



Stéphane Canadas, Sales & Marketing Manager

A note from our Editor!

Here is our second newsletter, we hope you enjoy reading it and find it informative and useful!

September has been a great month for us, we have launched a new product and attended our first exhibition in a long time. We've included all the latest updates in this newsletter.

We attended Salon Analyse Industrielle in Paris!

Our Sales & Marketing Manager, Stéphane Canadas, attended the exhibition.

"It was great to be in Paris this week to support SISTEC analyse de gaz during Salon Analyser Industrielle. It was especially nice to be able to meet face to face customers to talk about our range of FID Analysers such as our 3010 MINIFID and S4 SOLAR platforms for #VOCs measurement. Really enjoyed it!!"



Catch us at the AQE Virtual Event in October!

We will be at this year's Air Quality and Emissions show on the 13th & 14th October. This year, the main focus of the Signal Group booth will be hydrocarbon monitoring because the 3010 MINIFID is currently undergoing MCERTS testing and a new portable Methane/Non-Methane FID analyser will be unveiled with a video explaining the clever design features that have been built into the new unit – the SOLAR Xplore.

The virtual booth will also provide an opportunity to see a demonstration of Signal Group's innovative Series 4 analysers with detachable wireless tablets.

Head over to the AQE website to register for the exhibition. You can then visit our stand and book a meeting, or you can stop by and send us a message on the day!

INSIDE SEPTEMBER'S ISSUE:

A note from our Editor & our first exhibition of 2021!
Front Page

Growing demand for non-methane VOC monitors
Page 2

Introducing the S4 SOLAR XPLORE
Page 3

How to check the calibration and linearity of a gas analyser
Page 4&5

Video of the month & our latest product update
Page 6

Raising gas analysis to new levels

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Growing demand for non-methane VOC monitors

Signal Group, the UK gas analyser manufacturer, has seen a growth in demand for reference-grade analysers that are able to differentiate between total VOCs (volatile organic compounds) and Non-Methane VOCs (NMVOCs). "This demand is largely driven by domestic regulatory requirements, where countries are seeking to control emissions of both pollutants and gases that impact climate change," explains Signal's Stephane Canadas. "NMVOCs are important pollutants whereas methane is a major Greenhouse Gas, which is why the differentiation is often necessary."

For decades Signal Group has manufactured analysers with dual Flame Ionisation Detectors (FIDs), so that total VOCs and NMVOCs can be monitored simultaneously. In addition, the company has also developed a 'non-methane cutter' so that methane can be measured in isolation.

S4 SOLAR XPLORE - Portable heated FID VOC analyser



Background

Methane is a VOC and contributes to ozone formation on a global scale rather than in local photochemical smog episodes. Methane is also non-toxic, so it is often excluded from pollution measurements. Nevertheless, methane is a major concern with regard to climate change, because it is a powerful greenhouse gas, with a global warming potential 72 times greater than carbon dioxide over a 20-year period. Furthermore, atmospheric methane concentrations have increased by around 150% since 1750.

NMVOCs are organic compounds that differ significantly in their chemical composition but display similar behaviour in the atmosphere. NMVOCs are emitted from a large number of sources including combustion activities, solvent use and production processes. However, biogenic NMVOCs are also emitted by vegetation. The measurement of total NMVOC emissions provides an indicator of the emissions of the most hazardous NMVOCs.

Volatile organic compounds (VOCs) are significant air pollutants because they act as precursors to tropospheric (ground level) ozone and secondary organic aerosols (particulate matter), both of which represent significant health hazards. In recent decades, many countries

have successfully reduced emissions from road vehicles and other evaporative losses of VOCs from fuels (including natural gas) during their production and distribution. However, further reductions in VOC emissions are required for countries to meet their obligations under the National Emission Reduction Commitments Directive (by 2030) and the UNECE's Convention on Long-range Transboundary Air Pollution. In addition, many countries around the world have implemented domestic regulations with requirements to monitor and control emissions of NMVOCs.

In many countries NMVOC emissions have declined in recent decades as a result of a number of factors. Vehicle catalytic converters have reduced exhaust emissions, and carbon canisters on petrol cars have controlled evaporative emissions. These reductions have been driven by tighter vehicle emission standards, combined with limits on the maximum volatility of petrol. Reductions have also occurred in sectors where solvents are used in industrial processes, or where solvents form a component of the final product – paints, coatings, adhesives and cleaning chemicals for example.

Looking back

Monitoring has of course played a vital role in helping to reduce emissions of NMVOCs. In 1980 Signal Group delivered its first dual detector FID gas analyser to the Warren Spring Laboratory, which was then part of the UK government's Department of Industry. In those days, Signal worked closely with the Royal Aircraft Establishment and the National Gas Turbine Establishment; both of which contributed to the design of the dual detector FID and a methane cutter. The cutter contained a catalyst which oxidised all VOCs except methane, so a dual FID instrument was able to continuously

subtract one reading from the other in order to derive NMVOC readings.

In the early years some customers preferred a single detector which alternately switched the sample through the cutter for a period of time and took the reading to a 'sample and hold' circuit and then switched the sample to bypass the cutter; sending the sample directly to the detector. The 'sample and hold' circuit continuously held the last readings in both modes and allowed the subtraction of methane from total VOC to provide the NMVOC result. There are obvious disadvantages with this method if the sample concentration is changing rapidly.

Looking forward

Over the last 40 years, advances in electronics and instrument design have enabled Signal Group to further develop its range of VOC analysers. Stephane says: "The main areas of improvement were stability, ease of use, accuracy and reliability. However, the fundamental principles of operation behind the FID analysers and the cutters remain very similar."

The FIDs are extremely stable because the flow of fuel, air and sample are very accurately controlled with proportional electronic flow controllers. In addition, the stability of the electronic amplifiers has advanced enormously. Potential errors due to range-switching are nullified because these instruments are now able to remain in one range thanks to a 32-bit microprocessor

and a built-in algorithm which ensures that both detectors align during the calibration of the dual analyser.

Commenting on the company's latest development, Stephane Canadas says: "Our new Series 4 analysers are possibly the company's most innovative yet because they are available with a detachable tablet instead of the traditional built-in screen.

"This means that customers will no longer have to manage their analysers, while standing, sitting or squeezing into inconvenient or even hazardous locations; now they will be able to operate their equipment wirelessly from a convenient location nearby, using the instrument's built-in Wi-Fi."

In addition to wireless connectivity between the analyser and the tablet, all Series 4 instruments are supplied with software providing secure access via RS232 or Ethernet at any time, from anywhere. "This remote connectivity means that users can configure, calibrate and monitor their analysers from anywhere and at any time, whether they need to measure total VOCs, NMVOCs or both." Stephane explains. "The growth in demand for analysers that can differentiate between NMVOCs and methane can be explained by the need to use a reliable reference method to undertake measurements without the high cost and complication associated with analytical technologies that are able to speciate individual VOCs."

Introducing the S4 SOLAR XPLORE!

A compact, portable & certified heated FID analyser for the discontinuous measurement of VOC emissions.



The latest edition to our FID analyser collection, the SOLAR XPLORE is a compact, portable version of our popular S4 SOLAR analyser. With built in features such as an optional air purifier, wireless tablet, precision monobloc FID and THC & NMHC options available.

The Signal Group 'SOLAR' range of flame ionisation detectors are the latest 4th generation design; benefitting from knowledge and experience gained over 40 years.

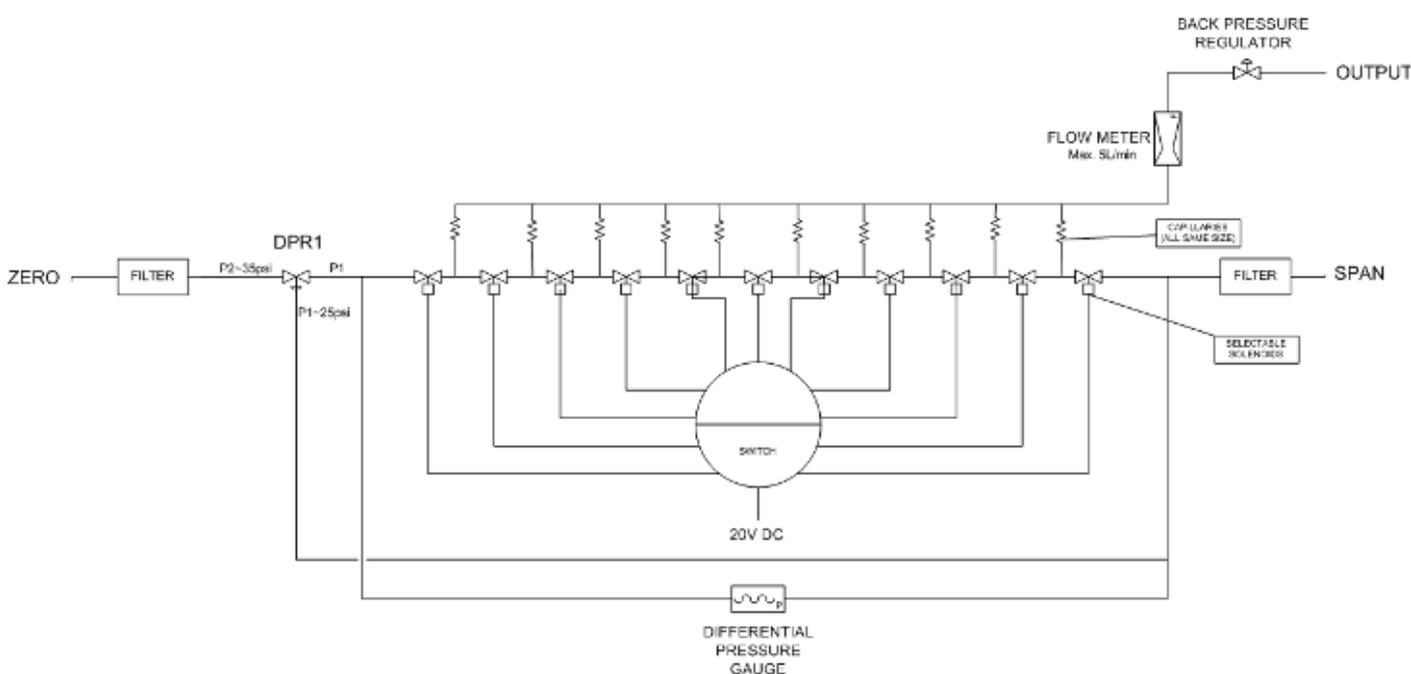
For more information, get in touch with us on sales@signal-group.com.

How to check the calibration and linearity of gas analysers

Calibration is the process of establishing the relationship between the output of a measurement and a known input. In common with most measuring instruments, gas analysers require calibration following installation, and then at regular intervals to check that they are performing to specification. Regular zero and span checks (known inputs) are necessary, but it is also necessary to check the linearity of the analyser regularly. Analyser linearity is unlikely to change after initial commissioning but if it does, errors can be substantial, so analysers should be checked regularly and/or following every major service.

Some instruments employ sealed gas cells or reference spectra for self-calibration, but a number of gases of known concentration are required for a linearity check. So, what is the best way to conduct accurate, reliable calibration and linearity checks, without incurring excessive cost?

First, where analysers are being used for compliance purposes, it is necessary to be familiar with the regulatory requirements. For example, the European standard EN14181 describes the quality assurance procedures needed to assure that Automated Measurement Systems (AMS) installed to measure emissions to air are capable of meeting the uncertainty requirements.



Under EN14181, the linearity of an analyser's response must be checked using five different reference concentrations, including zero, all of which should be traceable. The reference concentrations shall be selected such that the measured values are at approximately 20%, 40%, 60% and 80% of the range of two times the emission limit, and the test concentrations should be applied in a randomised sequence.

After each change in concentration, the first instrument reading shall be taken after at least three times the response time of the AMS, and at least three readings shall be made at each concentration. The time period between the start of each of the three readings shall be separated by at least four times the response time.

There are two main linearity audit options:

1. Purchase bottles of pre-prepared and certified calibration gases for each of the required concentrations, or
2. Purchase a gas divider so that one certified bottle of calibration gas can be accurately diluted to create each of the required concentrations.

The first option can be particularly expensive, and the number of bottles required can cause significant management and storage issues. The large number of gas bottles also creates greater potential for these costly purchases to run past their certified 'use by' date. Option 2 is therefore more popular because of its simplicity and lower cost. However, it is of course also necessary to be able to validate the gas divider...

Most commercially available gas blenders utilise mass flowmeters to control the gases. However, they are not linear in response and therefore also need to be calibrated. For this reason, the Signal Group Model 821S Gas Divider does NOT use mass flowmeters. Instead, the 821S uses a manifold block with ten identical capillaries and a precision pressure balance regulator. A selector allows each of two gases (zero and calibration) to flow through these capillaries in ratios of 1:9, 2:8, 3:7, 4:6, 5:5, 6:4, 7:3, 8:2, 9:1 and 10:0. Consequently, including zero, it is possible to create 11 different equal increment concentrations for each calibration gas, with which to audit the gas analyser linearity.

Since the design of the 821S provides symmetrical increments, the procedure to check the accuracy of the gas divider is simple: connect the zero and calibration gas to the opposite connection and repeat the test. If the gas divider is operating correctly, the gas analyser will show exactly the same readings.



821S Gas divider

In summary, a gas divider is an extremely useful tool for checking and demonstrating the performance of gas analysers; minimising costs, simplifying procedures, and avoiding a forest of expensive gas bottles.

For more information on our 821S Gas divider, get in touch with our sales team at sales@signal-group.com or head over to our website to see the full technical specification and download the latest datasheet.

Video of the month!

Every month we bring you the latest video from Signal Group, this month it's our S4 Wireless Tablet - Graphical User Interface Walkthrough.

Click the image below to watch and don't forget to subscribe to our YouTube Channel so you don't miss out on our latest videos.



Latest Product Updates - MCERTS applied for!

The Signal Group 3010 MINIFID MCERTS certificate has lapsed, but has now been submitted to TÜV for assessment against Quality Assurance Level 1 (QAL1) under EN 15267 part 4. The Signal Group S4 SOLAR Heated FID VOC analyser including ancillary equipment (sample, prefilter and heated line) has now been submitted to TÜV for assessment against Quality Assurance Level 1 (QAL1) under EN 15267 part 3. Both which specifies the performance criteria and test procedures for automated measuring systems for periodic measurements of emissions from stationary sources.

The 3010 MINIFID and S4 SOLAR have become extremely popular world-wide gas analysis system and Signal Group is confident that the current assessment will be successful and that certification will be achieved in the coming months.



S4 SOLAR



3010 MINIFID