

NEWSLETTER No. 11



August 2010

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Geotech G210 Medical Gas Analyser Review

Introduction

The Geotech FP99 medical gas analyser has been an key item of test equipment for the QC (MGPS) for the last 15 years. Unfortunately, being part of an obsolete range of analysers, continued service and maintenance support has become increasingly uncertain. In 2006, Geotech announced that support for the instrument would end in January 2008. However, the company eventually agreed to extend support for the instrument until a replacement model could be developed. Geotech have now developed a much-improved replacement, the G210 medical gas analyzer, and the FP99 is to be phased out. Its last factory service and calibration date is 28 February 2011.

Geotech consulted several QC's during the design stages of the new analyser to optimize its specification. Some of the key features asked for included:



- Improved stability and linearity
- No external pods – all sensors to be housed within the body of the instrument
- Simultaneous measurement of carbon dioxide and nitrous oxide
- Automatic data logging with user selectable time intervals for testing air plant, oxygen concentrators, ambient air in plant rooms, etc
- Longer battery life with a battery level indicator on the main display
- USB connectivity for downloading data and for software upgrades for the analyser
- Annual rather than six monthly calibration to minimize instrument downtime
- Lower calibration cost
- Zero calibration for carbon dioxide (a feature that was missing on FP99)
- Smaller instrument size

Development of the analyser proceeded accordingly and I was given an early prototype for evaluation. As a result of my initial experience with this unit, I have since purchased a couple of the new analysers.

Comparison: G210 vs. FP 99

The main differences between the G210 and the FP99 are summarized in the following table.

Feature	G210	Medigas FP99
Simultaneous gas readings	N2O, O2, CO2 & CO	N2O, O2, CO2 (& CO when used with external pod)
CO2 in presence of N2O	✓ YES!	✗ No!
Stability	✓ Good Stability	✗ Not as stable as G210
Linearity	✓ Good Linearity	✗ Not as stable as G210
N2O	0-100% (New Customised IR cell)	0-100% (IR cell)
O2	(Optional) 0-100% Internal (Electrochemical cell)	0-100%
CO2	0-2000ppm Internal (New Customised IR cell)	0-2500ppm (IR cell)
CO	0-500ppm Internal (Electrochemical cell)	0-1000ppm External pod (Electrochemical cell)
Readings options: -	'Normal/Current' or 'Peak' or 'Sample & Hold'	'Current' only
Location ref ID	✓ YES! (easy)	ID coding for data storage.
Data Logging	✓ Data logging with user selectable period.	✗ Data storage facility. No datalogging!
Data Storage Capacity	1000 reading sets + 270 events, 50 Site ID's and 300 sample point ID's	
Download to PC via	✓ YES USP 2 (very easily)	Bespoke software & serial Data Interface
Down-the-line Diagnostics	✓ YES!	✗ No!
Down-the-line Assistance	✓ YES!	✗ No!
Down-the-line Upgrades	✓ YES!	✗ No!

Remember/Transfer User Settings to another instrument (same model)	✓ YES!	✗ No!
PC Software	Analyser Data Manager (Windows OS)	Unicom Data Download (DOS based software)
Size – L/W/D in mm	165 x 100 x 55 (<i>c. ½ FP99 volume</i>)	220 x 226 x 51
Weight	500 grams = (<i>c. ¼ weight of PP99</i>)	2.1kg
Battery	Li Ion (no memory effect)	NiCad (memory effect can be a problem if cells old or instrument used infrequently)

User Experience of the G210

If you are a regular user of the FP99, the first thing that will probably strike you about the G210 is that it is very much smaller and lighter.

The instrument is supplied in a plastic carrying case that also contains a charger with a selection of plug adapters (for various international electrical socket types), tubing, filter, and software. A cover with a carrying strap is also provided to protect the instrument in use.

I found that I was able to use the basic features of the G210 within minutes of opening the box. With many more functions and options than the FP99, the menu structure is correspondingly deeper and more complex. However, it is no more difficult to navigate than the average mobile phone menu tree and I was up and running very quickly without more than a few quick references to the detailed user manual.

The instrument easy to calibrate and because of the improved linearity and stability it requires less-frequent calibration. This further improves running costs by reducing the use of expensive calibration gases.

As with the FP99, the concentrations of all four gases are simultaneously shown on the main display screen. The display is crisp and clear with a bright green backlight

that switches to red in warning conditions.

One shortcoming of the FP99 was its tendency to drift on the nitrous oxide range within minutes of calibration. The G210 is much more stable and I usually find that the instrument gives the same reading with the reference gas as when I last calibrated it on the previous day.

The carbon dioxide range gives similar stability with the added bonus of offering a reasonably accurate reading in the presence of nitrous oxide. Now we can confirm that the carbon dioxide content of our nitrous oxide does not exceed the 300ppm limit specified in the European Pharmacopoeia without recourse to expensive, inaccurate, and time consuming, chemical detector tubes!

As with all instruments using electrochemical sensors, the G210 occasionally produces spurious responses for carbon monoxide when sampling gases containing nitrous oxide. The prudent QC will make at least one test with a carbon monoxide chemical detector tube in these circumstances while also bearing in mind the cross-sensitivities of the chemical detector tube employed.

Where the FP99 gave the carbon dioxide reading in steps of 10ppm, the G210 provides a resolution of 1ppm. This gives a much more rapid indication of changing levels, for example when testing gas from medical air plant.

I find that the G210 gives good reproducibility in the readings obtained when alternating between different gases. The instrument also gives good reproducibility over time. For example, if I check the instrument against fresh ambient air and perform a similar check it maybe five or six hours later without re-calibrating in the interval, I usually find that the readings are almost unchanged.

The G210 makes a good companion to the Michell Instruments MD300 dewpoint meter particularly when testing medical air plant, oxygen concentrators, etc. The data-logging interval can be easily set to match that of the dewpoint meter. The reference code for the logged data can be set up on both instruments and logging can be easily initiated and terminated by simultaneous button presses on both instruments. Assigning the same reference codes to both sets of data ensures that they can be correctly combined into the test report when they are later downloaded. It is a fairly simple procedure transfer the logged data from the G210 and combine this with data logged by a Cermax or MDM300 dewpoint meter to produce a finished report for a routine medical air plant test, for example.



The G210 complements the MD300 dewpoint meter.

The inbuilt pump enables sampling of ambient air. This is useful for quick instrument calibration checks against fresh air. The user-selectable pump interval coupled with the data-logging feature allows the more ambitious QC to monitor the quality of ambient air. This is useful where we wish to monitor the air quality at the intake of medical air compressors.

Battery life is excellent. The G210 battery can certainly give those Duracell Bunnies a run for their money. I recently used one of the instruments on three successive days of prolonged testing without needing to re-charge it. Coupled with the long battery life is a reasonably short recharging time. The instrument also appears to accept charging via the USB port, a useful feature if you do somehow exhaust the battery and need to give it a 'kiss of life' from your notebook computer.

The software controlling the G210 seems to be very good and I haven't encountered any real problems in using it. However, as time goes by, I am sure that users will suggest little tweaks and mods that they would like to see. With the FP99 you were more-or-less stuck with the software that came with the instrument. The G210 supports software updates and these will be available to any user to download from the Geotech website.

PC connectivity also means I can copy my tailored set-up from one unit to the next. This is useful if you have several instruments and want them all to behave in the same ways.

Running Costs

Because the G210 is more stable than its predecessor it requires less frequent calibration. This results in savings on expensive calibration gas.

The FP99 needed a six-month factory service and calibration at a cost £700 (i.e about £1400 per year) which usually took at least two weeks including shipping. With the G210, Geotech recommends a full service and recalibration for the G210 every 12 months. This, coupled with a significantly lower service/calibration cost at around £350 and a typical turnaround of seven days, gives a calibration cost of just about one quarter of the cost for the FP99 with a corresponding reduction in instrument down-time. The reduced running cost coupled with Geotech's generous trade in on the FP99 during the changeover period means that the G210 will quickly pay for itself.

Conclusion

The G210 represents a major improvement in portable instrumentation for the analysis of medical gases. Following several years of uncertainty over the future of the FP99, with no other suitable instrument available on the market, the G210 looks set to give good service for years to come.

The G210 is small, light, and has good stability with improved linearity on all ranges.

A key improvement has been the addition of data logging capability which facilitates testing of medical air plant and oxygen concentrators.

The instrument has a fast re-charge with excellent battery life. The use of Li-Ion cells should end the problem of the memory effect that occurred with the NiCad cells employed in the FP99.

The lower running costs of the G210 mean that anyone switching to this instrument from the FP99 will quickly recover their costs and make significant savings over the lifetime of the instrument.

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