

UNITY–Air Server-xr™

Specification sheet

Covering: Three-channel and eight-channel Air Server-xr instruments for the UNITY-xr thermal desorber.

The Air Server-xr is a slimline module for automated sampling from on-line gas streams, canisters and bags, which allows a controlled flow of air or gas to be introduced directly into the focusing trap of the UNITY-xr.

UNITY-xr Thermal Desorbers are compatible with most GC and GC–MS applications and accommodate any workflows with the choice of manual or electronic control of gases: helium, nitrogen, and hydrogen (H₂ available with the Multi-Gas enabled range only).



1. System features

- **Three or eight channels** allow automatic sequencing between sample(s), zero and standard gas for unattended operation.
- **Electronic mass flow control** of sample and split flows. Set and actual sampling flows are displayed and continuously updated in the software.
- **Inert three-way switching valves** for stream selection.
- **Compatible with gas-phase samples** ranging in pressure from below atmospheric pressure to 50 psig.
- **Sample stacking:** Combine multiple samples/channels onto the focusing trap before injection into the GC column.
- **Tube desorption capability:** Single-tube desorption performed manually on the UNITY-xr, or up to 100-tube automated desorption performed with the addition of an ULTRA-xr.

2. System controls

2.1 Control software

- **Markes Instrument Control (MIC)** allows:
 - Automated, unattended sequencing of tubes, on-line and canister/bag samples.*

* Automated sequencing between tubes and on-line/canister samples also requires the ULTRA-xr to be configured.

- Addition, insertion or skipping of samples in active sequences.
- Rapid set-up of methods using pre-programmed parameters for: (a) standard methods including PAMS ozone precursors and odorous sulfur compounds; (b) conditioning methods for popular sorbent tubes and focusing traps.
- Automated, intelligent system self-checking diagnostics, including leak isolation.
- Preventative maintenance feedback with usage counter – indicates when parts could be replaced to avoid instrument downtime.
- Export of sequence history to .csv and .pdf files.
- Set-up in English, French, Japanese or Chinese languages.

2.2 Pre-desorption checks and controls

- **Selection of carrier gas type:** Three carrier gas options (helium, hydrogen (Multi-Gas models) and nitrogen) are available and user-defined in the software.
- **Electronic mass flow control** is used for all sampling and split flows, and are settable between 2–500 mL/min (helium and hydrogen) and 2–250 mL/min (nitrogen).
- **Leak test:** Leak test of the entire UNITY–Air Server-xr internal flow path run as part of an on-line sampling method.

- **Sample purge:** This ensures that individual sample lines leading up to the Air Server-xr, as well as the entire flow path inside the system, are swept with the current sample before the beginning of sample collection. The sample purge flow is all directed to the split line.
- **Sample purge flow:**
 - Range: 2–250 mL/min.
 - Adjustable in 1 mL/min increments.
- **Sample purge time:**
 - Range: 0–60.0 min.
 - Adjustable in 0.1 min increments.
- **Sample gas selection:** Air, helium, hydrogen (Multi-Gas models), or nitrogen sample gas can be selected.
- **Sample volume/time:** After the leak test (if selected) and sample purge, the flow of sample air/gas is directed to the electrically-cooled focusing trap of the UNITY-xr until the desired volume is collected, or for a defined sample time.
 - Sample volume range: 5–5000 mL, adjustable in 1 mL increments.
 - Sample time range: 0–120 min, adjustable in 0.1 min increments.
- **Sample flow:** This determines the flow rate of sample air/gas into the focusing trap for the sampling time. It is controlled by the mass flow controller and is independent of the pressure of the sample.
 - Range: 2–250 mL/min.†
 - Adjustable in 1 mL/min increments.
- **Line purge time:** The line purge directs a flow of carrier gas through the entire sample flow path, which is vented through the split line.
 - Range: 0–60.0 min.
 - Adjustable in 0.1 min increments.
- **Line purge flow:** This determines the carrier gas flow rate through the split.
 - Range: 2–500 mL/min.
- **Trap dry-purge:** The UNITY-xr focusing trap is purged with dry carrier gas after sample collection and before the trap is desorbed. The purge flow is directed through the focusing trap, in the trapping (sampling) direction, to sweep any remaining oxygen, water and/or other residual sample matrix gas from the trap to vent. This step is part of the Dry-Focus3 process.
- **Trap dry-purge time:**
 - Range: 0–60.0 min.
 - Settable in 0.1 min increments.
- **Trap dry-purge flow:**
 - Range: 2–500 mL/min.
 - Settable in 1 mL/min increments
- **Trap dry-purge temperature:**
 - Range: –30°C to 50°C.
 - Adjustable in 1°C increments.
 - Temperature limits are user-settable within the stated range.
- **Trap desorption:**
 - Default setting is ballistic heating, which reaches rates of 100°C/s during the first critical stages of secondary (trap) desorption.
 - Alternatively, programmed trap heating rates from 1°C/s to 40°C/s can be selected.
- **Cycle time (overlap):** The start of collection of another sample onto the focusing trap can overlap with analysis of the previous sample, to optimise the overall cycle time.

2.3 Automatic sequencing

- **Inlet selection:** Three or eight sample inlet options are available depending on the model chosen.
- The start of each new sample collection time can be programmed to begin:
 - as soon as the trap has re-cooled to its trapping temperature (250°C to –30°C in <5 min);
 - at a fixed time interval;
 - at an absolute time, e.g. 12:00, 13:00, 14:00.

2.4 Automatic sequencing of inlets

- A sequence of samples can be entered by the user into the sequence table on the PC user interface.

† Sampling flow rates of 250 mL/min may not be attainable under all operational conditions. A sampling pump may be required. Factors affecting the maximum sampling flow rate will include the type of focusing trap used and any sampling accessories connected to the sample inlet.

- An entire sequence can be repeated any number of times.
- Individual samples can be identified as 'calibrant', 'blank', 'sample' or as a user-defined name.
- A log file is produced as a sequence progresses and is automatically maintained and saved. Any sequence deviations are recorded in the log file.
- If any deviations occur in a sequence, the GC run is initiated to keep the analytical system 'in sync' with the desorber.
- Sequences can be stored and recalled for re-use if necessary.
- No manual change-over needed between Air Server-xr samples and ULTRA-xr tube desorption. Both sample types can be sequenced without user intervention.

3. System specification

The Air Server-xr mounts on the right-hand side of the UNITY-xr.

3.1 Dimensions and weight

Air Server-xr:

- Height: 36 cm (14.2").
- Width: 19 cm (7.5").
- Depth: 26 cm (10.2").
- Weight: 8 kg (17 lb).

UNITY–Air Server-xr:

- Height: 46 cm (18.1").
- Width: 35 cm (13.8").
- Depth: 54 cm (21.3").
- Weight: 24 kg (53 lb)

Air Server-xr Multi-Gas

- Height: 36 cm (14.2").
- Width: 27 cm (10.6").
- Depth: 26 cm (10.2").
- Weight: 13 kg (28 lb).

UNITY–Air Server-xr Multi-Gas:

- Height: 46 cm (18.1").
- Width: 43 cm (16.9").
- Depth: 54 cm (21.3").
- Weight: 29 kg (64 lb)

3.2 Recommended ambient operating conditions

- Temperature: 15°C to 30°C.
- Relative humidity: 5–95% RH (non-condensing).

3.3 Power requirements

- Powered by internal power supply of UNITY-xr. No extra power supply required.

3.4 Minimum PC specification

For TD control:

- CPU: 1 GHz 64-bit dual-core or better.
- RAM: 4 GB.
- Hard disk space: 2 GB.
- Graphics card: DirectX 9 or later.
- Display: 1024 × 768 display.
- Operating system: Windows 10 or 11, 64-bit, English.
- Other requirements: Windows-compatible keyboard and mouse; one free USB (in addition to the port required for the UNITY-xr).

3.5 Safety and regulatory certifications (for UNITY–Air Server-xr)

- The instrument is designed and manufactured under a quality system registered to ISO 9001.
- The instrument complies with the essential requirements of the following applicable European and North American Directives, and carries the CE/UKCA marks.
 - Low Voltage Directive 2014/35/EU.
 - EMC Directive 2014/30/EU.
 - ROHS Directive 2015/863/EU.

- The instrument conforms to the following product safety standards:
 - IEC 61010-1:2010/AMD1:2016.
 - IEC 61010-2-010/EN 61010-2-010:2014.
 - IEC 61010-2-081/EN 61010-2-081:2015.
 - Canada: CSA C22.2 No.61010-1:2012.
 - USA: ANSI/UL 61010-1:2012.
- The instrument conforms to the following regulation on electromagnetic compatibility (EMC):
 - IEC 61326-1/EN 61326-1:2013.

4. System options

- **Kori-xr water management option** (U-KORI-XR or U-KORI-H-XR): Uses an empty trap to remove water from humid air streams prior to analyte focusing, allowing simultaneous analysis of ultra-volatiles, polar species, oxygenates and pinenes.
- **In-line Nafion dryer** (U-ASDRY) for monitoring ultra-volatile, non-polar compounds in humid atmospheres (not suitable for polar species): Requires a pressure-regulated (~15 psig) supply of 150–200 mL/min pure dry air or nitrogen with a dew point below –50°C (as required for UNITY-xr).
- **ULTRA-xr 100-tube autosampler** (U-ULTRA-XR or U-ULTRA-H-XR): Both Air Server-xr and ULTRA-xr can be installed onto the same UNITY-xr, allowing automated re-collection of the outlet split from both tube and on-line samples.
- **Pump** (U-ASPM1/U-ASPM2/U-ASPM3 or U-ASPM1-H/U-ASPM2-H (for Multi-Gas models)): If the sample/standard gas is pressurised (>5 psig), the controlled flow through the entire system is driven by this pressure.† If the sample is at low pressure (<5 psig), a pump is required to draw the gas-phase sample through the system. The pump includes a power cord to connect to the mains supply, silicone rubber tubing and a copper tube adaptor for connection to the Air Server-xr.

Trademarks

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