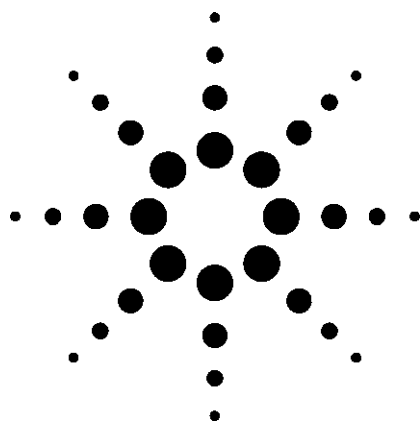# Markes International ULTRA™ Thermal Desorption Autosampler

Specifications

The UNITY(e)™ Thermal Desorber is designed to analyze single, standard sample tubes. The ULTRA autosampler connects to UNITY(e) and allows up to 100 of these standard tubes to be desorbed and analyzed sequentially.

Tubes on ULTRA™ are contained in 10 trays each holding up to 10 tubes. All tubes are capped and sealed at both ends with DiffLok™ caps. These eliminate ingress of atmospheric vapors via diffusion and prevent loss of retained volatiles while samples are waiting for analysis. DiffLok caps do not need to be removed by the instrument prior to analysis as they allow a flow of gas through the tube when pressure is applied. The added impedance of a pair of caps is below 1 psi at flow rates of 100 mL/min. The sample flow path through the cap at the sample outlet end is heated and inert coated to prevent condensation and make it completely inert.

Primary desorption of each tube takes place on the ULTRA autosampler under control of the Windows® compatible sequencing software. Tubes are moved into position inside the static desorption oven and sealed into the carrier gas stream with a minimum of simple robotic operations.

Desorbed vapors are transferred in the gas stream, through a short, inert, heated transfer line to the focusing trap of UNITY(e) for subsequent secondary desorption and analysis. UNITY(e) provides the carrier gas and takes care of any sample splitting during both primary or secondary desorption steps. For details of this part of the desorption process see the UNITY(e) specification sheet.

Standard ULTRA-UNITY(e) systems offer manual SecureTD-Q™ for recollection and repeat analysis of critical samples or for use during method development/validation. The SecureTD-Q process may be automated by the addition of a second ULTRA autosampler and a connection kit to the split side of UNITY(e). The second ULTRA automates the recollection process. A complete ULTRA-UNITY(e)-ULTRA system

for automated desorption and recollection is called AutoSecureTD.

ULTRA Features

- Tubes are sealed on the autosampler before and after analysis to prevent contamination of samples and loss of volatiles

- The DiffLok caps incorporate patented diffusion limiting technology

- Minimal linear robotic movements required for operation, thus increasing reliability

- 32-bit Windows PC control

- Automatic sequencing of tubes – several sets of tubes using different desorption methods may be entered into the sequence table via the graphical interface on the PC

ULTRA Operation

ULTRA contains its own primary desorption (tube) oven. When ULTRA is connected to UNITY(e), the original desorption oven on UNITY(e) becomes part of the heated flow path.

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ULTRA uses four simple linear motions to move each tube into the primary desorption oven in turn. Each of these movements is controlled by stepper motors.

The four movements are as follows:

- Vertical movement of the 10-tray stack

- Lateral movement of a single tray

- Vertical movement of each tube into the desorption oven

- Horizontal movement of the tube nozzle (cold end) to seal the tube into the carrier gas flow path

- No complex tube uncapping or recapping operations are required

Primary (Tube) Desorption Oven

- Temperature range 50 °C to 390 °C

- Settable in 1 °C increments

- Desorption time 0 to 999.9 min

- Settable in 0.1 min increments

Predesorption Checks and Controls

The predesorption checks and controls are as for UNITY(e). However, the leak test is automated such that if a tube fails, it is replaced in its position in the tray. The DiffLok caps maintain the integrity of the failed tube. A 'blank' GC run is then triggered (this keeps the gas, chromatography/mass spectrometry GC(/MS) sequence in synchronization with the desorber) and the system goes on to the next tube in the sequence.

The position of the tube that failed the leak test is stored in system memory and included in the run log file. At the end of a sequence, the system presents a log file for the sequence, including leak test failures. Log files may be stored indefinitely.

If three tubes fail the leak test in succession, a system error is reported and the instrument stops and waits for operator intervention.

Automatic Sequencing of Tubes

A sequence of tubes comprising several 'sets' may be entered by the user into the sequence table via the user interface on the PC. Tubes may be included in more than one set in a sequence.

A set normally comprises a series of tubes which are to be analyzed by the same desorption method. Multiple (up to 100) desorptions may be carried out on each individual tube. An entire sequence can be recycled as many of times as required.

Individual tubes may be identified as calibrant, blank, or sample.

The sequence may be viewed in the convenient 'Sequence Viewer' screen both before initializing the run and while a sequence is in progress. A comma separated values log file is produced and appended to as the sequence progresses.

Any sequence deviations are recorded to the log file. If any deviations occur in a sequence, for example leak test failure or missing tube, the GC run is initiated to keep the analytical system in synchronization with the desorber. Sequences may be stored and recalled for re-use if necessary.

Tube conditioning mode is available on ULTRA-UNITY(e) configurations allowing automated, sequential tube conditioning without risk of trap contamination.

Dimensions and Weight

- Height: 62 cm (24 in)

- Width: 24 cm (9.5 in)

- Depth: 53 cm (20.9 in)

- Weight: 23 Kg (51 lb) unloaded, 28 Kg (60 lb) fully loaded with 100 capped tubes

Environmental Conditions

- Ambient operating temperature 15 °C to 30 °C

- Ambient operating humidity 5% to 95% RH without condensation

Power Requirements

- 90 to 253 V, 47/63 Hz, 600 VA

Heat Output During Operation

- Power supply unit rated to 350 W. Max output in use is 175 W

- Input inrush current of <25 amps

Safety and Regulatory Certifications

Conforms to the following safety standards:

- UL1950

- CSA22.2 No. 950

- EN60950

- IEC60950

- CE marked for LVD

- Type Approved for IEC 61010-1

- EN61010-1

- EN60601-1

Conforms to the following regulations on Electromagnetic Compatibility (EMC) and Radio Frequency Interference (RFI)

- EN55022 Class B 1987

Designed and manufactured under a quality system registered to ISO 9001

Data System – Minimum PC Specification

As for UNITY(e), except that two serial ports are required; one for UNITY(e) and one for the ULTRA accessory. Note that a USB to serial conversion cable can be used if insufficient serial ports are available on the control PC. However, please note that Windows NT® and 95 do not support USB.

ULTRA Software

If the ULTRA is to be added to an existing UNITY(e) installation, the accessory will be shipped with a new set of Markes International Thermal Desorption Control Software. This software will replace the existing software used to operate UNITY(e) as a standalone device.

Before installing the software upgrade, any older versions of the UNITY(e) software must be completely uninstalled from the PC. Instructions for this are supplied with the software and are included in the Operator's Manual.

Combined ULTRA-UNITY(e) systems are shipped with the complete control software set on one CD. The system control software includes system configuration options, desorption methods, sequence generation, sequence logging, and system status viewing functions.

Electrical Connections

As well as the standard connections included with UNITY(e), ULTRA is shipped with its own power lead and RSC-232 PC cable.

ULTRA-UNITY(e) Accessories

- AutoSecure System: - the addition of a second ULTRA autosampler (U-ULTRA) and connection kit (U-USKIT) will fully automate the SecureTD-Q function (quantitative recollection of samples)

- ULTRA autosampler preconfigured with Internal Standard Addition/Dry Purge accessory (U-ULTIS): allows the introduction of a known volume of gas phase standard onto the sampling end of a tube before desorption. The accessory also allows a sequence of blank tubes to be loaded with gas-phase internal standard before field sampling. Furthermore, U-ULTIS can also be used to dry purge tubes in the sampling direction before analysis.

- U-INLET: Heated Direct Link accessory – for the direct introduction of headspace vapors from bulk materials. Odors/headspace vapors from diverse sample types – mold, bacterial cultures, polymer components, air fresheners, growing plants, fresh foods, insects, etc. – can therefore be purged or pumped directly into the UNITY(e) focusing trap – ideal for measuring changes in odor profile over time. U-INLET may be ordered for an ULTRA-UNITY(e) but cannot be co-installed with the ULTRA autosampler.

- U-MFC: Mass Flow Control accessory – for the electronic control of the split flow. Using the MFC accessory different split flows can be selected for each stage of operation (standby, pre-purge, tube desorb and trap desorb) and the split flow settings may be stored and recalled as part of the desorption method.

- U-AIRSV: – Air Server™ accessory for the introduction of up to three bags, canisters or online air/gas streams directly into the focusing trap of UNITY(e) (includes U-MFC) [See UNITY-Air Server/MCS06/08™ Specification Sheet]. Note that both Air Server and ULTRA may be installed onto the same UNITY(e) although only one autosampler may operate at any one time.

For More Information

For more information on our products and services, visit our Web site at www.agilent.com/chem/air

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