

UNITY-ULTRA-xr Pro™

Specification sheet

The ULTRA-xr Pro is an autosampler module that adds to the UNITY-ULTRA-xr*, for fully automated re-collection of all split flows and extended unattended analysis of VOCs and SVOCs from up to 199 sample sorbent tubes in a single sequence.

UNITY-ULTRA-xr Pro Thermal Desorbers are compatible with most GC and GC-MS applications and accommodate tube-based 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

- **Capacity for 199 tubes** (3½" industry-standard) offers large-scale unattended operation over several days for optimum productivity.
- **Automated quantitative re-collection** of tube (inlet) and trap (outlet) desorption split flows to allow enhanced repeat analysis.
- **Sample stacking:** Multiple tube samples can be combined onto the focusing trap before injection into the GC column.
- **Internal standard** (optional): Allows gas-phase standard to be loaded onto the focusing trap or a sample tube via a 1mL loop.
- **Integrated TubeTAG read/write capability** for enhanced tracking of tube history.
- **Overlap mode** (desorption of a subsequent sample while a previous sample is still running) optimises productivity.
- **Sealing of tubes with DiffLok caps** prevents entry of contaminants and loss of volatiles before, during and after analysis.
- **Minimal linear robotic movements** required for operation, thus increasing reliability.
- **Tube cooling fan:** Rapidly cools sample tubes after desorption for increased sample throughput.

- **Versatility and throughput:** Software allows multiple sets of tubes requiring different TD methods to be linked together in a single automated sequence.

2. System controls

2.1 Control software

- Markes Instrument Control (MIC) allows:
 - Automated, unattended sequencing of tube samples.
 - Addition, insertion or skipping of samples in active sequences.
 - Rapid set-up of methods using pre-programmed parameters for: (a) standard methods including VDA 278, US EPA TO 17, US EPA 325 and PAH analysis; (b) conditioning methods for popular sorbent tubes and focusing traps.
 - Pre-loading of an internal standard on a tube or trap.
 - Preventative maintenance feedback with usage counter – indicates when parts could be replaced to avoid instrument downtime.

* The ULTRA-xr Pro is not compatible with the UNITY 2-ULTRA-xr or the UNITY 2-ULTRA.

- Integrated pressure ratio calculation for monitoring of tube packing integrity.
- Export of sequence history to .csv and .pdf file
- Set-up in English, Chinese, French and Japanese language.

2.2 Primary (tube) desorption oven

- **Temperature:**

- Range: 35°C to 425°C.
- Adjustable in 1°C increments.
- Temperature limits are user-settable within the stated range.

N.B. The tube oven heats from ambient to the selected temperature at the start of tube desorption in order to minimise risk of flash vaporisation and split discrimination when analysing samples with unknown water/solvent content.

- **Desorption time:**

- Range: 0–600.0 min.
- Settable in 0.1 min increments.

2.3 Pre-desorption checks and controls

- The pre-desorption checks and controls are as for the UNITY-xr. However, the leak test is automated so that if a tube fails the leak test it is not desorbed and replaced into the autosampler tray.
- The number of consecutive leak test failures before sequence stop is user-settable.

2.4 Automatic sequencing of tubes

- A tube sequence can be entered into the sequence table via the PC user interface.
- An entire sequence can be repeated any number of times.
- Individual tubes can be identified as 'calibrant', 'blank', 'sample' or as a user-defined name.
- A sequence history/log file is produced as a sequence progresses, and is automatically maintained and saved.
- Sequence deviations, e.g. leak test failure or missing tube, are recorded in the log file. If any occur, the GC run is initiated to keep the analytical system synchronised with the desorber.

- A tube-conditioning mode is available, allowing automated, sequential tube conditioning without risk of trap contamination.
- Automated re-collection of both tube desorption (inlet) and trap desorption (outlet) split flows for up to 99 tubes is possible using the combination of the ULTRA-xr and ULTRA-xr Pro autosamplers.
- Automated re-collection of just trap desorption (outlet) split flow for up to 99 tubes when re-collected onto clean tubes, or for up to 199 tubes when re-collected onto the original sample tubes.

2.5 Sample splitting and quantitative re-collection for repeat analysis

- The UNITY-ULTRA-xr split can be operated in the following ways:
 - During primary (tube) desorption only (inlet split).
 - During secondary (trap) desorption only (outlet split).
 - During both desorption stages, i.e. double split operation (inlet and outlet split).
 - During neither desorption stage, i.e. splitless operation.
- The split can be turned on or off during system standby.
- Split and desorb flows are controlled by needle and solenoid valves downstream of the sample flow path.
 - Optional mass flow controllers provide electronic control of split and desorb/trap flows.
- The split vent line contains a charcoal filter in front of the control valves (and MFC) to prevent contamination of the valves/MFC and laboratory atmosphere. The charcoal filter has the same external dimensions as a standard sorbent tube. The charcoal filter is connected to the main heated valve via a short, inert, heated flow path.
- When required, the charcoal filter can be replaced with a conditioned sorbent tube to quantitatively re-collect the split effluent from tube and trap desorption (inlet and outlet split). This capability allows repeat analysis, method/data validation and archiving of critical samples.
- Note: Maximum split ratios and flows may not be achievable in all configurations

3. System specification

3.1 Dimensions and weight

ULTRA-xr Pro:

- Height: 62 cm (24.4").
- Width: 24 cm (9.4").
- Depth: 55 cm (21.7").
- Weight: 23 kg (51 lb) unloaded, 28 kg (62 lb) fully loaded.

UNITY-ULTRA-xr Pro:

- Height: 62 cm (24.4").
- Width: 64 cm (25.2").
- Depth: 55 cm (21.7").
- Weight: 62 kg (137 lb) unloaded, 72 kg (159 lb) fully loaded.

3.2 Tubes accommodated

- 3½" (89 mm) long × ¼" (6.4 mm) o.d. tubes.
- Constructed of stainless steel, inert-coated stainless steel or glass.
- With or without sorbent packing.
- With or without TubeTAG RFID tags.

3.3 Ambient operating conditions

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

3.4 Power requirements

- 100–240 V, 50/60 Hz, 400 W (ULTRA-xr Pro self-adjusts to local voltage input).

3.5 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 ports required for the UNITY-ULTRA-xr).

3.6 Safety and regulatory certifications

- 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 Directives, and carries the CE mark accordingly:
 - Low Voltage Directive 2014/35/EU.
 - EMC Directive 2014/30/EU.
 - ROHS Directive 2011/65/EU
- The instrument conforms to the following product safety standards:
 - IEC 61010-1:2010/EN 61010-1:2010.
 - 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

- Standard model configured for use with helium and nitrogen carrier gas
- Multi-Gas enabled model configured for use with helium, hydrogen and nitrogen carrier gas
- **Internal standard accessory:** Contains a 1 mL loop for introducing a gas-phase internal standard onto the focusing trap or inlet end of a blank or sampled tube. Only one internal standard accessory is needed for the full ULTRA-xr Pro system.
- **Combination with UNITY-ULTRA-xr DAAMS** enables automated sequencing between 100 × DAAMS tubes (4½" × 6 mm) and 99 × industry-standard tubes (3½" × ¼").

For more information about our products and services, please visit www.markes.com.

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