored in a folder that is within a folder on a top level.

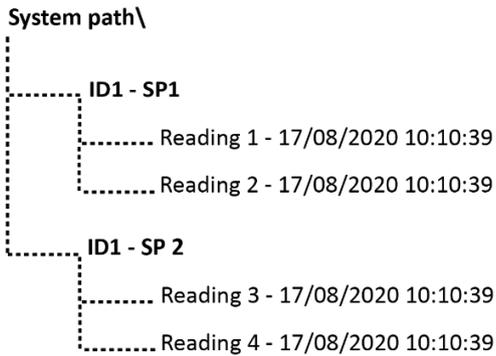
System path\
..... Reading 1 - 11/08/2020 11:15:02
..... Reading 2 - 11/08/2020 16:36:14
..... Reading 3 - 17/08/2020 09:42:22
..... **ID1** - "Engineer's name"
..... Reading 4 - 17/08/2020 10:10:39
..... Reading 5 - 18/08/2020 12:45:12
..... **ID2** - "Site name"
..... Reading 4 - 17/08/2020 10:10:39
..... Reading 5 - 18/08/2020 12:45:12

The device allows a maximum of three ID levels.





The two diagrams below show examples of how a user may configure the IDs. The first example is a **very simple set up**. This may be used if **the instrument has one user on one site**.

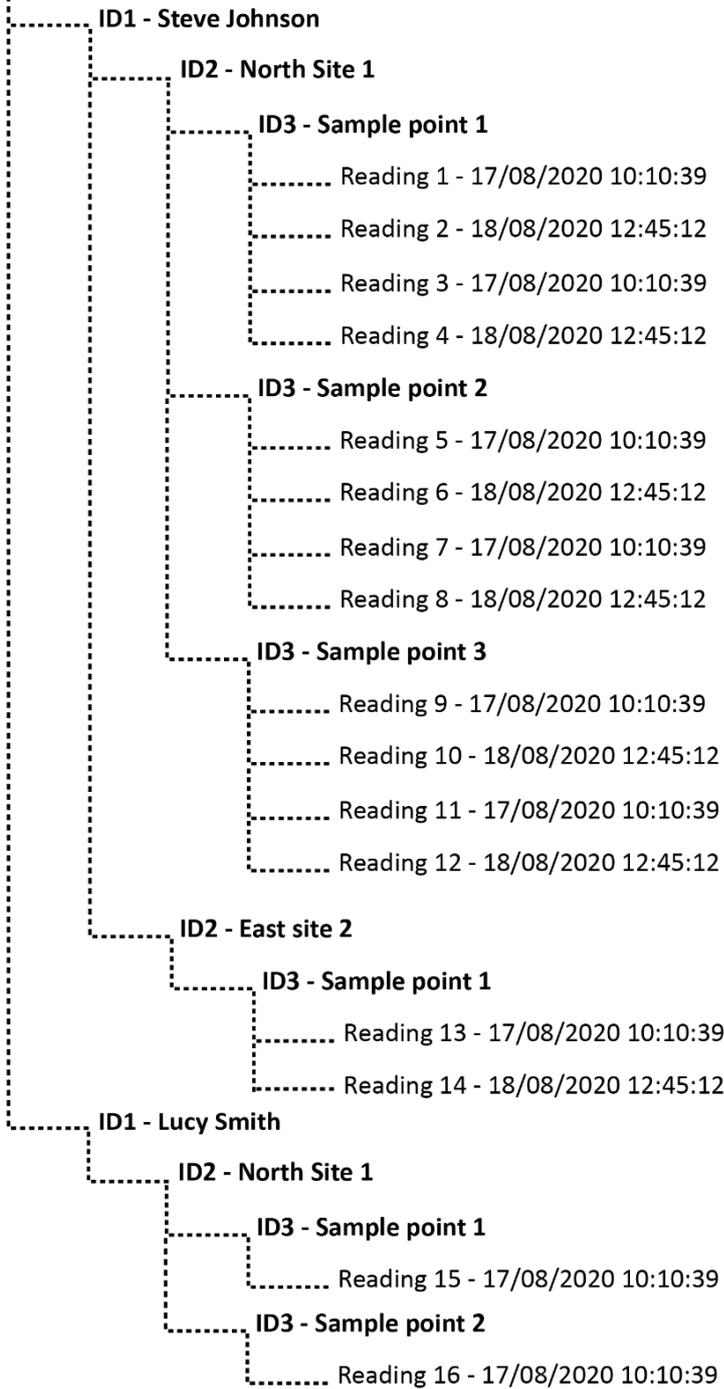


The second example shows a much **more complicated set up** which would be used if there are **multiple users, across a variety of sites**.





System path\





Before you can start storing or logging readings you need to create a sample point, essentially a name or location information for your log. This is done using the Sample Point Setup function.

12.3 Sample Point Setup

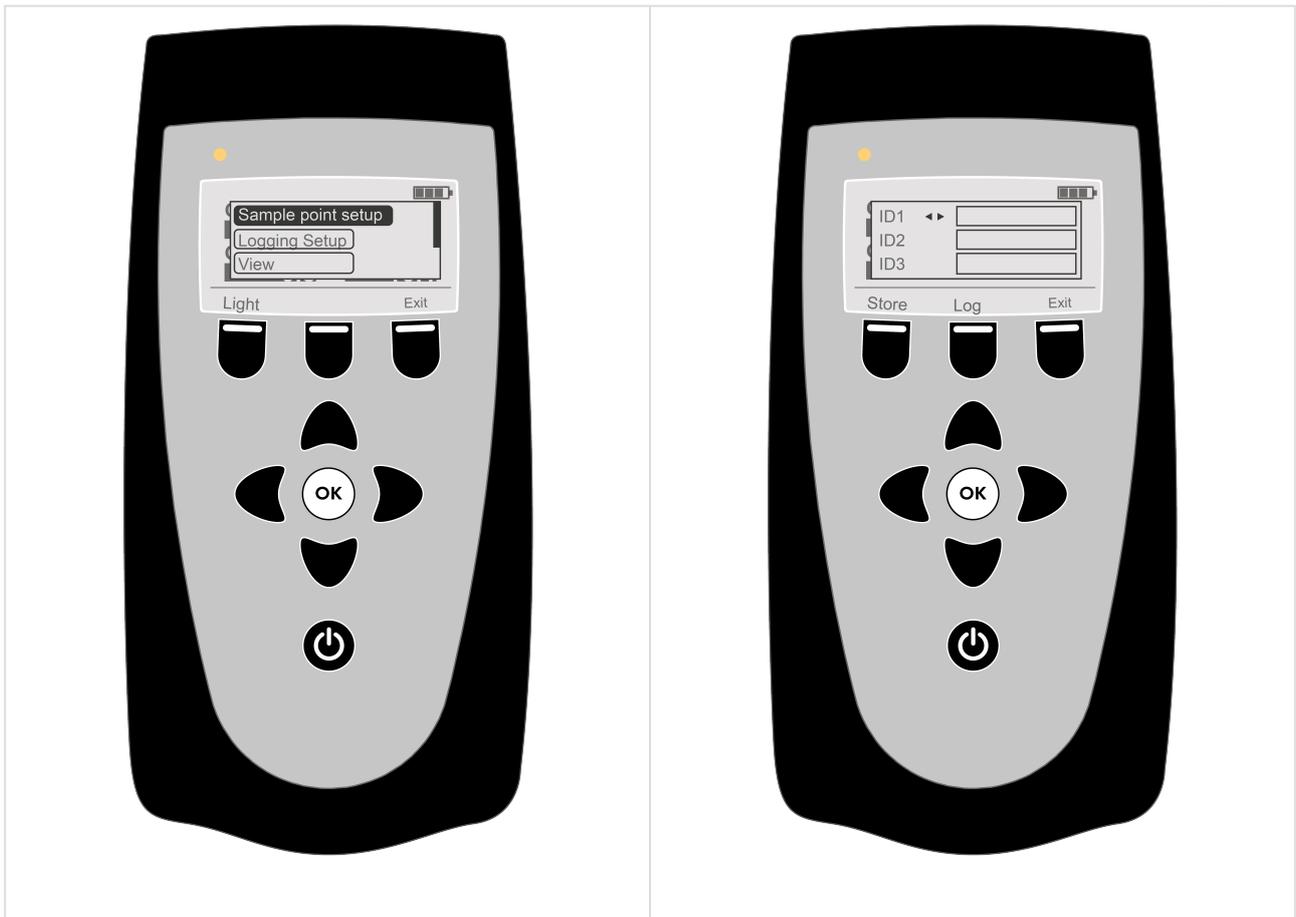
A sample point is the name given to the point at which the instrument draws a sample of gas from a main gas pipe. As there is a great number of different sample points a customer may use, users may set up ID tags on the instruments to symbolise particular sample points (or to symbolise anything the customer desires). Instructions on setting up these sample point IDs are found below:

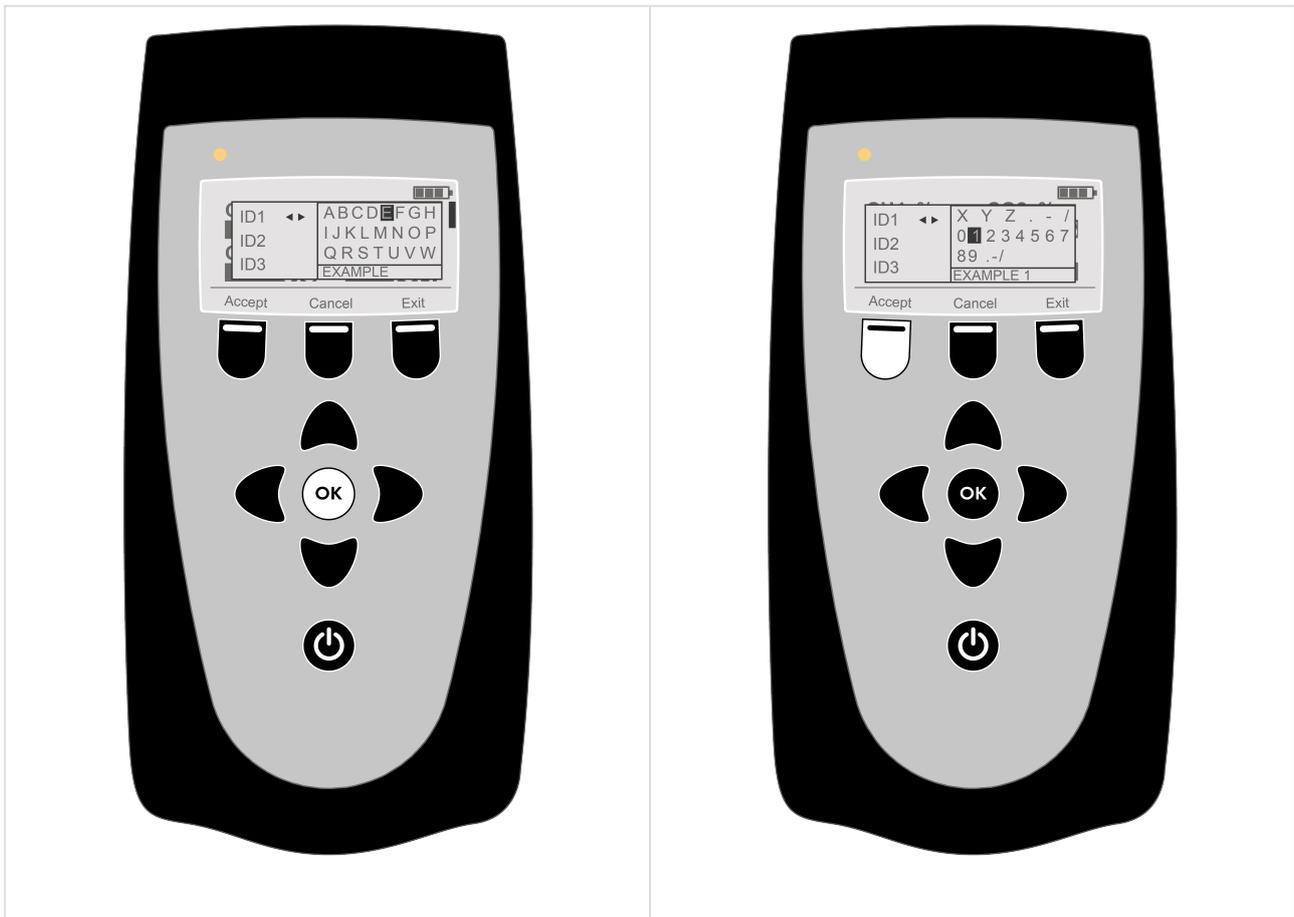
On the Gas Readings display, using the soft keys, open the menu and select “Sample point setup” using the OK key.

This opens the ID selection table. To understand the structure behind the ID numbers, see the chapter on **Data Storage ID Structure**.

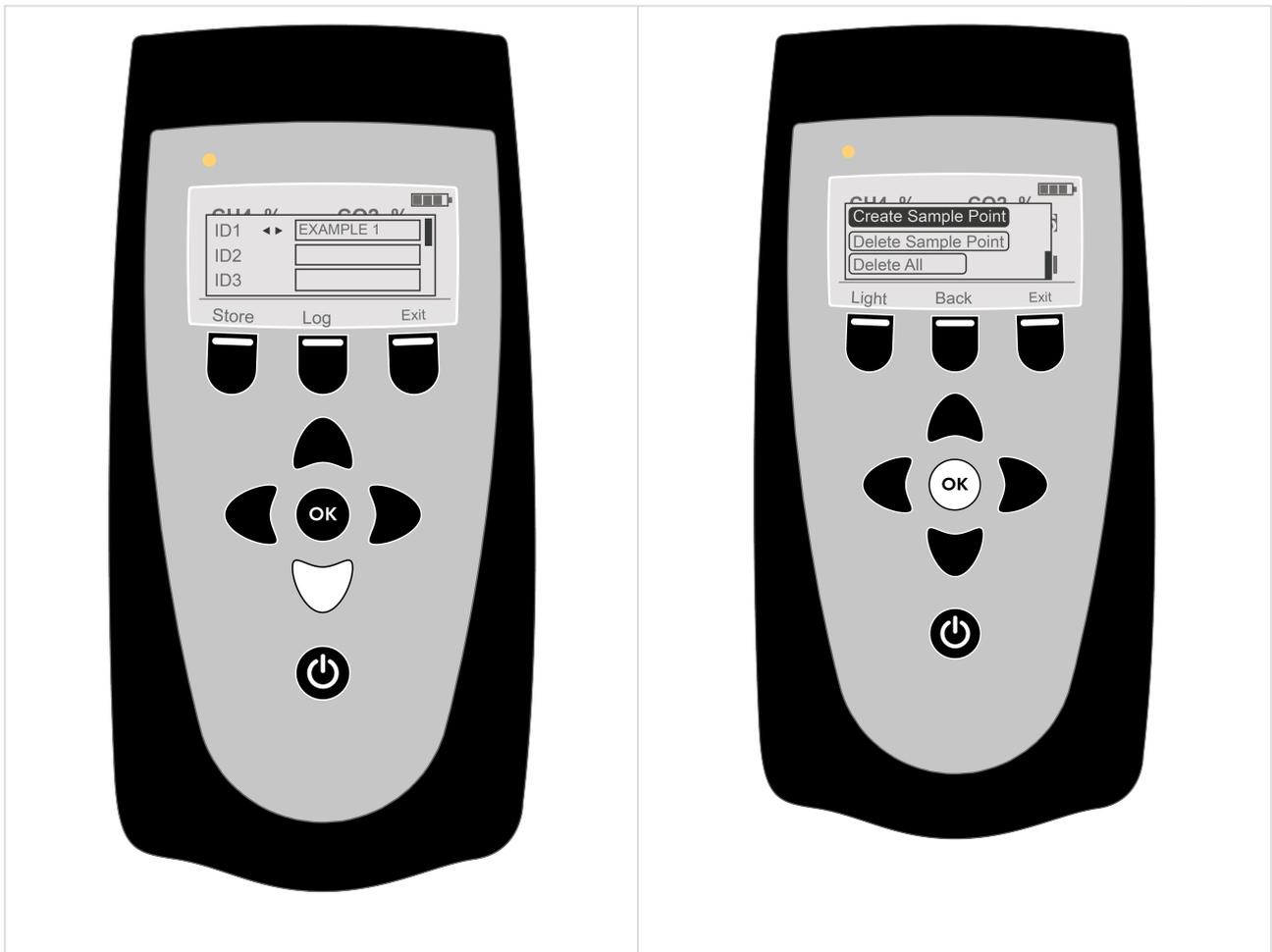
To edit the name of an ID, navigate to the desired cell (either one to be edited or a blank cell for a new entry) and press OK. Use the arrows and OK key to enter the desired name for the ID selected. Then press the left soft key to “Accept”.





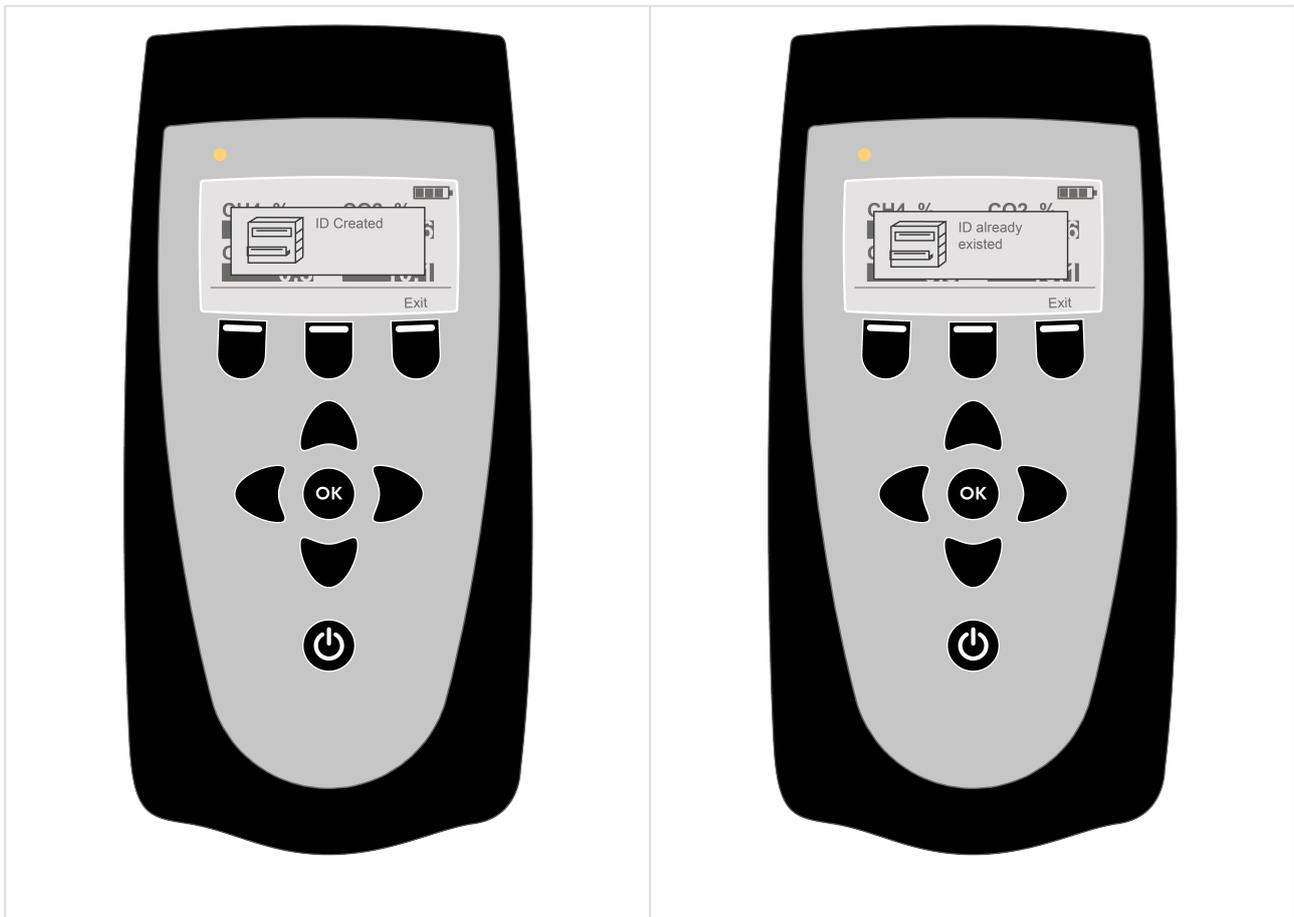


When all the appropriate tiers have been given the correct names, scroll down using the arrow keys and select “Create sample point” using the OK key. This menu can also be used to **delete sample points**. Sample points are selected when storing data by pressing “OK” on each ID number and using the “left and right arrows” to select the desired sample point.



Once the sample point is created, the display will read “ID Created”, unless the ID already exists in which case you will be notified when the display reads “ID already existed”.





12.4 Logging Setup

The instrument has a built-in 'Unattended Data Logging' facility. This allows the instrument to be programmed to carry out repeated samples over a defined period.

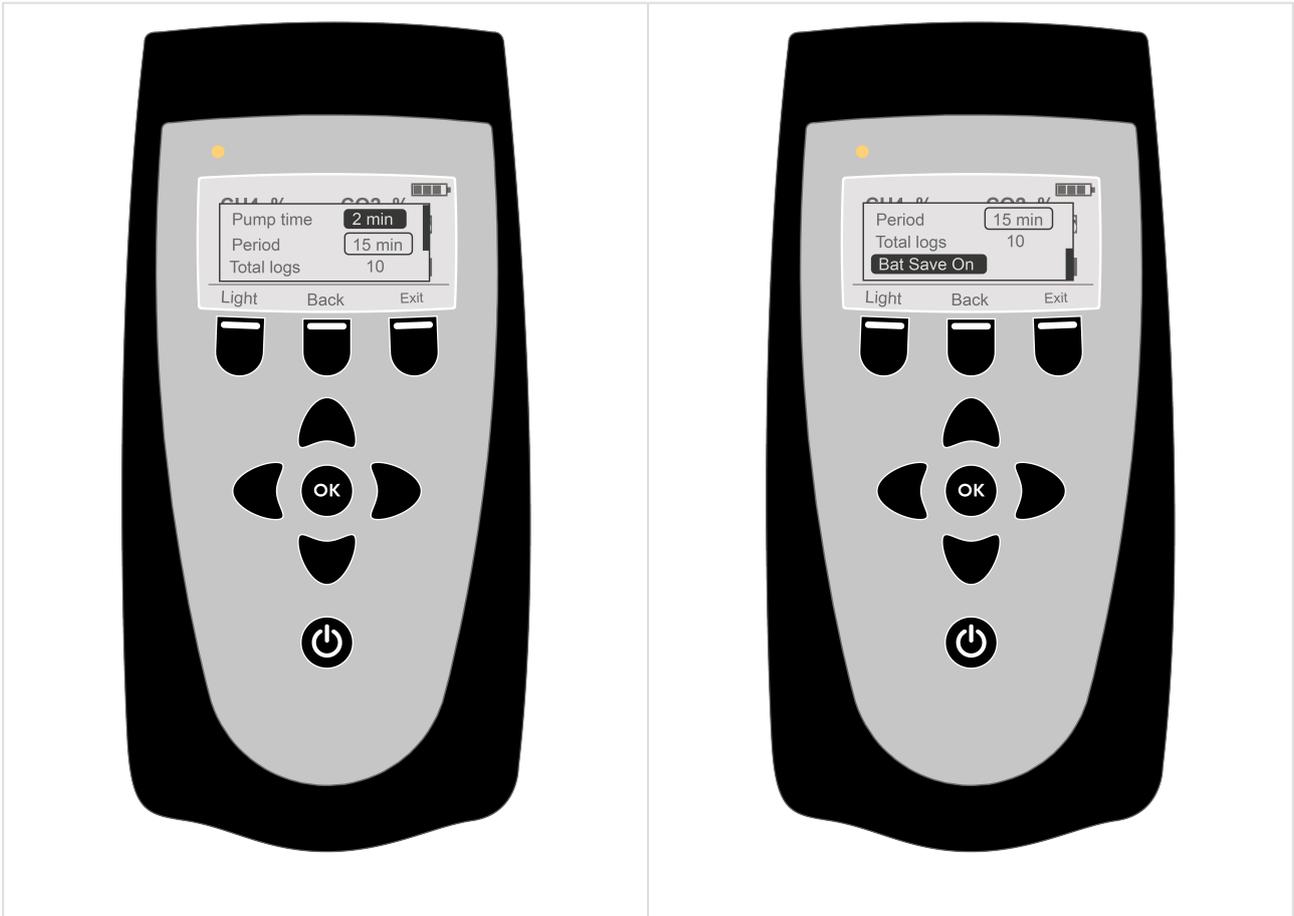
To access the Logging Setup Screen, press the Middle Soft Key ('Menu') from any of the measurement display screens.

Use the arrows to highlight 'Logging Setup' and press the OK button.



Logging Setup is a menu for setting up unattended data logging parameters. The parameters can be found on the list on screen. They are accessed by scrolling up and down with the arrow keys and pressing the OK key to edit.

IMPORTANT: Logging must be set up against a named ID number. If not, the readings will not save. A failed log will be identified by “ILL” appearing in the top right hand corner by the battery symbol. See the chapter on **Instructions On Setting Up IDs**



12.4.1 Pump Time

This parameter determines the length of time the pump will run for a while before the gas analysis values are captured, also known as sample time. This is a pre-set list of values to select from - 90 seconds, 2 minutes, 3 minutes, or 4 minutes.

Pressing 'OK' will scroll through these options. When you have selected the required value, use the 'Up/Down' arrows to move to the next parameter.

A selection of 3 minutes, for example, will allow the pump will run for 3 minutes and then the instrument will store the analysis values it measured at the end of the 3 minute period.

12.4.2 Period

This parameter determines the time between samples. This is a pre-set list of values to select from – 10 minutes, 15 minutes, 20 minutes, 30 minutes, 1hr, 2hrs, 3hrs, 6hrs, 12hrs and 1 day.





A selection of 10 minutes, for example, will result in the instrument storing a result every 10 minutes. The instrument will use the Pump Time parameter as it calculates its timings.

For example, if a pump time of 2 minutes and a period of 15 minutes is selected then the pump will be off for 13 minutes, then will operate for 2 minutes so the results are stored every 15 minutes.

Pressing 'OK' will scroll through these options. When you have selected the required value, use the 'Up/Down' arrows to move to the next parameter.

By default, the Pump Time is 2 minutes and the period is 15 minutes.

12.4.3 Total Logs

These parameters determine the total number of samples which will be taken.

Unlike Pump Time and Period, you can set Total Logs to any number between 0 and 3000 readings. The upper limit is determined by the remaining store space.

If Total Logs is set to 0 it will Log continually until there is no more store space remaining.

To change Total Logs, select the field and press OK. Then use the Left and Right Key to highlight the digit you wish to change and use the Up and Down Keys to increment or decrement that number. To move to the next digit, use the arrow keys again.

Once you have set your Total Logs press OK to move to the next field.

By default, Total Logs is 10.

12.4.4 Bat Save On

The battery save function is on by default and increases the length of time the instrument can be left to perform unattended data logging by shutting down between samples.

With battery save enabled the instrument will switch itself off 5 seconds after taking a sample unless it is interrupted, for example by a Key being pressed or the log ending, then switch itself back on approximately 30 seconds before it is due to start taking its next sample.

With battery save disabled the instrument will remain always turned on, until the battery is empty.





Pressing OK when this parameter is highlighted will toggle this setting.

When all the parameters have been selected, press 'Exit' to return to the Gas Display screen, and the logging sequence will be saved.

12.5 Logging Display

The Logging Display shows the total number of samples to be taken in the log, 'Total Logs', and the number of samples which have been logged, 'Logged'.

When the pump is running and it is sampling a countdown timer and 'Sampling' will be shown, when this reaches 0 the measurements will be stored, and a popup will appear saying 'Reading stored' and the number of free readings available (i.e. the amount of store space remaining) if the store was successful.



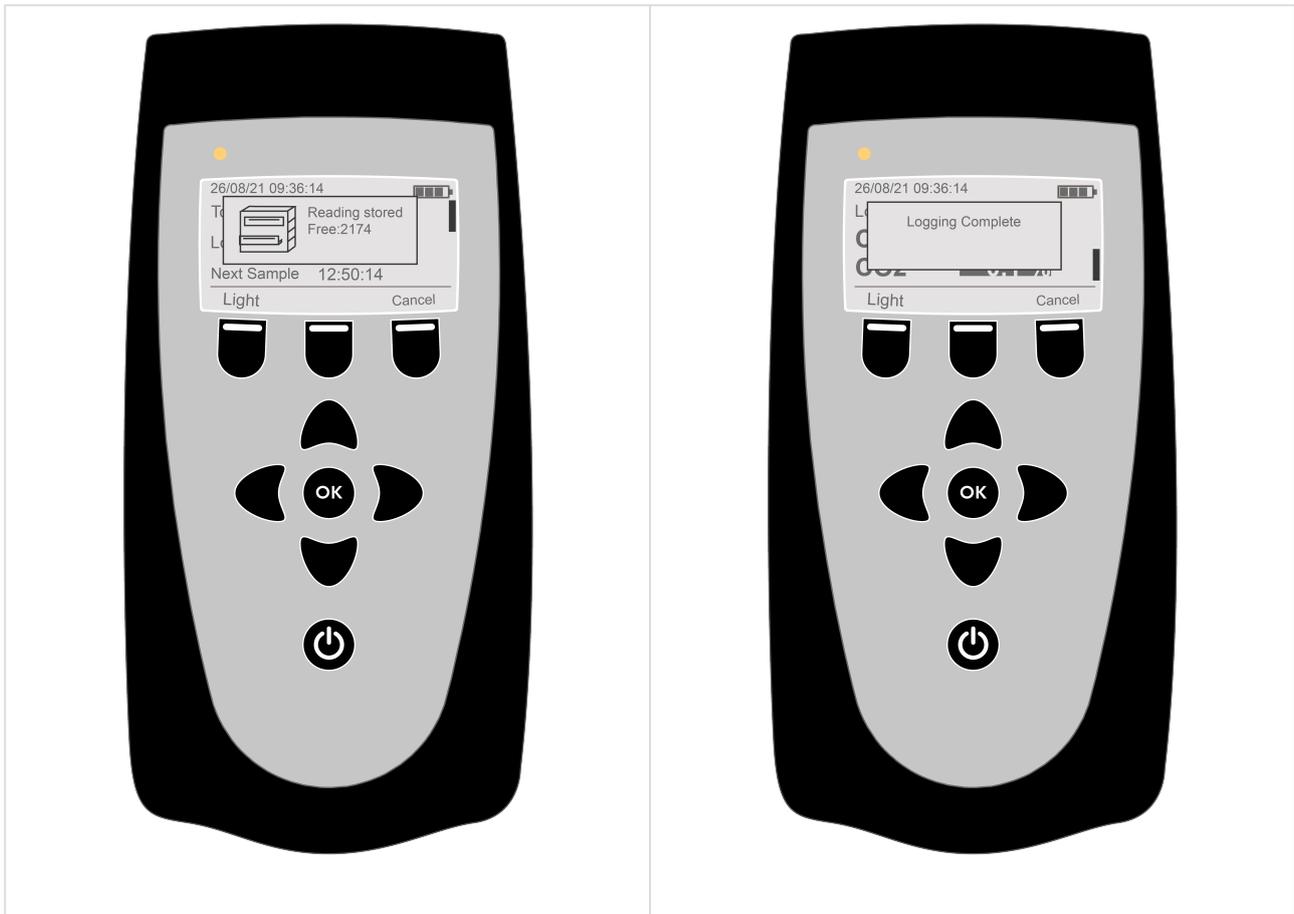
When it is not sampling, 'Next Sample' and the time until the next sample will be shown unless the log has finished. Saved readings can be read by scrolling down with the down arrow. As the instrument moves through the number



of total logs, readings will be saved against the time and date and under any ID number combinations selected at the start.

After each sample, a pop-up box will appear saying “Reading stored” and then an indication of the remaining memory on the device.

After all the samples are complete (i.e. number of total logs has been reached), another pop-up box will show saying “logging complete”.



NOTE: These Soft Keys are hidden while popups are being shown and pressing a Soft Key while a popup is active will close it.

If the battery save function is on the length of time the instrument can be left to perform unattended data logging is increased as the instrument will shut down between samples.





A popup saying 'WARNING Switching Off May Interrupt Sampling' will be shown when the instrument wakes itself as manually switching the instrument on or off during logging may interrupt sampling or cause a log to be missed or not taken.



12.6 Logging Setup

Unable to render include or excerpt-include. Could not retrieve page.

12.7 Store Menu

Unable to render include or excerpt-include. Could not retrieve page.

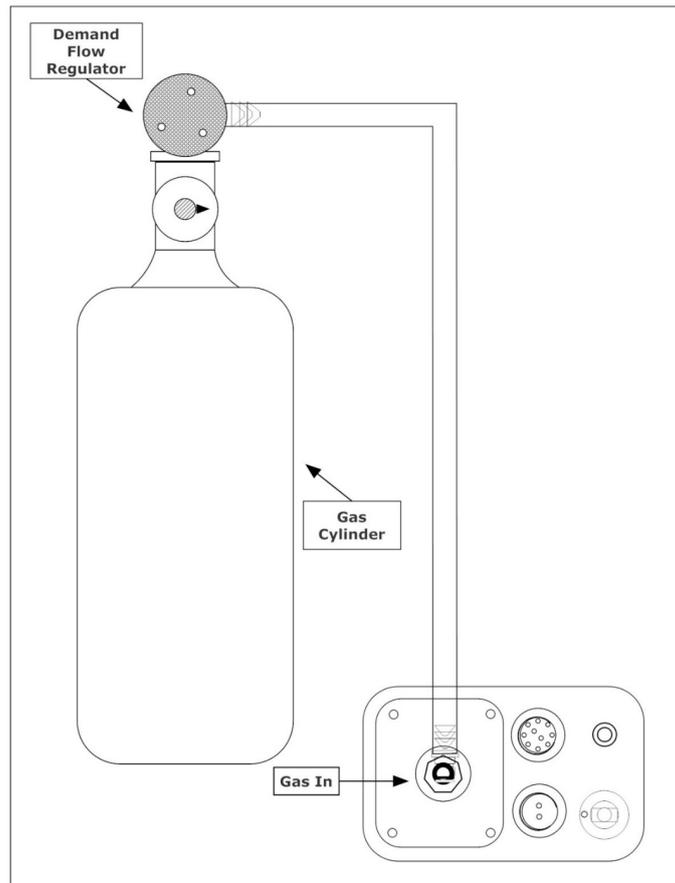


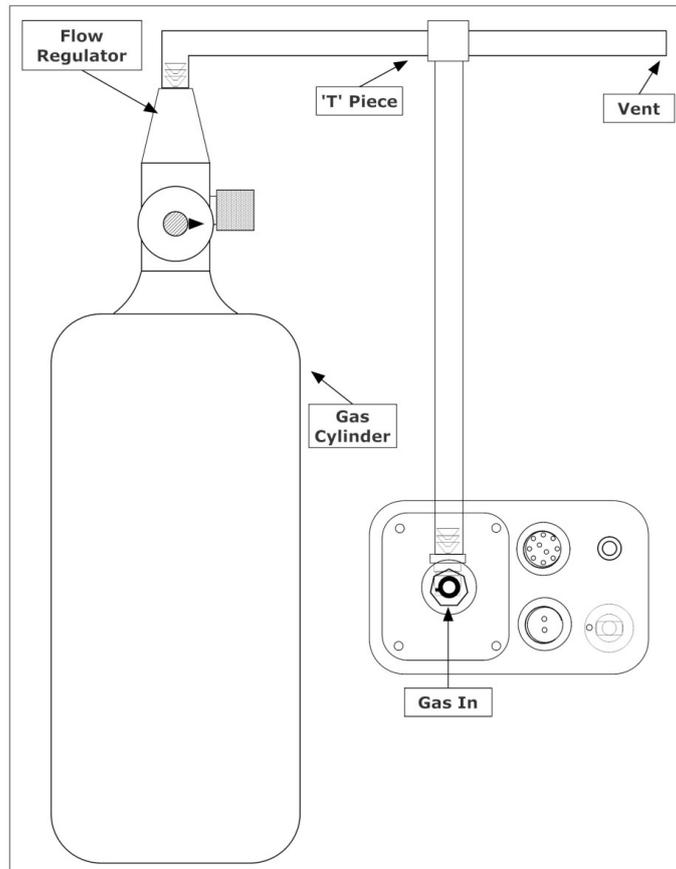


13 User Calibration

Calibration of this instrument involves the use of pressurised cylinders of test gases.

A cylinder of the appropriate gas at the specified concentration needs to be connected to the 'Gas In' port at the top of the instrument with the valve open when calibrating a point. It is recommended that a demand flow regulator is used. If a demand flow regulator is not used connect the cylinder through a 'T' piece to bypass most of the gas to exhaust and set the gas flow regulator to 500 ml/min.





⚠ The use of pressurised cylinders of test gases may produce hazards including the following:

- High pressure gas leakage
- Release of flammable gas mixtures
- Release of toxic gas mixtures

Always follow the safety guide lines given by your test gas cylinder supplier.

On the Banner Display pressing Right Soft Key, Right Soft Key, then Middle Soft Key will reveal a hidden Calibrate button.

Pressing the **Right Soft Key twice**, once after another then the **Middle Soft Key** will reveal a hidden button for the **User Calibration Display**.



Press the Right Soft Key, labelled 'Calibrate' to go to the User Calibration Display.





From here, the gas to be calibrated should be selected using the up and down arrows and then the OK key.

Only one gas may be calibrated at a time. Be sure to select the correct calibration option of the four available. This can be done by scrolling with the up and down arrows once the gas has been selected. They are as follows:

<p>Reset factory delta</p>	<p>When an instrument is User Calibrated, the “Deltas” are adjusted. These are the three numbers shown below the gas reading. These represent the adjustment ratios of the software to compensate for any drift that the gas channels may have been subject to. Resetting the Factory delta will remove any adjustment ratios. Calibrating the instrument at any point will create new deltas and overwrite the previous ones.</p>
<p>Calibrate zero point</p>	<p>A calibration of the instrument when the gas its zero point (0.0% or 0ppm)</p>





<p>Calibrate low range point</p>	<p>A calibration of the instrument at a low reading, typically around 5% (different low rangers per gas). This is done to improve the accuracy of readings at the lower end of the possible range.</p>
<p>Calibrate high range point</p>	<p>A calibration of the instrument at high reading, usually dictated by the gas composition typically available.</p>

To calibrate an instrument, the pump must be activated when connected to the correct gas source. Allow the instrument to sample the gas for at least 3 minutes, then when the reading stabilises select “Calibrate” with the middle soft key. This will change the deltas and overwrite the previous values.



Note: Ensure the correct gas concentration is connected to the instrument before calibrating. Miss-calibrating will inevitably lead to false results. If anything goes wrong with the user calibration, reset the factory deltas. Please contact the manufacturer for any further questions.



The zero Cal point requires a gas known to have 0.0% of the measured gas for the specific gas channel being calibrated. The low and high range Cal points will depend on the specific gas channel being calibrated and is summarised in the following table:

Gas Channel	Zero Cal Point	Low Range Cal Point	High Range Cal Point
CH ₄	0.0%	5.0%	60.0%
CO ₂	0.0%	5.0%	40.0%
O ₂	0.0%	6.0%	20.9%
H ₂ S	0ppm	1500ppm	3000ppm
CO	0ppm	1000ppm	2000ppm

The same information can be seen built into the instrument when selecting which calibration option to calibrate. Navigate through the different calibration ranges and different gases using the up and down arrow.







NOTE: Only attempt to calibrate a point if the current gas reading is within +/- 5% of the indicated calibration point. If the Middle Soft Key, labelled 'Calibrate', does not appear this means that it is currently not possible to calibrate the desired point. Also, the valve must be open for the gas to flow and starting or stopping the pump will also open and close the valve. If you are using a cylinder of calibration gas without a demand flow regulator, then having the cylinder connected with the regulator open while the valve is closed will cause a back pressure. Having the cylinder connected with the regulator closed or when the cylinder is depleted while the valve is open and the pump is on, may damage the pump.

Scroll using the up and down arrows to find **"GAS Reset factory delta"**. Then select **"Reset"**. This will remove any user calibration, and return the deltas to 1/1/0

Once calibration is complete, press the Left Soft Key, labelled 'OK', to return to the Banner Display.





14 Auto Turn Off

To help prolong the time between charges, the instrument will automatically turn off after 15 minutes of inactivity. This does not occur whilst the instrument is connected to the mains supply.





15 GFM436 - Maintenance

As the instrument is an ATEX, UKEX and IECEx rated, precision instrument of analysis, it is very important to maintain its good condition for both safety and performance.

The instrument requires annual servicing, the date for which is displayed on the opening screen. The following conditions must be met and are essential to the instrument's functionality and reliability:

- It must be stored at room temperature.
- It must be powered up and have a sample taken at least once a week.
- Each day it is used, a sample of fresh air must be taken before and after use.
- It must be charged the same day when the instrument has run out of charge.

If these are not done, then the instrument is at risk of the following:

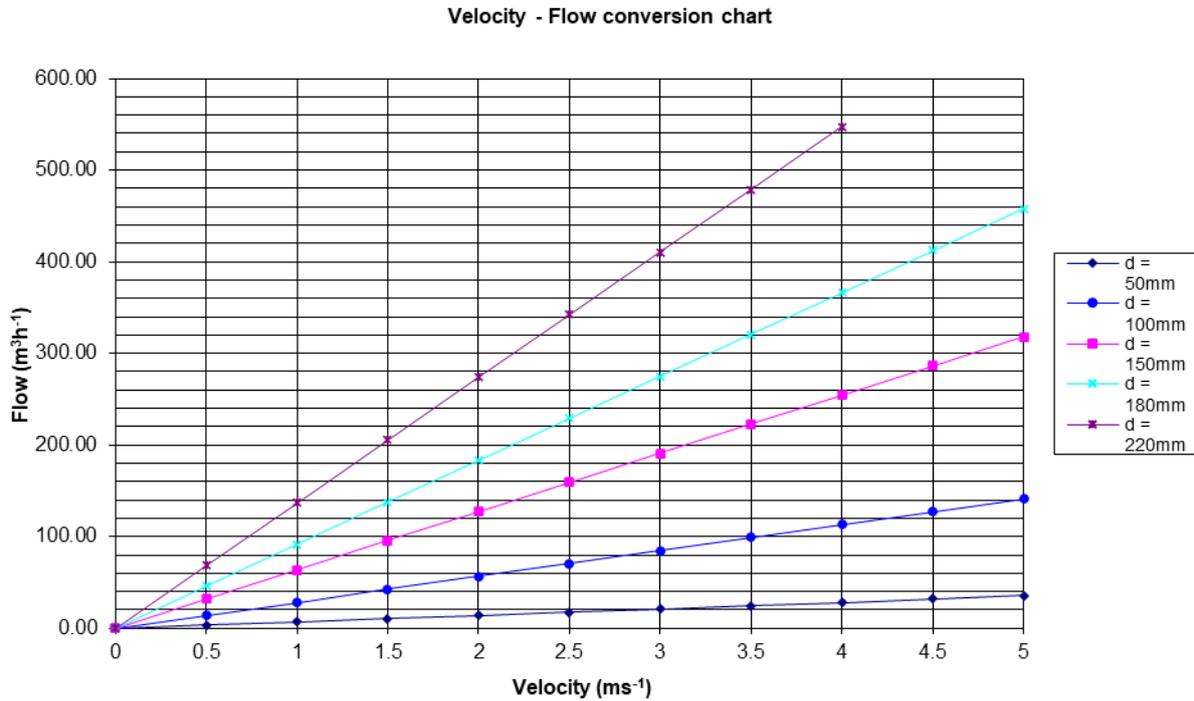
- Reducing battery life
- Bringing harm to the electrochemical cells, reducing their lifetime
- Affecting the instrument's performance in gas analysis





16 Appendix A – Velocity Flow Conversion Charts

The following chart is included to enable the operator to make quick and easy conversions from velocity measurements provided by the vane anemometer to flow rates.



The formula for calculating the conversion is:

$$f = 0.00283 d^2 v$$

where

f = flow in m^3h^{-1}

d = pipe inside diameter in mm

v = velocity in ms^{-1}



17 Appendix B – Understanding Instruments For Use In Flammable Atmospheres

17.1 Hazardous areas classified by zones

There are three zones defined to guide users as to the necessary precautions which should be taken when working in potentially flammable atmospheres:

1. Zone 0 - An area in which an explosive gas/air mixture is continuously present, or present for long periods.
2. Zone 1 - An area in which an explosive gas/air mixture is likely to occur in normal operation.
3. Zone 2 - An area in which an explosive gas/air mixture is not likely to occur in normal operation and if it does occur will exist only for a short time.

Make certain that the area in which you intend to work can be described by one of the zones above.

i NOTE: This instrument is suitable for use in Zone 1 and 2.

17.2 Different types of gas

Different gases are grouped according to how easily they are ignited. Some examples are given below. (For other gases please contact the manufacturer).

Gas	Relative Ignition	Group
Hydrogen/Acetylene	Most easily ignited	IIC
Ethylene		IIB
Carbon monoxide		IIB
Hydrogen sulphide		IIB
Ammonia		IIA
Propane		IIA
Petrol vapour		IIA



Methane	Least easily ignited	I
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NOTE: This instrument is suitable for use in flammable atmospheres caused by the presence of gases in Group I, Group IIa and Group IIb.

17.3 Design and construction of intrinsically safe instruments for use in flammable atmospheres

The technique of intrinsically safe design and construction is defined in the standard BS EN 60079-11:2012. The technique identifies potential sources of ignition (by spark or by heat) and specifies the design of safety circuits that limit the energy of the spark and/or the component temperatures such that they cannot ignite the gases expected within the hazardous area. There are two categories of intrinsically safe instruments:

1. **'ia'** The safety circuits used will prevent the generation of a spark or temperature capable of igniting the gas even if the instrument develops TWO faults.
2. **'ib'** The safety circuits used will prevent the generation of a spark or temperature capable of igniting the gas even if the instrument develops ONE fault.

NOTE: The R Series is designed to meet the requirements of category 'ib'.

By testing components in fault conditions (as required by 'ib') the worst-case temperature within the instrument is determined. This is used to give the instrument a temperature classification. A guide to temperature classifications is given below.

Temperature Class	Maximum Temperature (°C)	Maximum Temperature (°F)
T1	450	842
T2	300	572
T3	200	392
T4	135	275
T5	100	212





T6	85	185
----	----	-----

The higher the T class the lower the temperature.

Different gases will be ignited at different temperatures. Some examples are given below.

Gas	MINIMUM Required T class
Acetylene	T2
Hydrogen	T1
Ethylene	T2
Carbon monoxide	T1
Hydrogen sulphide	T3
Ammonia	T1
Propane	T1
Methane	T1

NOTE: This instrument is designed to meet the requirements of class T1.

17.4 Testing and Certification

This instrument has been submitted for both European Type Assessment, United Kingdom Type Assessment and IEC Type Assessment. These assessments examine the design and construction criteria set out above and controls the manufacture process. This process is defined in Annex II of the European ATEX Directive 94/9/EC. This allows the instrument to carry the 'Ex' logo followed by a summary of the level of protection that is incorporated into the instrument.





18 Appendix C – Vane Anemometer

i NOTE: Anemometers do not form part of the ATEX, UKEX or IECEx certification of this instrument. Contact the manufacturer for further advice on the safe use of these probes.

18.1 Operating Instructions

These operating instructions are intended to ensure that the measuring instrument and probe remain perfectly serviceable, guaranteeing fault-free and safe operation. We therefore ask you to read these instructions carefully before placing the instrument in operation for the first time:

Avoid moisture, extreme temperatures, and vibrations.

Do not shake!

Clean probes and indication unit only in accordance with the cleaning instructions given below!

Strong electromagnetic interference (e.g. transformers, radio transmitting equipment) may affect the accuracy of the measuring instrument.

18.2 Important notes

Every vane anemometer has a designed operating range. The transducers have been developed and produced for this envisaged operating range. The calibration corresponds to the actual state, at the moment measurements are made.

Incorrect handling can adversely affect vane anemometer readings.

It must be ensured that the instrument is operated only by trained personnel, the instrument is regularly serviced and calibrated, and that no changes are made to the instrument except those described in the operating instructions.

18.3 Streamline Measuring Head

The form of the measuring head guarantees a high direction insensitivity which is approx. +/- 20 degrees for Micro head and +/- 25 degrees for Mini head.





18.4 Response time

18.4.1 Response Time of electronics:

When connected to supply (on/off): immediate

Time to reach 63 % of end value: 424 ms

18.4.2 Response Time of Vanes:

Increase of flow: 1.0 sec.

Decrease of flow: 8.0 sec.

18.4.3 Technical data – MiniAir 6 Micro

Measuring range	0.7 – 40 m/s
Accuracy +/-	1.0% fs
Operating temp.	-10 to +80°C (14°F to 176°F)
Head dimensions	11 x 15mm (0.4" x 0.6")
Access opening	16mm (0.6")
Probe length	165mm (6.5")
Storage temp.	-65 to +150°C (-85°F to 302°F)

18.5 Cleaning and maintenance

Vane anemometers are precision products which will give fault-free service if correctly handled. If you handle them as described in the operating instructions, your instruments and probes will remain in a serviceable condition and ensure the reliable operation of the measuring system. Each instrument has its designed range of application and is only to be used for this range.

⚠ *If faults should nevertheless occur, do not attempt to open the instrument and repair it yourself; always have repairs carried out by our after-sales service.*





18.5.1 General handling tips

- Protect the probes against severe vibration
- Do not kink the connector cable (risk of cable break)
- Never allow hard objects to contact rotating impellers
- Always carry out probe cleaning according to the cleaning instructions
- Never immerse probes in solvent
- Never blow probes through with compressed air
- Allow hot temperature probes to cool slowly; never cool by plunging them in cold water or the like.

18.5.2 Vane probes

Instrument and probe must be switched off or disconnected prior to cleaning.

As the probes are highly sensitive measuring instruments, they must be cleaned with very great care.

Fibres or other foreign bodies can be carefully removed with fine tweezers.

When doing so, take care not to bend or otherwise damage the vanes or the spindle.

 *The adjustment of the bearing screws must never be changed. This can result in erroneous measurements.*

 *Never allow hard objects to contact rotating impellers!*

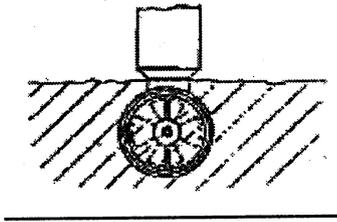
Cleaning agents which extract the plasticizer from the plastic are never to be used for plastic probes (practically all solvents!).

We recommend the following for cleaning the probes:

- running water
- soapy water
- pure benzene

Cleaning example:





Carefully swish the top part of the impeller back and forth in clean, pure benzene for approx. 10 min. Then swish the top part of the impeller back and forth in clean kerosene for approx. 1 min to re-lubricate the impeller bearings.

If soapy water is used as a cleaning agent, it is advisable to wash out the soap solution thoroughly with distilled water before lubrication with kerosene.

After cleaning the probe, rub it dry externally with a clean, dry, fluff-free cloth.

Leave the top part of the impeller to dry for approx. 30 minutes.

⚠ Only clean the head of the impeller!

⚠ Probes are on no account to be fully immersed in the solution.

18.5.3 Cable, extension rod, case

The following agents:

- Soapy water
- EDP plastic cleaner
- Window cleaning fluid (without ammonia)
- For any stubborn deposits, pure benzene

These solutions are only to be applied to the parts with a fluff-free cloth.

⚠ Only carry out surface cleaning. The parts are never to be immersed in the solution.





18.5.4 Snap Head

The snap head fixing system renders it very simple to fit a new impeller to the flow probe: this saves costly non-productive time and in the event of damage to the snap-head enables the operator to have the probe back in service in a matter of seconds by simply changing the snap-head.

18.5.5 Checking/factory inspections

Depending on the application and the loads on the instrument we consider it highly advisable to have the probe annually checked or inspected/repared at our factory.





19 Appendix D – Warranty Policy

This instrument is guaranteed, to the original end user or purchaser, against defects in materials and workmanship for a period of one year from the date of shipment to the user. During this period, the manufacturer will repair or replace defective parts on an exchange basis. Freight charged to and from the the manufacturer factory or authorised service centre will be paid by the end user. The decision to repair or replace will be determined by the manufacturer

19.1 Conditions and exclusions

To maintain this warranty, the purchaser must perform maintenance and calibration as prescribed in this user guide. This includes prompt replacement or repair of defective parts and such other necessary maintenance, calibration and repair as may be required according to the use of the equipment in the reasonable judgement of the manufacturer.

Normal wear and tear, and parts damaged by abuse, misuse, negligence or accidents are specifically excluded from the warranty.

19.2 Disposal

Disposal of old electrical and electronic equipment (applicable throughout the European Union and other European countries with separate collection programmes).



This equipment must not be disposed of as household waste. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring that this product is disposed of correctly, you will help to prevent potential adverse consequences to the environment and human health which could otherwise be caused. The recycling of materials will help to conserve natural resources. For further information, please contact your local city office or waste disposal service.





20 Appendix E – Declarations of Conformity

20.1 EU DoC

Manufacturer Name & Address:

Gas Data Ltd.
 Unit D
 Earlplace Business Park
 Fletchamstead Highway
 Coventry
 CV4 9XL

Model Numbers:

(reference list attached on the following page(s))

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The GFM family of instruments are hand-held gas analysers. The models covered by this declaration are the GFM226, GFM406, GFM426, GFM436, GFM526 and GFM610.

20.1.1 The Electromagnetic Compatibility Directive 2014/30/EU:

I hereby certify that the apparatus described above conforms with the protection requirements of Council Directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility, based on the requirements of the following harmonized standards.

Ref. No.	Title
EN 50270:2015	Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen
EN 61000-6-3:2007+A1:2011	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments





20.1.2 ATEX Directive 2014/34/EU:

I hereby certify that the apparatus described above conforms with the protection requirements of Council Directive 2014/34/EU on the approximation of the laws of the Member States generally concerning equipment and protective systems intended for use in potentially explosive atmospheres, based on the requirements of the following harmonized standards.

Ref. No.	Title
EN IEC 60079-0:2018	Electrical apparatus for explosive gas atmospheres. General requirements
EN 60079-11:2012	Explosive atmospheres. Equipment protection by intrinsic safety "i"

The equipment is marked



II 2G Ex ib IIB T1 Gb

ATEX certificate number ITS04ATEX23415X.

20.1.3 IECEx:

I hereby certify that the apparatus described above conforms with the protection requirements of IECEx equipment and protective systems intended for use in potentially explosive atmospheres, based on the requirements of the following harmonized standards.

Ref. No.	Title
IEC 60079-0:2017	Explosive atmospheres – Part 0: Equipment – General requirements
IEC 60079-11:2011	Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “I”





The equipment is marked



ib IIB T1 Gb

IECEx certificate number IECEx ITS 21.0004X.

20.2 Notified body

Notified Body responsible for the ATEX certificate:

Intertek Italia S.p.A. via Miglioli, Notified Body number 2575
2/A - 20063 Cernusco sul Naviglio

Milano - Italy

Notified Body responsible for the ATEX QAN:

Intertek Testing Services NA Ltd., Notified Body number 2903
14920-135 Avenue, Edmonton, AB,

T5V 1R9, Canada

20.3 Additional information

Product	Description	EMC ¹	ATEX and IECEx ²
GFM226	Hidden person stowaway detector	Yes ^A	No
GFM406	Multichannel portable gas analyser	Yes ^A	Yes
GFM426	Portable landfill gas extraction analyser	Yes ^A	Yes
GFM436	Site investigation, landfill and compliance analyser	Yes ^A	Yes





GFM526	Portable landfill gas extraction analyser	Yes ^A	Yes
GFM610	Flow Monitor	Yes	Yes

Notes relating to CE marking:

¹ Entries in this column may be;

Yes Product conforms to the EMC Directive.

N/R Product is not required to conform to the EMC Directive.

Products marked with note ^A in the EMC column deviate from EN 50270:2015 as described below:

1. Gas readings may become erratic when exposed to high intensity radiated EM fields of specific frequencies.

² Entries in this column may be:

Yes Product conforms to the ATEX Directive and IECEx.

N/R Product is not required to conform to the ATEX Directive and IECEx.

20.4 Signature

Signed for and on behalf of Gas Data Ltd, Coventry, UK.

Responsible Person:

Graham Sanders

Managing Director

09/10/2023

20.5 UK DoC

Manufacturer Name & Address:





Gas Data Ltd.
 Unit D
 Earlplace Business Park
 Fletchamstead Highway
 Coventry
 CV4 9XL

Model Numbers:

(reference list attached on the following page(s))

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The GFM family of instruments are hand-held gas analysers. The models covered by this declaration are the GFM226, GFM406, GFM426, GFM436, GFM526 and GFM610.

20.5.1 The Electromagnetic Compatibility Regulations 2016:

I hereby certify that the apparatus described above conforms with the protection requirements of The Electromagnetic Compatibility Regulations 2016, based on the requirements of the following harmonized standards.

Ref. No.	Title
EN 50270:2015	Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen
EN 61000-6-3:2007+A1:2011	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments





20.5.2 Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016:

I hereby certify that the apparatus described above conforms with the protection requirements of the Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016, based on the requirements of the following harmonized standards.

Ref. No.	Title
EN IEC 60079-0:2018	Electrical apparatus for explosive gas atmospheres. General requirements
EN 60079-11:2012	Explosive atmospheres. Equipment protection by intrinsic safety "i"

The equipment is marked



II 2G Ex ib IIB T1 Gb

20.6 Notified body

Notified Body responsible for UKEX certificates and UKEX QAN:

Intertek Testing & Certification Limited Notified Body number 0359
 Cleeve Road, Leatherhead, Surrey, KT22 7SA

20.7 Additional information

Product	Description	EMC ¹	UKEX ²	Cert. Number
GFM226	Hidden person stowaway detector	Yes ^A	No	





GFM406	Multichannel portable gas analyser	Yes ^A	Yes	ITS21UKEX0026X
GFM426	Portable landfill gas extraction analyser	Yes ^A	Yes	ITS21UKEX0026X
GFM436	Site investigation, landfill and compliance analyser	Yes ^A	Yes	ITS21UKEX0026X
GFM526	Portable landfill gas extraction analyser	Yes ^A	Yes	ITS21UKEX0026X
GFM610	Flow Monitor	Yes	Yes	ITS21UKEX0026X

Notes relating to UKCA marking:

¹ Entries in this column may be;

Yes Product conforms to the EMC Directive.

N/R Product is not required to conform to the EMC Directive.

Products marked with note ^{A B} in the EMC column deviate from EN 50270:2015 as described below:

1. Gas readings may become erratic when exposed to high intensity radiated EM fields of specific frequencies.

² Entries in this column may be:

Yes Product conforms to the UKEX Directive

N/R Product is not required to conform to the UKEX Directive.

20.8 Signature

Signed for and on behalf of Gas Data Ltd, Coventry, UK.

Responsible Person:





A handwritten signature in black ink, appearing to read 'Graham Sanders'.

Graham Sanders
Managing Director
09/10/2023





21 Appendix F – ATEX, UKEX and IECEx Certificate

The first page of each ATEX, UKEX and IECEx Certificate can be seen in the paper copy of this manual. Full versions are available in the online version of this manual, or by request from the manufacturer.



EU TYPE-EXAMINATION CERTIFICATE

1. EU type-examination Certificate (Module B)
2. Equipment or Protective System intended for use in potentially explosive atmospheres (Directive 2014/34/EU)
3. EU type examination certificate No: **ITS04ATEX23415X R.2**
4. **Product:** G1 Max
5. **Manufacturer:** Gas Data Limited **Applicant:** Gas Data Limited
6. **Address:** Unit 4, Fairfield Court, Seven Stars Estate, Wheeler Road, Whitby, Coventry, CV3 4LL UK **Address:** Unit 4, Fairfield Court, Seven Stars Estate, Wheeler Road, Whitby, Coventry, CV3 4LL, UK



7. This product and any acceptable variation thereto are specified in the schedule to this certificate and therein-referred to.
8. INTERTEK ITALIA S.p.A., Notified Body n° 2575 in accordance with article 17 of the Directive 2014/34/EU of the European Parliament and Council of the 26 February 2014, certifies that the equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective system intended for use in potentially explosive atmosphere, given in Annex II of the Directive.
The examination and tests results are recorded in confidential technical evaluation Intertek Report No: 105076491LHD-002 dated 1st September 2022.
9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN IEC 60079-0:2018 and EN 60079-11:2012 except in respect of those requirements referred to at item 16 of the Schedule.
10. If the sign X is placed after the certificate number, it indicates that the product is subject to Specific Conditions of Use specified in the schedule to this certificate.
11. This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
12. The marking of the product shall include the following:



II 2 G Ex Ib SB T1 Gb
Tamb: -30°C to +40°C

Certificate issue date

1st October 2022



Mark Newman
Certification Officer
Intertek Italia S.p.A. (NB 2575)



PER N° 2778
Membro degli Accordi di Mutual Recognition EA, UK e ILAC
Signatario di EX, UK and IECEx Mutual Recognition Agreements

This certificate has been issued by Intertek Italia S.p.A. NB 2575 on transfer from Intertek Testing & Certification Ltd. (NB 0359) using the same issued original certificate number.

 This Certificate is for the exclusive use of Intertek Italia S.p.A. and is provided pursuant to the agreement between Intertek Italia S.p.A. and the Client. Intertek Italia S.p.A.'s responsibility, availability and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Certificate. Only the Client is authorised to permit copying or distribution of this Certificate and then only with Intertek's prior written consent. Any use of this Certificate name or mark, for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek.

Intertek Italia S.p.A. Via Magliolo, 1/4 - 20060 Corniglio di Pieve, Milano - Italy
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IECEx Certificate of Conformity		
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres <small>For rules and details of the IECEx Scheme visit www.iecex.com</small>		
Certificate No.:	IECEx ITS 21.0004X	Page 1 of 4
Status:	Current	Issue No: 2
Date of Issue:	2022-10-11	Certificate history: Issue 1 (2022-03-28) Issue 2 (2021-09-23)
Applicant:	Gas Data Limited Unit 4, Fairfield Court, Seven Stars Estate Whiter Road Wolverley Coventry CV3 4LJ United Kingdom	
Equipment:	QF Maxx Series of Gas Analyzers	
Optional accessory:		
Type of Protection:	Intrinsic Safety 'i'	
Marking:	Ex ib IIB T1 Gb -20°C ≤ Tamb ≤ +40°C IECEx ITS 21.0004X	
Approved for issue on behalf of the IECEx Certification Body:	Mark Newman	
Position:	Certificate Officer	
Signature: <small>(for printed version)</small>		
Date: <small>(for printed version)</small>	Date: 2022.10.11 1428.03401007	
<small>1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.</small>		
Certificate issued by		
Intertek Testing & Certification Limited ITS House, Chester Road Leathworth Surrey, KT22 7SA United Kingdom		
		





22 Appendix G – Non-EX Safety Critical Information

The power supply provided with this product accepts 100-240V AC, 50-60 Hz, 200-400mA. Its output is 9V DC, 2000mA. The power supply must not be exposed to moisture or liquids. During charging the charger is considered a disconnect device and must remain accessible at all times.

This product can work in a relative humidity of 15 to 90%.

This product can work in a pollution degree of 1, 2, 3, or 4. The product can be used outdoors and in wet environments.

When operating this product appropriate PPE must always be used, and applicable site regulations must be followed.

If this equipment is used in a way not specified in this manual, the protection provided by the equipment may be impaired.

The manufacturer's address is:

Gas Data Ltd.
Unit D
Earlplace Business Park
Coventry
CV4 9XH
UK





23 Appendix H - Three Letter Codes

The GFM can display a number of three letter codes in the upper right corner of the display. Where relevant these have already been mentioned in the manual. The full list is given here for convenience.

Code	Meaning
CMP	Compensation mode OFF
SQZ	Squeeze on in Engineering mode
CAL	When string or cal file data is corrupted
BSY	When erasing or formatting storage
ILL	When a request for readings is made when the .cal file configuration is suspect
TRASH	Relates to storing data
CLK	When real-time clock is flagged as corrupted
STR	When storage is corrupted
<->	When data is being transferred over USB
EDT	When user is being asked to edit a field or value
INP	When user is being asked to respond or select a list item
WRM	Warming up during power on
ENG	The GFM is in Engineering mode

