

ORBITAL

GLOBAL SOLUTIONS

A black graphic element consisting of a curved line that starts under the 'S' of 'SOLUTIONS', arches over a solid black circle, and ends under the 'L' of 'SOLUTIONS'.

Integrated Sampling Solutions

Introduction to Sampling



ISO 10715 section 3.1:
“The main function of sampling is to take an adequate sample that is representative of the gas.”

For a sample to be *representative* in the context of natural gas analysis, the requirements are far more complex than initially perceived:

- **The sampling location** should be selected so it is not in a dead leg, source stream flow disturbance is minimized, and the location is suitable and relevant to your analytical objectives.
- **The sample identity** should be preserved at all cost throughout every step of the sampling process. Anything that comes into contact with the sample has the potential and the proclivity to alter its identity.
- **The allocation of analytical result should be fast and reliable:** Many significant assessments, calculations and decisions are based on the correlation of real-time data with the analytical data resulting from sampling.

To deliver a sample from a source stream to an analyzer, you need to achieve a number of steps while adhering to the requirements of representative sampling.

- Take a sample of gas from the source stream
- Reduce and control the pressure for analysis
- Stabilise and control flow
- Protect the analytical instrument from particulates and droplets and unexpected pressure/flow ‘excursions’.

Achieving these steps often results in compromising on one or more of the key criteria of representative sampling mentioned, devaluing or even invalidating the results obtained. This fundamental sampling failure is often overlooked though, due to the more visible issues seen in practice!

- Vortex-induced vibration and wake calculation concerns
- Blocked filters
- Condensation/icing on pressure regulator
- Trapped contamination in the sample system
- Inability to achieve and verify good quality sampling



VE Technology® Solution



“Sampling is no longer just about protecting your analyzer, representative analysis requires advanced engineering solutions”

VE Technology have rejected traditional methods and technology. We realized that sampling is no longer just about protecting your analyzer, representative analysis requires advanced engineering solutions. We went right back to scientific and engineering fundamentals in order to develop a sampling system of the future, achieving what was previously impossible:

- Deliver the necessary steps for sampling; faster, more simply and more efficiently than ever before possible.
- Eliminate all visible issues and some unseen and ignored issues, by scientifically addressing root causes.
- Respect and perfect the laws of representative sampling; challenging what was previously acceptable, to deliver better performance for end users.

VE Technology deliver this through 3 modular sampling components, that can be configured to meet almost any customer analytical and spatial requirements:

- 1. VE Fixed or Retractable Sample Probe**
- 2. VE Conditioning Unit**
- 3. VE Analyzer Interface Module**

As simple as 1 - 2 - 3

With this new technology, it really is as simple as 1 - 2 - 3!

VE Technology sampling equipment is designed to work as a harmonious integrated system – each modular item of equipment excels in its purpose, and further optimizes the succeeding sampling module. The result is a super lean and efficient, extremely versatile sample system.

Each of these components is packed with new technology to eliminate uncertainty in a wide range of sampling applications, and deliver a fast and reliable result every time.



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1. VE Fixed and Retractable Sample Probes



Retractable Probes

- VE Sample Probe allows previously unimaginable insertion depths
- Vortex shedding elimination technology
- Fully retractable to allow pigging
- Can be inserted through block valve so no need to depressurize pipeline (can be fully inserted/retracted under operating pressure)
- Same internals and safety features of fixed probe – preserving sample state/chemistry and delivering fastest available purge/response times



➤ Probe Feature

Integrated Isolation Valve

- Combination of isolating and diverting valves
- Continuous and constant 2mm bore ball valves with no 'dead' space in valves or connections

Valve Housing

- Indexable orientation
- Valve protection

Process Connection

- Threaded connection machined from same solid as probe structure
- All type flange connection available including 'compact' design
- Forged or welded to coded procedures

Sample Pathway

- 2mm constant diameter – probe tip to outlet
- Only fully wetted ball valves used
- All wetted surfaces electropolished
- Available fully SilcoNert coated

Probe Structure

- Machined from single piece of certified solid or hollow bar
- Choice of material – SS, Inconel, Duplex and many others
- Passes right through process connection

Probe Tip

- Patented design eliminates vortex induced vibration
- Patented aerodynamic shape
- Electropolished wetted surfaces
- Available SilcoNert coated
- Aperture matched to sample pathway ID for seamless entry to sample system

➤ Key Innovations

- Combination of isolating and diverting valves
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➤ Major Benefits

- Double block and bleed isolation
- High pressure sample off-take port
- Cleaning of probe and sample system in-situ
- Validation gas entry port – verify system integrity in-situ

- Orientate valves to suit operation
- Safe, simple operation
- Lockable in 'OFF' position

- Security and versatility of process connection

- Small volume – rapid purge
- Minimized surface reactions and sorption
- No dead space or recirculation areas
- Perfect preservation of sample identity
- Responsive and accurate

- No more vortex-Induced vibration or wake calculations
- Minimized risk of probe or pipeline nozzle failure
- Minimized disturbance to local and downstream sourcestream flow

- Dynamic rejection of particulates and droplets
- No localized aerosol formation
- No recirculation/sucking of particulates
- Minimized flow disturbance

2. VE Conditioning Unit



➤
“The VE Conditioning Unit (VECU) is a unique, multi-functional unit that plays a very important role in the VE sample system.”

The VE Conditioning Unit (VECU) is a unique, multi-functional unit that plays a very important role in the VE sample system.

Its primary function is to reduce and control the pressure and flow rate in preparation for analysis. The biggest challenge during this process is managing the gas-liquid phase boundary, also known as the dew point curve: as the gas pressure is reduced, the temperature decreases also. This is called the Joule-Thomson effect as a problem in Natural Gas sampling because of retrograde condensation – crossing the phase boundary – irrevocably and invisibly changes the sample.

This is a common function and a common challenge in all high pressure gas sampling systems, but whereas other manufacturers mask the symptom of this effect by warming the regulator housing (be it in the probe body using surrounding gas or as a separate unit); the VECU pre-heats the gas molecules to be sure beyond any doubt that the sample remains unchanged during pressure reduction.

The VECU provides much more than protection of the sample from adverse Joule-Thomson effects. The unit has fully integrated filtration, sample pre-heating, temperature monitoring and pressure/flow control. The VECU is ATEX and IECEx approved for Zone0, allowing its use in any configuration with the other VE modules, across a huge range of applications.

As with the other sample system modules, 2mm ID electropolished tubing is used throughout to minimise internal volume and purge time, and improve efficiency and running costs.

- Fast, simple and inexpensive to install
- Fast purge time
- Economic and efficient to run
- Total confidence in retrograde condensation avoidance

This practical and technologically advanced product is designed to be mounted directly to the VE sample probe, or adjacent to it in a mounted cabinet.

3. VE Analyzer Interface Module



➤
“The VE AIM allows you to know you have conditions exactly as required for safe, effective analysis.”

The VE Analyzer Interface Module (AIM) works in perfect harmony with the VE Sample Probe and VECU. In the continuing quest for minimal sample interaction, there are absolutely no components in the live sample pathway!

THE VE AIM allows you to know you have conditions exactly as required for safe, effective analysis.

This module has been created to provide control and monitoring where you need it – as close to the analyzer as possible.

Sample Live Pathway:

- 2mm ID, electropolished, minimized transport length
- No control components
- Available with proprietary Silconert coating
- Can be backflushed to clean entire sample system pathway in-situ

Other Features:

- ASME/PED safety relief valve
- Pressure transmitter
- Flow alarm
- Flow meter and pressure gauge
- Back pressure regulator

VE Integrated Sampling Solution: 1-2-3



➤ “VE Technology develop customized all-in-one integrated solutions to work with the new micro-analyzer systems that are leading the rapid-analysis market.”

With the modular arrangement, the VE sampling solution can be configured and installed to suit your specific requirements, with no need for infrastructure works or trained technicians.

VE-i Solutions

The industry needs faster, smarter, more efficient solutions. VE Technology develop customized all-in-one integrated solutions to work with the new micro-analyzer systems that are leading the rapid-analysis market.

- MicroGC-i
- CV/Wobbe-i
- Hg-i
- H₂O-i
- H₂S-i



“VE Technology: making the impossible possible, making the possible a certainty.”

Applications



What?

- NG/LNG/LPG/NGL/...
- Trace H₂O
- Trace H₂S
- Trace Hg
- Trace Siloxanes
- Heavy Hydrocarbons

Where?

- Well head, primary processing, compressor stations, distribution networks, fiscal metering, custody transfer
- Liquefied Natural Gas (LNG) plants
- Drier Beds

Who?

- End users, combustion plants, derivative industries



Eliminate Uncertainty
in Natural Gas Sampling

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