atmosCAL

Protea Gas Blender

The accurate calibration of gas analysers is critical, during factory build, routine service but also for on-going field assessment of analyser performance. Protea has developed the atmosCAL Gas Blender to enable dilution of high concentration gas cylinders over lower concentration ranges, in order to calibrate gas analysers – allowing characteristics such as absolute reading, repeatability, reproducibility, linearity and response time to be tested on analysers.

Using multiple Mass Flow Controller (MFC) technology, generating required gas concentration is as simple as typing into the touchscreen the desired concentration and choosing the flow rate. MFC technology operates on the principal of thermal mass, and different gases require compensation. The atmosCAL embedded software is pre-loaded with a range of compensation factors so the majority of gases can be used with the atmosCAL without adjustment.

The atmosCAL can be delivered with a maximum flow rate of 10l/min. Also, atmosCAL can be supplied with a number of different MFC flow ranges in the unit. For example, 5l/min and 0.5l/min MFCs within the one blender. As the accuracy of a MFC is limited by the operating range, by installing MFCs with multiple ranges the atmosCAL can still deliver accurate calibration mixes at high-dilution levels. This increases the atmosCAL's application to even lower concentrations, giving wider and more cost-effective usage of gases within the laboratory.

As a minimum, atmosCAL is provided with two MFCs – one for zero gas and one for input gas. However, atmosCAL can be provided with up to 8 calibration MFCs. This enables 8 separate gas cylinders to be connected and the software can be configured for the gases within in these, even if some contain multi-gas mixtures. The software will allow for gas cylinder information logging, such as certificate numbers, for traceability of the calibration

For calibration of laboratory and field gas analysers:

❋ Up to 8 gas bottles diluted

❋ Sequences of calibration for unattended operation

❋ ppb, ppm, mg/m3, %Vol units

❋ Gas compensations

❋ ISO 17025 calibration

❋ High or Low Flow Options

❋ Variable Flow MFCs for higher accuracy low-level calibrations

❋ Coated parts for reactive gas calibrations

❋ Modbus and Analogue Inputs for Gas Analyser Data Logging alongside calibration values
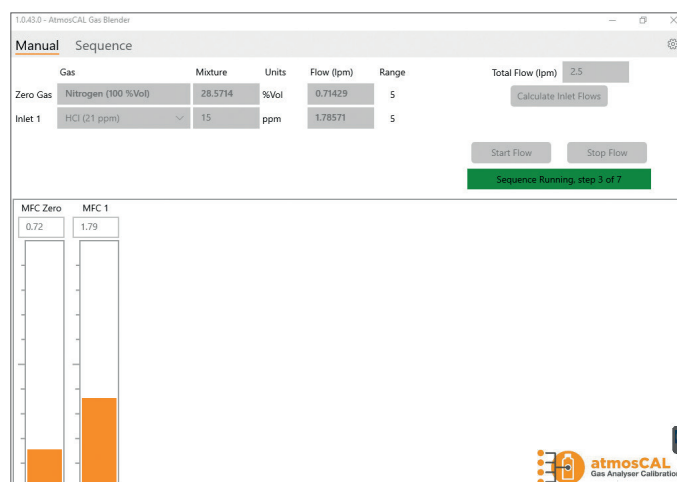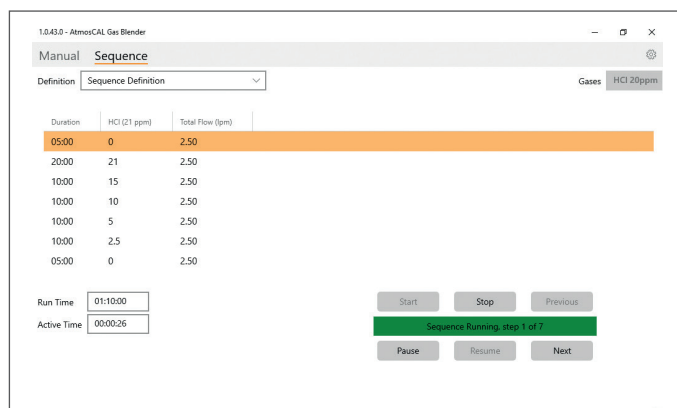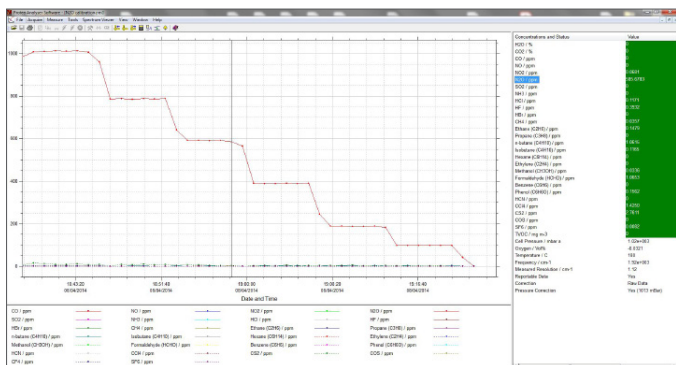
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Linearity Sequence

atmosCAL can be programmed with an automated sequence of calibration points. This enables analyser linearity to be assessed, as per various European and International standards for gas analyser validation. For example, a sequence can generate 10% increments of any gas in a random sequence to assess an analyser's accuracy across its operating range. Common sequence patterns are available as templates, such as 5%, 10%, 20% increments.

Linearity sequence provides fixed-duration step changes in gas concentration. Ideal for analysers like Protea's atmosFIR FTIR

Linearity steps are easy to program

Calibration and Accuracy

The MFCs used have a high accuracy of 0.5% of reading, plus 0.1% of the range. The atmosCAL embedded software allows for quadratic calibration functions to be applied to the MFCs following their calibration.

Protea can provide the atmosCAL with full ISO 17025 traceable calibration. This can be either individual calibrated MFCs or a complete product ISO 17025 calibration certificate. The complete product certificate ensures the devices in its entirety gives the require flowrates, and does not just rely on the MFCs being calibration in isolation, and it recommended.

atmosCAL for field-based calibration is compact, robust and accurate for gas blending on-site

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Modbus and Analogue Inputs from Analyser

The atmosCAL runs Windows-IOT and the embedded software allows for data connection directly with the gas analyser under test. This can be through analogue inputs or via Modbus Serial or Modbus TCP/IP. Configuring the gas blender to record the gas analyser readings in real-time as the calibration gas is delivered gives the operator the complete data set required to assess and report the analyser performance.

Applications for atmosCAL

* **Continuous Emissions Monitoring Systems (CEMS)**
* **Factory calibration, Service, QAL1 and QAL2 assessments**
* **Portable stack analyser calibrations**
* **ISO 17025 laboratory calibration tool**
* **Fire Testing analyser calibration**
* **Calibration for:**
   FTIR Gas Analysers
   NDIR Gas Analysers
   FID VOC Gas Analysers

Purging

atmosCAL contains in-built solenoid valves on each MFC channel. These allow for shut-off of calibration gas to the MFC when a calibration run is finished, to increase MFC lifetime. When calibration gases are closed off, a purge sequence can be employed to pass zero gas through all MFCs within the device. This purging again ensures MFCs operate at optimum performance for longer.

Calibration Workbook

With each atmosCAL, Protea will provide a calibration workbook (Microsoft Excel format) that can be used with the data from atmosCAL and the gas analyser to provide a calibration certificate for the analyser over its range.

Calibration workbook provided with atmosCAL gives EN and ISO calculations for the user

Protea Analyser Manufacturer

As Protea manufactures a range of IR, UV, FTIR and MS gas analysers, atmosCAL has been designed to meet the needs of calibrating our analysers against a range of standards and procedures. This includes emissions testing standards for both fixed (CEMs) and portable gas analysers, as well as standards for specific analysis applications such as Fire Testing.

Gas analysers manufactured and calibrated by Protea make use of the atmosCAL for linearity and interference gas checks

![Protea logo]
technology leadership
in measurement solutions

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Specifications

Number of Input Gases	2 -8 gases
Range(s)	Standard Range 5l/min for all MFC Variable ranges available. Maximum range 10l/min
Accuracy	±0.5% Rd plus ±0,1%FS (based on actual calibration)
Repeatability	< 0.2% Rd
Settling time	Standard: 1...2 sec
Control stability	< ±0.1% FS (typical for 1 ln/min N2)
T and P sensitivity	Zero: < 0.05% FS/°C; Span: < 0.05% Rd/°C 0.1% Rd/bar typical N2
Warm-up time	30 min. for optimum accuracy 2 min. for accuracy ± 2% FS
Material (wetted parts)	Stainless steel 316L construction Silconert® coating Seals: Viton®
Power supply	90-250 VAC 200mA per MFC
Internal SBC	RPi SBC running Win 10 IoT Core
Connectivity	Ethernet LAN Serial USB
Communication	Modbus Serial ASCII Modbus Serial RTU Modbus TCP/IP
Analogue	0-5V, 4-20mA
Data Saving	CSV file of date/time, calibration gas, analyser reading

*atmosCAL also available
in desktop case for
laboratory only use*

Windows 10 IoT