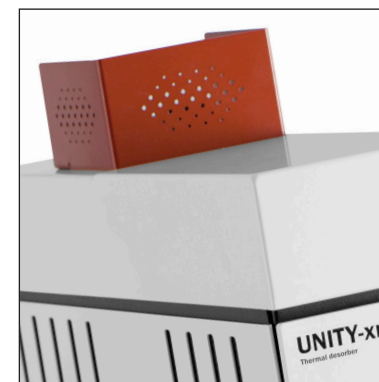
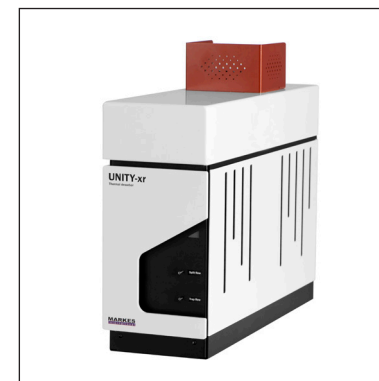


UNITY-xr

The most versatile and powerful
thermal desorption unit



UNITY-xr™

Introducing the UNITY-xr thermal desorber for GC and GC-MS – the most versatile instrument for the analysis of trace-level volatile and semi-volatile organic compounds (VOCs and SVOCs) in air and materials.

As the world leader in thermal desorption (TD) since 1997, Markes International has pioneered many breakthroughs in analytical instrumentation. We now present the UNITY-xr for method-compliant TD analysis, across a wide range of sample types and applications. Together with the other members of the new 'xr' series, the UNITY-xr offers the latest technical advances, including:

- Extended re-collection
- Extended analyte range
- Extended reliability.

Efficient cryogen-free trapping

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

Method-compliance

Method-compliance is aided by tube- and leak-testing, water management, and addition of internal standards.

Superior sample integrity and traceability

Samples are easily tracked with barcoded tubes and RFID TubeTAGs.



Platform-neutral

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

Quantitative sample splitting and re-collection

Quantitative sample re-collection of all the split flows enables repeat analysis of critical samples and easy method validation.

Unparalleled analyte and concentration range

An inert, optimised flow path allows quantitative recovery of C₂ to C₄₄, including reactive and thermally labile species... from percent to sub-ppt concentrations.

Unbeatable application versatility

As well analysing 3½" standard TD tubes, the UNITY-xr facilitates analysis of on-line, canister and bag samples through the modular addition of versatile accessories.

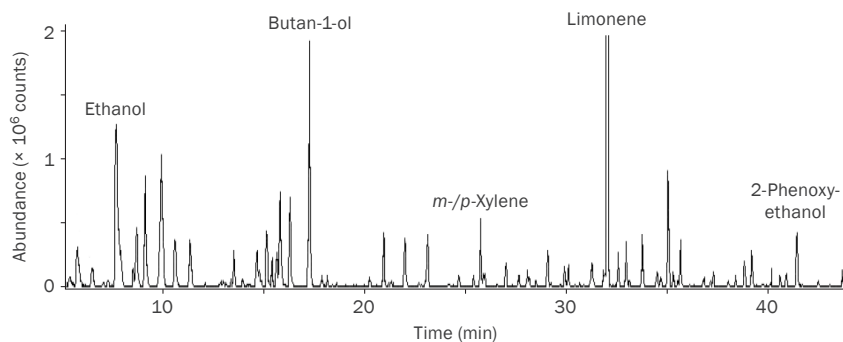
Outstanding analytical capability and reliability

Leading-edge thermal desorption technology

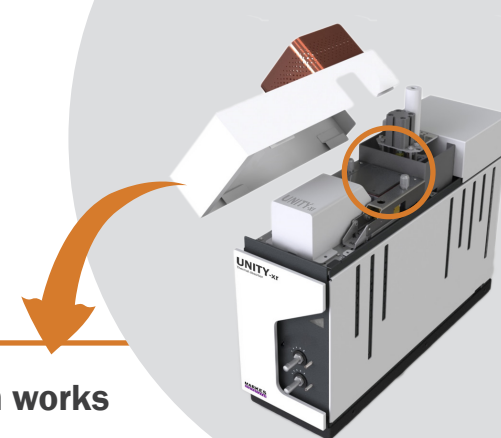
Building on the field-proven strengths of its UNITY 1 and UNITY 2 predecessors, every UNITY-xr offers:

- **Analysis of ultra-volatiles to semi-volatiles:** Optimised temperature capabilities, an upgraded flow path, and a new optional module for water management allow quantitative recovery of C₂ to C₄₄, including reactive and thermally labile species, from percent to sub-ppt concentrations.
- **Sample splitting and re-analysis:** Quantitative re-collection of both the inlet (tube desorption) split and the outlet (trap desorption) split is offered as standard on UNITY-xr (and all other TD systems from Markes), for repeat analysis and powerful method validation.
- **Outstanding reliability:** High-quality components reduce the need for routine maintenance, so maximising uptime.

Method-compliant air monitoring



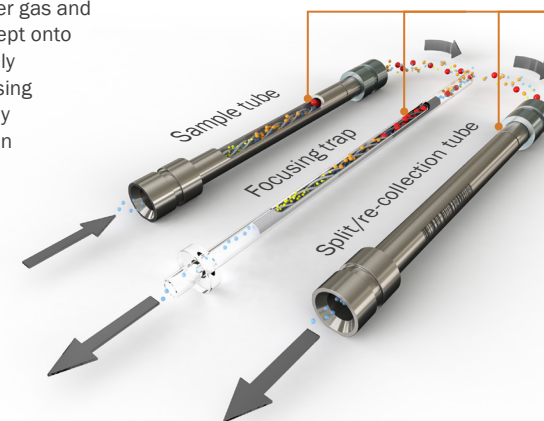
Analysis of trace-level VOCs in ambient air, in accordance with US EPA TO-17 or Chinese EPA Method HJ 644, is easy with the UNITY-xr. Splitless analysis ensures maximum sensitivity for small sample volumes.



How two-stage thermal desorption works

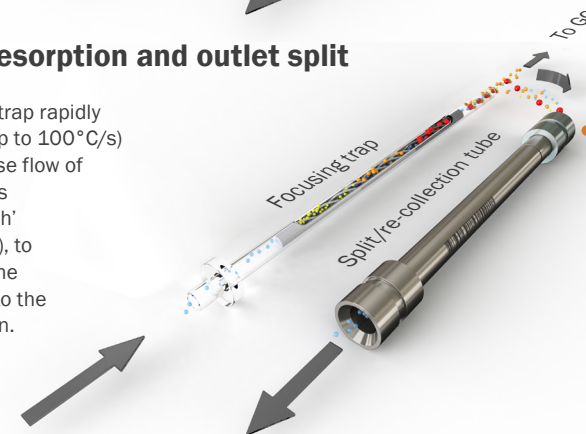
1 Tube desorption and inlet split

Sample tube heated in a flow of carrier gas and analytes swept onto an electrically cooled focusing trap, typically held between ambient and -30°C.



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.



Unbeatable application versatility

Fully method-compliant thermal desorption analysis of sorbent tubes

The enhanced features of the UNITY-xr, coupled with a suite of innovative sampling accessories, make it suitable for a wide range of 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



The UNITY-xr complies with:

- US EPA Method TO-17 (ambient air)
- US EPA Method 325 (fenceline)
- Chinese Method HJ 644 (ambient air)
- New European SVOC protocols
- Method CEN/TS 13649 (stack emissions)
- Chinese Method HJ 734 (source emissions)
- and more...

Indoor and in-vehicle air



The UNITY-xr complies with:

- ISO 16000 series (indoor air)
- ASTM D6196 (indoor air)
- ISO 12219 series (automotive test)
- VDA 278 (automotive test)
- Multiple OEM standards
- and more...

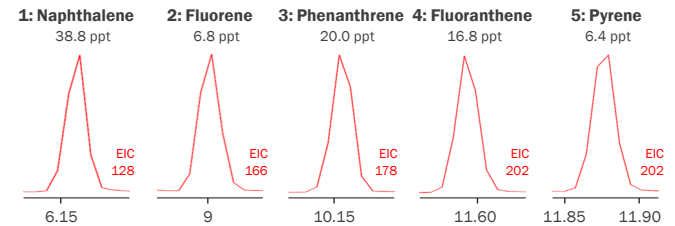
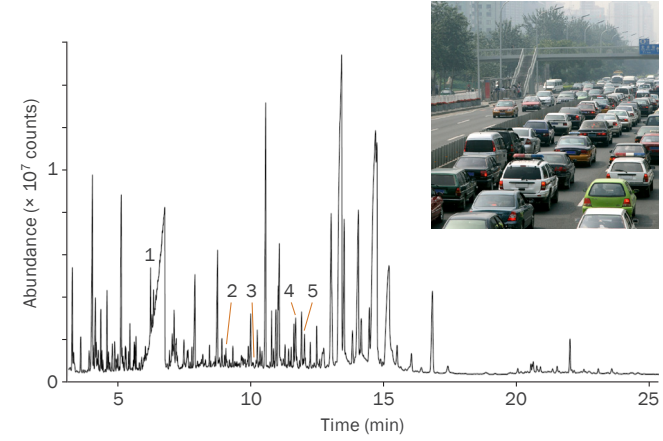
Consumer environmental health



The UNITY-xr complies with:

- European Method EN TS 16516 (construction products – mandatory)
- ASTM standards (spray polyurethane foam)
- New CEN standards (combustible air fresheners)
- and more...

Perfect for challenging applications



Defence and homeland security



Fragrance and odour profiling



Food and drink



Forensic



Biological profiling

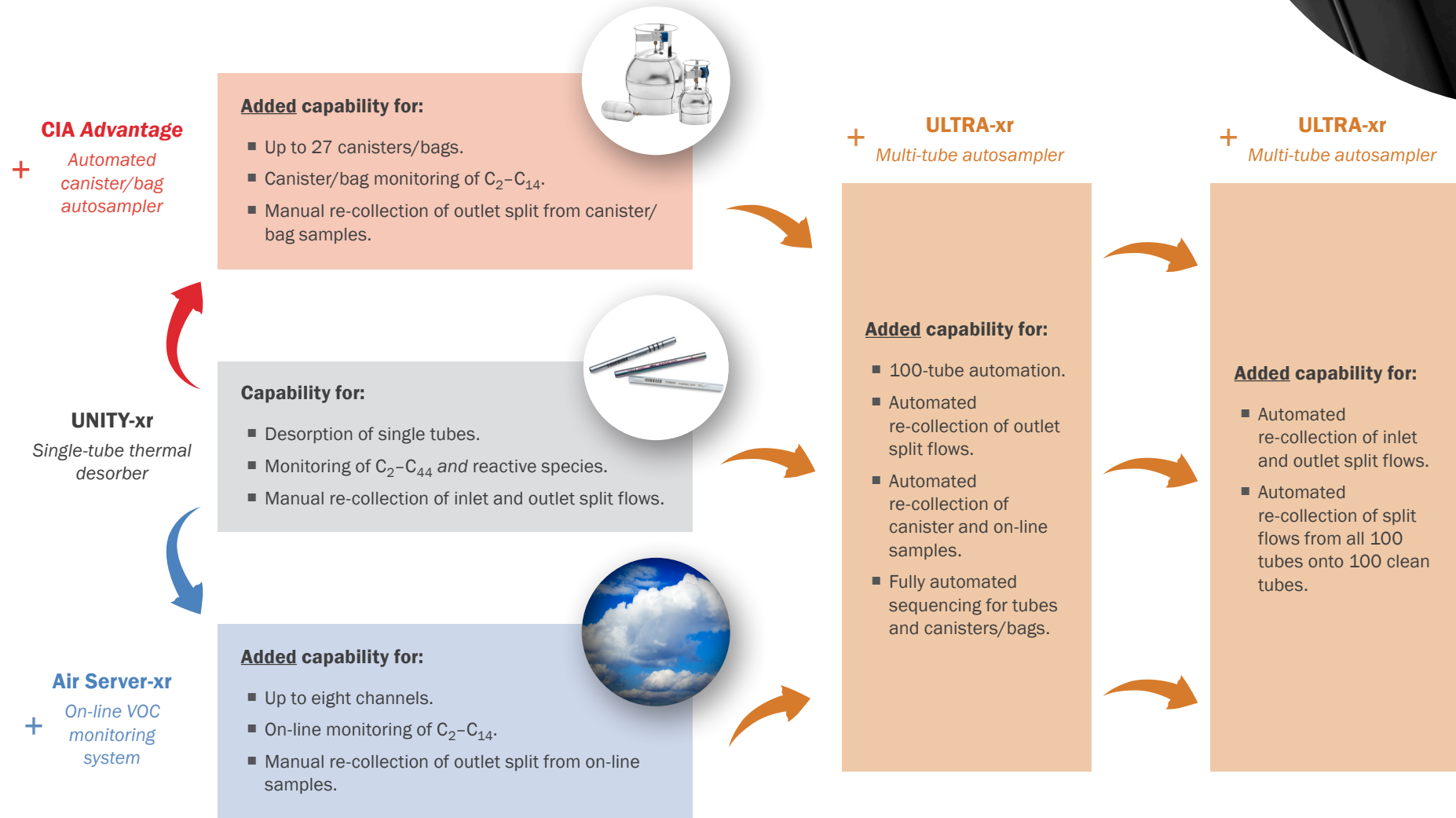


Using Markes' dedicated PAH sorbent tube and a sample volume far lower than required by traditional monitoring protocols, the UNITY-xr allowed several ppt-level polycyclic aromatic hydrocarbons (PAHs) to be detected in this complex urban air sample.

Modular systems for ultimate sampling flexibility

The 'xr' series – For tubes, canisters, bags and on-line monitoring

The modular nature of Markes' systems means that it is easy to extend the analytical capability of any UNITY-xr, for even greater versatility.



ULTRA-xr

High-throughput autosampler for UNITY-xr for up to 100 tubes. It offers:

- **Automated re-collection options.**
- **Enhanced traceability** of samples using barcodes and RFID TubeTAG.

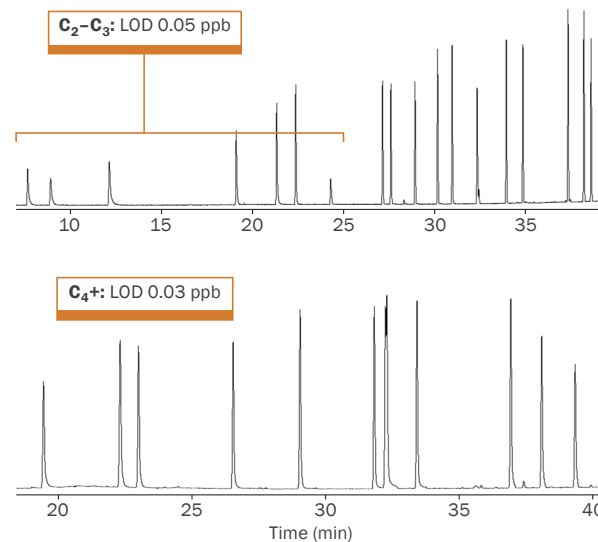


- **Stringent sample sealing** throughout the desorption process using Markes' patented DiffLok caps.
- **Additional confidence in results:** Optional internal standard/dry-purge (ISDP) facility provides an additional means of method validation.



Air Server-xr

Versatile on-line VOC monitoring system which can be used for on-line analysis of ozone precursors, terpenes, ultra-volatile compounds, sulfur species, greenhouse gases, in addition to typical 'air toxics'. It also complies with various standard protocols, most notably the US EPA PAMS scheme and the EU Clean Air Act.

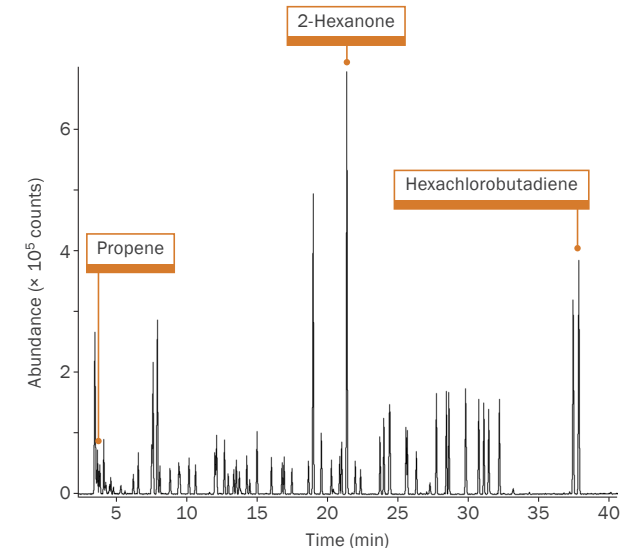


Low limits of detection: Efficient operation of the UNITY-Air Server-xr provides LODs well below the 0.5 ppb required for analysis in accordance with the US EPA PAMS scheme, for ozone precursors ranging in volatility from acetylene to trimethylbenzene.

CIA Advantage

Cryogen-free automated canister autosampler and pre-concentrator.

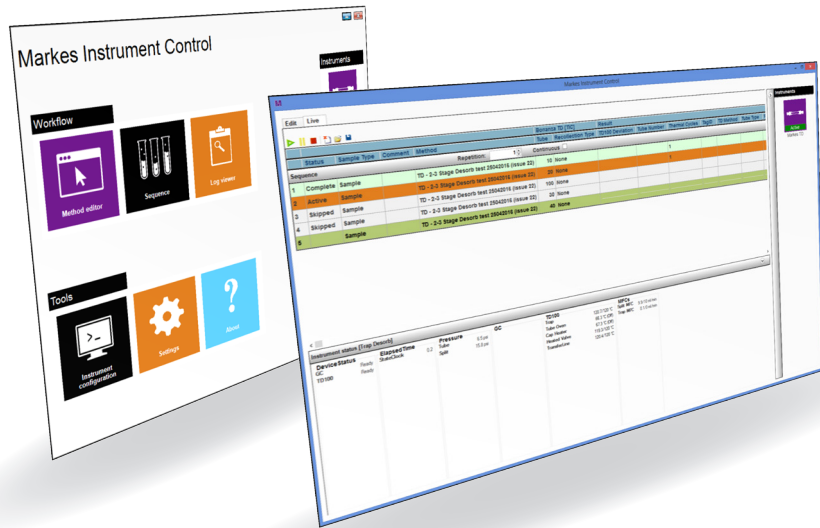
Systems containing CIA Advantage-xr are versatile, offering gas-loop and MFC-controlled sampling options, which combined with sample splitting, allow compatibility with the widest possible sample concentration range.



Method-compliant 'air toxics' analysis: This analysis of 1 L of a 1 ppb 'air toxics' mix shows how canister-sampled volatile air pollutants can be analysed in accordance with US EPA Method TO-15 or Chinese EPA Method HJ 759.

Markes Instrument Control

Easy-to-use software for the new 'xr' series



The new software used to control the UNITY-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

ACTI-VOC™ pump – optimised for sorbent tube sampling.

Micro-Chamber/Thermal Extractor™ for fast and flexible sampling of chemicals and odours released from materials and foods.

MTS-32™ for pumped sequential sampling onto multiple tubes.

Easy-VOC™ for simple, rapid 'grab-sampling' of air/gas.

VOC-Mole™ for soil gas sampling.

TubeTAG™ – RFID tags for ultimate tube traceability and quality assurance.

Sample tubes – Stainless steel, glass or inert-coated, individually barcoded and with single- or multi-bed sorbents for maximum application versatility.

Brass storage caps for ultimate sample integrity.
DiffLok™ caps for tubes on autosampler.
Diffusion caps for passive sampling.

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:

TD100-xr™

High-throughput
100-tube automated
thermal desorber.

UNITY-Air Server-xr™

Versatile on-line VOC
monitoring system.

ULTRA-xr™

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

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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