MARKES international

Air Server-xr

Robust, cryogen-free, on-line air monitoring system

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2015

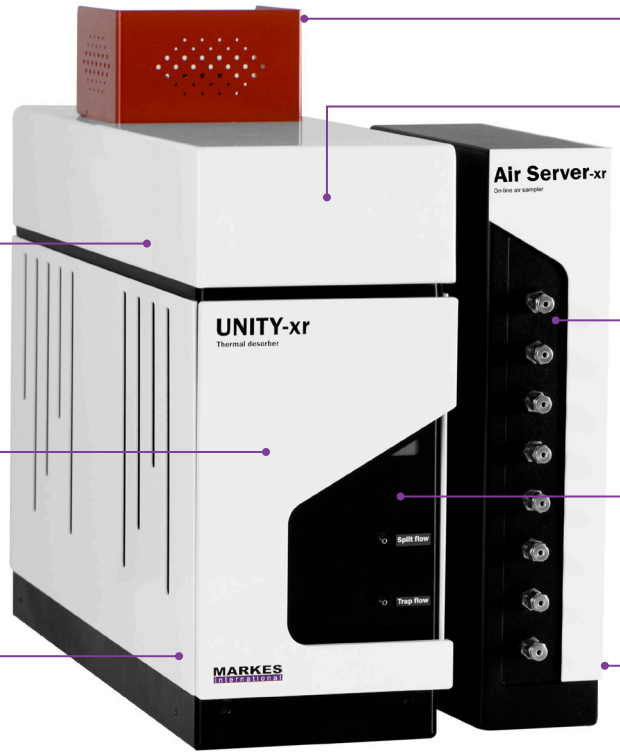
Air Server-xr™

Introducing the Air Server-xr – an on-line sampling device for the GC and GC–MS analysis of trace-level volatile and semi-volatile organic compounds (VOCs and SVOCs) from air and materials.

Since 1997, Markes International has pioneered many breakthroughs in analytical instrumentation, making it the world leader in thermal desorption. We now present the Air Server-xr, for *in situ* on-line air sampling – as well as the analysis of canister/bag and thermal desorption tubes – resulting in outstanding performance for the most challenging applications, with utmost sample security.

Like other instruments in Markes International's world-leading 'xr' series, the UNITY–Air Server-xr offers:

- **Ex**tended **re**-collection
- **Ex**tended analyte **r**ange
- **Ex**tended **r**eliability.



Platform-neutral

Compatible with all major makes of GC and GC–MS.

Efficient cryogen-free trapping

Rapid operation of the electrically-cooled focusing trap reduces costs and ensures fast sample throughput.

Improved laboratory efficiency

Three or eight channels for unattended sequencing.

Tube desorption capability

Method-compliant single-tube TD capability – with options for automation.

Remote system control

Suitable for field sites and mobile labs.

Wide concentration range

User-defined sampling parameters allow analysis of both high- and low-concentration samples.

Unparalleled analyte range

Inert, optimised flow paths allow quantitative recovery of C_2 to C_{44}, including reactive and thermally labile species.

Trouble-free sampling of humid air

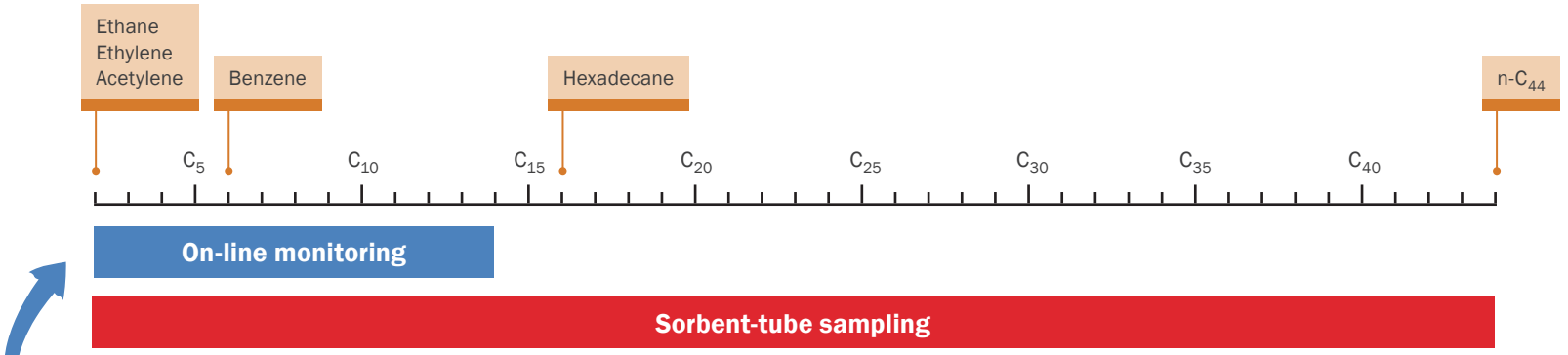
New Kori-xr water management option avoids loss of polar species.

Sample and analyte versatility

A single instrument for on-line monitoring and tube-based samples

The Air Server-xr, drawing on 20 years of innovation from Markes, offers tube-based desorption in addition to on-line, canister and bag sampling – making it one of the most versatile TD instruments on the market. Look no further for method-compliant, cryogen-free analysis of VVOCs, VOCs and SVOCs.

From C_2 to C_{44} on one system



Method-compliant analysis is routine using the Air Server-xr. On-line monitoring can be conducted in accordance with protocols such as the US EPA PAMS scheme or the EU Clean Air Act. Sorbent-tube sampling can be performed in compliance with a number of methods including US EPA Method TO-17 or Chinese EPA Method HJ 644.

For on-line monitoring, the Air Server-xr is used for the following applications:

- Urban air monitoring – Typical VOC 'air toxics', C_2 compounds, ozone precursors and other ultra-volatiles.
- Single-run analysis of polar and non-polar compounds.
- Industrial process control.
- Odour monitoring (*e.g.* reduced sulfur species).
- Atmospheric research – monoterpenes, greenhouse gases and ozone depletants.

Quantitative recovery of all these compounds can be confirmed by re-analysis using Markes' unique splitting and re-collection technologies.

For sorbent-tube sampling, the Air Server-xr allows analysis of:

- C_2–C_{44} compounds.
- 5/6-ring PAHs, phthalates and PCBs.
- Thiols.
- Explosives and chemical warfare agents.

Tubes and traps packed with different sorbents allow the compatible volatility range to be optimised for your application.

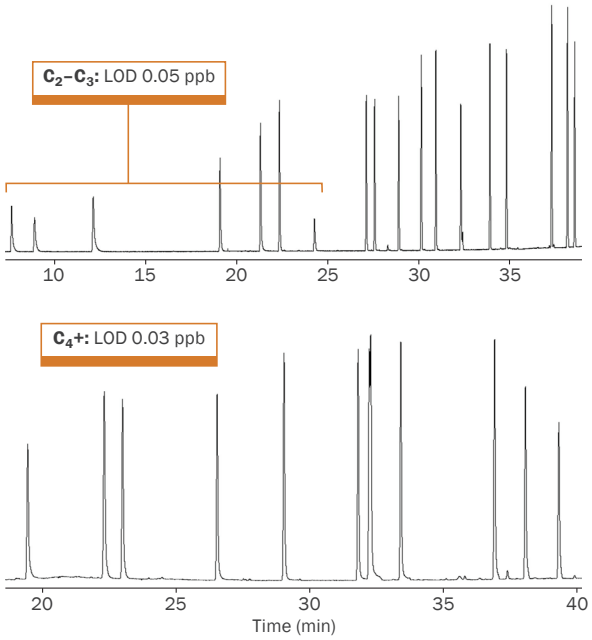
High-productivity on-line monitoring

Innovative technology for maximum laboratory efficiency

The Air Server-xr offers a number of features that speed up on-line analyses and keep costs down:

- **Quantitative retention of ultra-volatiles** from up to 1.5 L volumes and efficient low-flow, splitless desorption ensure low detection limits.
- **Fully automated sequences of air/gas** (from a sample stream, calibration gas or zero air/gas) can be set at user-defined frequencies.
- **Low trap-purge flow** reduces consumption of expensive carrier gas.
- **Peltier-cooled focusing trap** eliminates ice-plug formation, while fast trap cooling minimises cycle times.

On-line analysis: US EPA PAMS

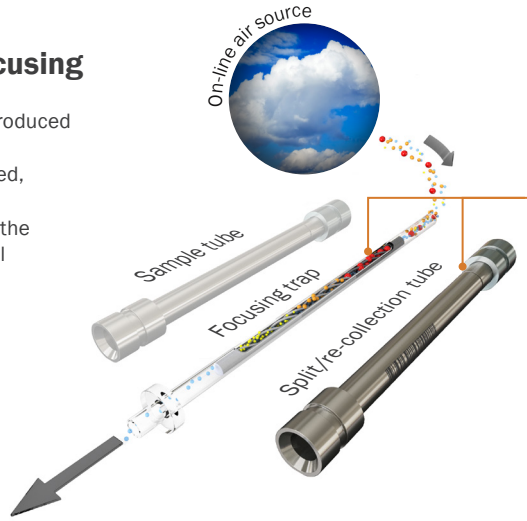


The efficient operation of the Air Server-xr provides limits of detection (LODs) well below the 0.5 ppb required, for ozone precursors ranging from acetylene to trimethyl-benzene.

How on-line analysis with the Air Server-xr works

1 Air/gas focusing

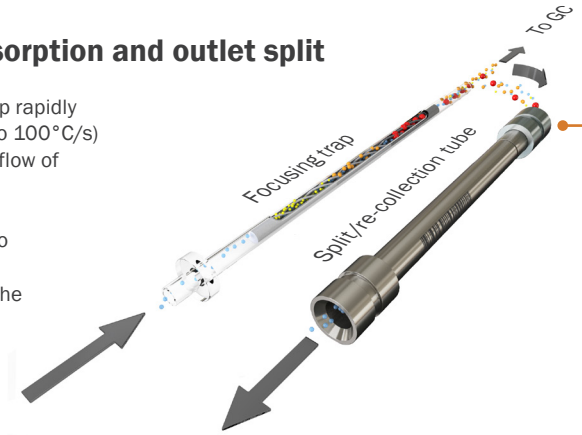
Samples are introduced directly onto the electrically-cooled, sorbent-packed focusing trap of the UNITY-xr thermal desorber, typically held between ambient and –30°C.



Tubes and traps can contain multiple sorbents, for analysis of an extended range of analytes.

2 Trap desorption and outlet split

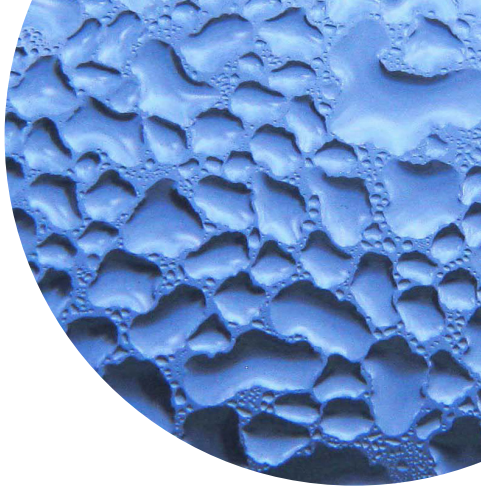
Focusing trap rapidly heated (up to 100°C/s) in a reverse flow of carrier gas ('backflush' operation), to transfer the analytes to the GC column.



During trap desorption, the flow of analytes can be split and re-collected onto a clean sorbent tube.

Effective water management

Kori-xr™ – An innovative approach for monitoring polar species in humid environments



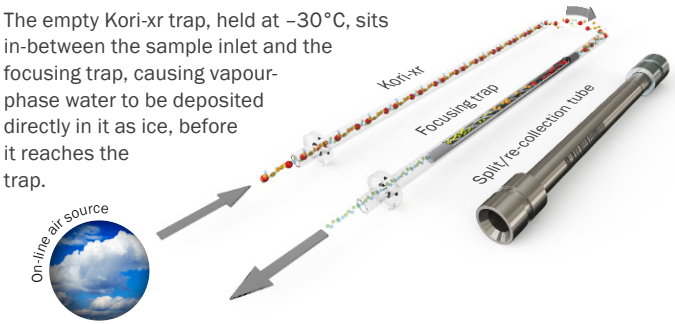
When analysing humid air streams, it is necessary to remove the moisture before the gas flow reaches the GC column and detector, in order to avoid poor chromatography. However, certain polar species and ultra-volatiles can be lost when using typical on-line water-management approaches such as a Nafion™ dryer or a trap temperature of 25°C.

The **Kori-xr** option for the Air Server-xr addresses this problem by selectively removing water prior to analyte focusing – allowing high-sensitivity on-line analysis of polar species, oxygenates and pinenes (as well as all other typical VOCs) in humid environments.

Effective on-line water management

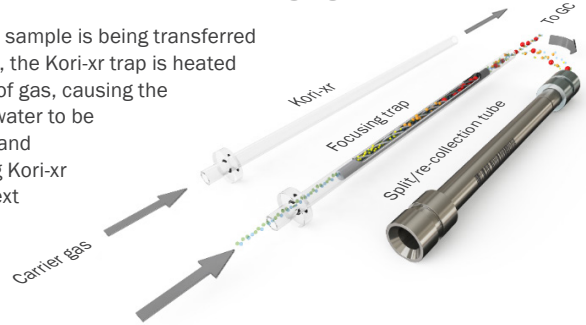
1 Air sampling and water removal

The empty Kori-xr trap, held at –30°C, sits in-between the sample inlet and the focusing trap, causing vapour-phase water to be deposited directly in it as ice, before it reaches the trap.



2 Trap desorption and water purging

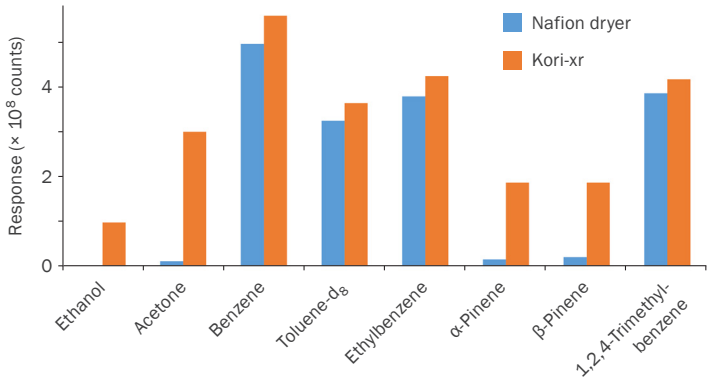
While the sample is being transferred to the GC, the Kori-xr trap is heated in a flow of gas, causing the trapped water to be expelled and preparing Kori-xr for the next sample.



Options for water management compared

Analyte type	Nafion™ dryer	Trap set at 25°C	Kori-xr
C_2 compounds	✓	✗	✓
Non-polar C_3+	✓	✓	✓
Pinenes	✗	✓	✓
Polar VOCs	✗	✓	✓
Sulfur compounds	✓	✓	✓

Improved retention of ultra-volatile and polar species



Kori-xr shows enhanced recovery of low-boiling and polar VOCs from an air stream with 80% RH, compared to use of a Nafion™ dryer.
Kori-xr was developed in collaboration with the University of York under a Knowledge Transfer Program.

Versatile tube-analysis capability

Fully method-compliant tube-based analysis across a variety of application areas

On-line TD systems are often used only during the warmer summer period. To maximise laboratory productivity throughout the year, Air Server-xr systems can also be used for a wide range of tube-based TD applications.

Across many of these areas, our involvement with technical committees and legislative agencies means that we are uniquely well-placed to advise on method compliance.

- Environmental monitoring
- Indoor and in-vehicle air
- Consumer environmental health
- Defence and homeland security
- Fragrance and odour profiling
- Food and drink
- Forensic
- Biological profiling

Tube automation options

All Air Server-xr systems offer quantitative manual re-collection of the outlet split from on-line samples, and both inlet and outlet splits from sorbent-tube samples, for subsequent re-analysis.

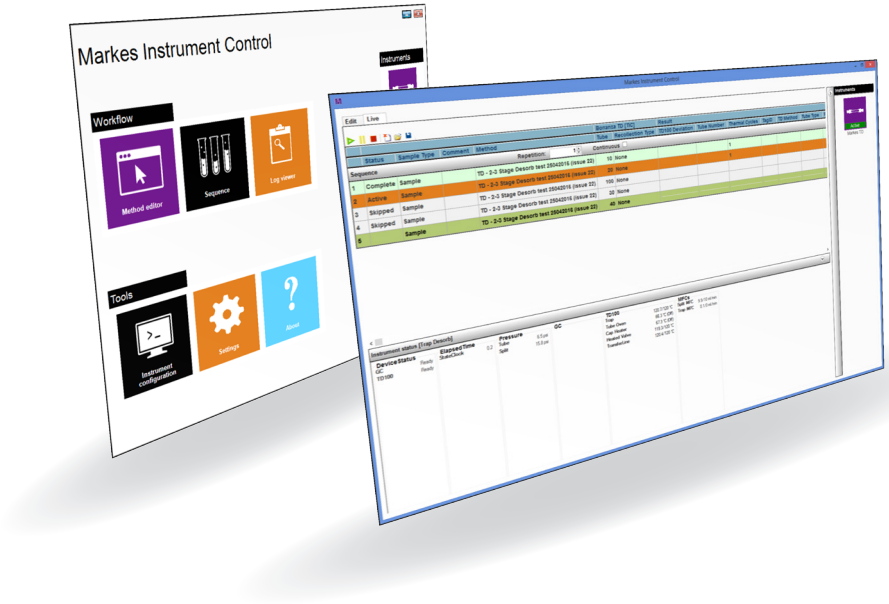
Adding an **ULTRA-xr 100-tube autosampler** enables automated re-collection of the outlet split, while a second ULTRA-xr automates inlet re-collection. Tubes *and* on-line samples can be run in a fully automated sequence, without the need for user intervention.

Markes' re-collection technology – perfect for challenging applications

Markes' sample splitting and re-collection technology allows samples such as this odorous industrial air to be re-analysed. As well as aiding method validation and offering greater peace-of-mind, it also allows a single sample to be analysed at different split ratios, allowing both high- and low-concentration components to be accurately quantitated.

Markes Instrument Control

Easy-to-use software for the new ‘xr’ series



The new software used to control the Air Server-xr and the other members of the ‘xr’ series offers the following features for enhanced laboratory productivity:

- **Automated, unattended sequencing** of tube and on-line samples.
- **Editing of active sequences,** for greater flexibility and ease of use.
- **Rapid set-up of TD methods** using pre-programmed parameters for standard methods including VDA 278, US EPA TO-17 and PAH analysis.
- **Pre-loading of an internal standard** on a tube or trap, for enhanced quantitation.
- **System self-checking,** for improved diagnostics.

Unmatched product range

A comprehensive range of sorbent tubes and sampling accessories for every TD application

Markes International – The TD experts

World-leading instruments and unmatched expertise in VOC and SVOC monitoring

Markes International has for 20 years been at the forefront of innovation for enhancing the measurement of trace-level VOCs and SVOCs by thermal desorption–gas chromatography. Our suite of instruments for thermal desorption sets the benchmark for quality and reliability:

UNITY-xr™
Single-tube thermal desorber featuring sample re-collection of all split flows.

ULTRA-xr™
High-throughput 100-tube autosampler for UNITY-xr.

TD100-xr™
High-throughput 100-tube automated thermal desorber.

CIA *Advantage*™
Cryogen-free automated canister autosampler and pre-concentrator.

TC-20™ & TC-20 TAG™
Cost-effective systems for off-line multi-tube conditioning and dry-purging.

TT24-7™
Twin-trap instrument for near-real-time on-line monitoring.

Micro-Chamber/Thermal Extractor™
Unique sampling device for emissions of VOCs and SVOCs from products and materials.

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