# Markes International
# CIA 8

## Specification Sheet February 2008

To be read in conjunction with USpec the Series 2 UNITY specification sheet

### SYSTEM SUMMARY

**UNITY 2 is a cryogen-free two-stage manual thermal desorber for tagged or untagged tubes.** It uniquely provides a universal TD platform, compatible with every TD application. It incorporates an electrically-cooled focusing trap and a patented, inert heated valve ensuring recovery of the broadest range of analytes: $C_2$ to n-$C_{40}$ hydrocarbons and reactive species such as mercaptans.

The 8-channel free-standing Canister Interface Accessory (CIA 8) connects to UNITY 2 and extends the compatible sample range to include whole-air/gas samples such canisters & Tedlar™ bags.

UNITY 2 plus CIA 8 offers a method-compliant, cryogen-free, automated system for analyzing ambient air toxics in canisters *per* US EPA Method TO-15 and other standards. It features thermostatted internal flow paths, a heated interface to (ULTRA-)UNITY 2 and internal standard addition (1 ml inert loop). The series 2 UNITY – CIA 8 system offers selection and control of sampling flow rates and times and remains compatible with TO-17-compliant analysis of sorbent tubes.

The selected sample, standard or calibrant gas channel is directed (*via* an optional in-line dryer) into the UNITY 2 cold trap at a controlled flow rate. This process is fully automated *via* software. Sampling times and flows are entered into the 'on-line' TD method. During the 'sampling phase', the UNITY 2 cold trap is electrically-cooled allowing quantitative retention of ultra-volatiles such as methyl chloride and freons. The typical upper limit of compounds sampled on-line or in canisters is n-$C_{10/12}$.

If the sample/standard gas is pressurized (>10 psi), the sampling flow is driven by this pressure. If the sample is at low (<10 psi), atmospheric or sub-atmospheric pressure, a pump (P/N U-ASPM1 (115V) or U-ASPM2 (230V)) is required to 'pull' the gas-phase sample through the flow path and focusing trap.

At the end of sampling and after a purge of carrier gas to eliminate air, the UNITY 2 focusing trap heats ballistically to transfer the compounds of interest to the analytical system and trigger the measurement cycle. Collection of the next sample can begin, if required, as soon as the cold trap has re-equilibrated at its trapping temperature.

**Key applications areas include:**

- Analysis of ambient 'air toxics' in canisters per US EPA Methods TO-14/15 and other standards.

**Benefits of (ULTRA-)UNITY CIA 8 systems:**

- Cryogen-free operation and low gas consumption for robust operation and high uptime
- Peerless chromatographic performance for optimum sensitivity
- Electronic mass flow control of sample and split flow. Set and actual sampling flows are displayed and continuously updated in the software.
- Inert 3-way switching valves offer selection between eight channels. Zero dead volumes ensure no carryover.
- Addition of internal standard to the end of the focusing trap during sampling
- Thermostatted sample flow paths eliminate risk of condensation/carryover
- Compatible with gas-phase samples ranging in pressure from just below atmospheric to 50 psi
- Systems include TO-17 compliant tube desorption capability as standard

**Pre-desorption checks & controls**

- Three **carrier gas options** – He, $H_2$, $N_2$ are available as standard and are user defined in the software
- All split and purge flows are under **electronic mass flow control** and are settable between 2 and 100 ml/min. Higher range mass flow controllers (MFCs) are available on request (*e.g.* 5 – 200 and 10-500 ml/min)

- **Leak test:** optional in on-line mode
- **Pre-purge:** This ensures that individual sample lines leading up to the CIA 8 plus the entire flow path inside the system (~0.6 ml without the optional dryer, ~2 ml with the dryer) are swept with the current sample before the beginning of sample collection. The MFC controls the pre-purge flow to that set for sampling. The pre-purge flow is all directed to the split line.
  - Ambient purge time 0 to 99.9 minutes
  - Settable in 0.1 minute increments
- **Internal sample flow path:** Thermostatted. Settable to 25-50ºC in 1ºC increments.
- **CIA 8 to UNITY 2 heated link line:** Heated to 90-100ºC. Eliminates risk of condensation.
- **Sample time:** After the leak test (if selected) and after the pre-purge, the flow of sample air/gas is directed to the electrically-cooled trap of UNITY 2 for this time period
  - Range 0 to 99.9 minutes
  - Settable in 0.1 minute increments
- **Sample flow:** This determines the flow of sample air/gas into the cold trap for the sampling time. It is controlled by the mass flow controller and is independent of the pressure of the sample
  - Range 2 to 100 ml/min. Higher ranges are available on request
- **Sample gas selection:** A choice of five common sample gas matrix types is available to the user: Air, helium, carbon dioxide, nitrogen and hydrogen
- **Trap purge time:** This relates to purging the UNITY 2 flow path and cold trap with carrier gas after sample collection and before the trap is desorbed. It is analogous to the ambient temperature purge of the tube before desorption. For the first 0.2 minutes (12 seconds) of purge time, the purge flow is all directed to the split line to prevent carryover. After the first 12 seconds, the purge flow is directed through the cold trap (in the trapping direction) to sweep any remaining $O_2$ or other residual sample matrix gas from the trap before desorption
  - Ambient purge time 0 to 99.9 minutes
  - Settable in 0.1 minute increments
- **Trap purge flow:** The same trap purge flow will be maintained whether the trap purge flow is passing to split or trap
  - Range 2 to 100 ml/min. Higher ranges are available on request
- **Cycle time:** The cycle time parameter defines the interval between the start of each sample collection time. Setting a cycle time means that the start of collection of another sample can overlap with analysis of the previous sample. System software uses the cycle time parameter to calculate when collection of a subsequent sample should begin such that the GC analysis of the previous sample will be complete and the GC system ready again, just before the cold trap is ready to desorb with the next sample.

**Automatic sequencing of whole-air/gas analyses**

- Programming a sequence: A series of analyses is programmed using the sequence table in an analogous way to a multi-tube sequence using ULTRA 2. 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
  - at a fixed time interval or
  - at an absolute time *e.g.* 12.00, 13.00, 14.00

**Automatic sequencing of inlets**

A sequence of samples (gas/air streams, canisters, bags or other whole air/gas containers) comprising several 'sets' may be entered by the user into the sequence table on the user interface on the PC. Individual samples/sample channels may be included in more than one set in a sequence.

A set normally comprises a series of samples which are to be analyzed by the same method. Multiple (up to 100) analyses may be carried out on each individual sample. An entire sequence can be recycled any number of times as required.

Individual samples may be identified as calibrant, blank, sample or by any 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 synch' with the desorber. Sequences may be stored and recalled for re-use if necessary.

## SYSTEM SPECIFICATION

### Dimensions and Weight

- Height: 28 cm (11.2 in)
- Width: 12 cm (4.8 in)
- Depth: 50 cm (2 in)
- Weight: 8 Kg (17 lb)

### Environmental Conditions

- Ambient operating temperature 0°C to 40°C
- Ambient operating humidity 30 to 90% RH non-condensing

### Power Requirements

- Powered by Lambda SWS 75 Watt power supply with IEC mains input.
- 90 to 253V, 47/63 Hz (CIA 8 self-adjusts to local voltage input *e.g.* UK 220-250V, US 110-120V)

### CIA 8 Safety and regulatory Approvals:

- EN 60950-1
- EN 61010-1
- CE marked and compliant with Low Voltage Directive (73/23/EEC) EN60950
- CIA 8 is designed and manufactured under a quality system registered to ISO 9001.

### EMC Performance

- IEC 61326:2002
- EN 61326:1997 + A1:1998 + A2:2001 + A3:2003

Designed and manufactured under a quality system registered to ISO 9001.

CIA 8 power supply (P.S.U.) conforms to the following safety approvals:

- UL60950-1
- CSA60950-1
- EN60950-1
- EN50178

### Data System – Minimum PC Specification

As per UNITY 2 except that two serial ports are required for series 2 UNITY-CIA 8 systems. Note that if insufficient serial ports are available on the control PC additional ports can most simply added using either a USB hub and USB to serial cables or a PCI card.

### CIA 8 software:

If the CIA 8 is to be attached to an existing (ULTRA-)UNITY 2 installation, it will be shipped with a new set of TD Control Software. This software should be used to replace any existing (ULTRA-)UNITY 2 control software.

### Electrical connections

As well as the standard connections included with UNITY 2, CIA 8 is shipped with its own power lead and RSC-232 PC cable.

### CIA 8 options:

- **Pump** (U-ASPMP1/2): If the sample/standard gas is pressurized (>10 psi), the controlled flow through the entire system is driven by this pressure. If the sample is at low (<10 psi), atmospheric or just below atmospheric pressure, a pump (115/230V) 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 adapter
- **In-line dryer** (U-ASDRY): (Optional item required for monitoring ultra-volatile, apolar compounds in humid atmospheres). The dryer requires a pressure regulated (~15 psi) supply of 150-200 ml/min dry air or nitrogen with a dew point below –45°C (as required for UNITY 2). Note also that appropriate fittings will be required to connect the regulated dry gas supply to the 1/8th-inch copper tubing provided
- **Series 2 ULTRA** 100-tube autosampler: Both CIA 8 and ULTRA 2 may be installed onto the same UNITY 2 although only one autosampler may operate at any one time. A connection kit will be required for this (See price list)

### For further information

For more information about our products and services please visit our web site at www.markes.com.